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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.5 of 10 December 2007

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---

Written by:       Philip Hazel
Email local part: ph10
Email domain:     cam.ac.uk

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Python was created in the early 1990s by Guido van Rossum at Stichting
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principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
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| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |

| | | | | |
|---|---|---|---|---|
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
| 2.0.1 | 2.0+1.6.1 | 2001 | PSF | yes |
| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.2 | 2.1.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
| 2.1.3 | 2.1.2 | 2002 | PSF | yes |
| 2.2.1 | 2.2 | 2002 | PSF | yes |
| 2.2.2 | 2.2.1 | 2002 | PSF | yes |
| 2.2.3 | 2.2.2 | 2003 | PSF | yes |
| 2.3 | 2.2.2 | 2002-2003 | PSF | yes |
| 2.3.1 | 2.3 | 2002-2003 | PSF | yes |
| 2.3.2 | 2.3.1 | 2002-2003 | PSF | yes |
| 2.3.3 | 2.3.2 | 2002-2003 | PSF | yes |
| 2.3.4 | 2.3.3 | 2004 | PSF | yes |
| 2.3.5 | 2.3.4 | 2005 | PSF | yes |
| 2.4 | 2.3 | 2004 | PSF | yes |
| 2.4.1 | 2.4 | 2005 | PSF | yes |
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Theodore Ts'o
23-June-2007

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Last revised by Reagle $Date: 2005-06-03 18:49:13 -0400 (Fri, 03 Jun 2005) $
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Last revised by Reagle $Date: 2005-06-03 18:49:13 -0400 (Fri, 03 Jun 2005) $

# 1.15 findutils 4.2.31

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# 1.19 valgrind 3.10.1

## 1.19.1 Available under license :

```
#! /bin/sh
#
# Script updates the copyright year in every file in Valgrind that contains
# a copyright notice.  Assumes they're all in the same format:
#
#     "Copyright (C) 20xy-2012"
#
# where x can be 0 or 1 and y can be anything.
# To use:
# - change the years in the 'perl' command below appropriately.
# - Run it from the base directory of a Valgrind workspace.
# - And check the results look ok by diff'ing against the repository.
#
# Note that it will spit out some warnings when it runs;  ignore these.
#

# The find command deliberately skips .svn/ subdirs -- we don't want to
# change them.
for i in `find . -name '*.[chS]' -o -name '*.in' -type f -not -path '*.svn\/*'` ; do
  echo $i
  if [ -L $i ]; then continue; fi  # skip symbolic links
  perl -p -e 's/Copyright \(C\) 20([0-1])([0-9])-2013/Copyright (C) 20$1$2-2014/' < $i > tmp.$$
  mv tmp.$$ $i

# Copyright IBM Corp. 2010-2011
```

```
  perl -p -e 's/Copyright IBM Corp. 20([0-1])([0-9])-2013/Copyright IBM Corp. 20$1$2-2014/'
< $i > tmp.$$
  mv tmp.$$ $i
done
```

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# 1.23 zeromq 4.0.5

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# 1.25 python 3.5.1

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC.  Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to

BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

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| Release | Derived from | Year | Owner | GPL-compatible? (1) |
|---|---|---|---|---|
| 0.9.0 thru 1.2 | | 1991-1995 | CWI | yes |
| 1.3 thru 1.5.2 | 1.2 | 1995-1999 | CNRI | yes |
| 1.6 | 1.5.2 | 2000 | CNRI | no |
| 2.0 | 1.6 | 2000 | BeOpen.com | no |
| 1.6.1 | 1.6 | 2001 | CNRI | yes (2) |
| 2.1 | 2.0+1.6.1 | 2001 | PSF | no |
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| 2.1.1 | 2.1+2.0.1 | 2001 | PSF | yes |
| 2.1.2 | 2.1.1 | 2002 | PSF | yes |
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# 1.35 binutils 2.23.52

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```
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the documentation, and info on specific files will go into an AUTHORS
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++++++++++++++++

Dean Elsner wrote the original gas for vax.  [more details?]

Jay Fenlason maintained gas for a while, adding support for

gdb-specific debug information and the 68k series machines, most of
the preprocessing pass, and extensive changes in messages.c,
input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various
enhancements and many bug fixes, including merging support for several
processors, breaking gas up to handle multiple object file format
backends (including heavy rewrite, testing, an integration of the coff
and b.out backends), adding configuration
including heavy testing and
verification of cross assemblers and file splits and renaming,
converted gas to strictly ansi C including full prototypes, added
support for m680[34]0 & cpu32, considerable work on i960 including a
coff port (including considerable amounts of reverse engineering), a
sparc opcode file rewrite, decstation, rs6000, and hp300hpux host
ports, updated "know" assertions and made them work, much other
reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of
the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan.
Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of
Buffalo University and Torbjorn Granlund of the Swedish Institute of
Computer Science.

Keith
Knowles at the Open Software Foundation wrote the original MIPS
back end (tc-mips.c, tc-mips.h), and contributed Rose format support
that hasn't been merged in yet. Ralph Campbell worked with the MIPS
code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors
(tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format
(obj-ieee), was written by Steve Chamberlain of Cygnus Solutions.
Steve also modified the COFF back end (obj-coffbfd) to use BFD for
some low-level operations, for use with the Hitachi, 29k and Zilog
targets.

John Gilmore built the AMD 29000 support, added .include support, and
simplified the configuration of which versions accept which
pseudo-ops. He updated the 68k machine description so that Motorola's

opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of Cygnus Solutions (original, incomplete implementation), Pete Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner of the Open Software Foundation (i386 mainly), and Ken Raeburn of Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon University. Additional work was done by Ken Raeburn of Cygnus Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000 series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30 (tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error checking, updating the code, and improving the 16 bit support, using patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If

you've contributed significant work and are not mentioned on this list, and
want to be, let us know.  Some of the history has been lost;
 we aren't
intentionally leaving anyone out.

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"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this
function must
be optional: if the application does not supply it, the square

root function must still compute square roots.)

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This option is useful when you wish to copy part of the code of the
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4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

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a copy of this License. If the work
during execution displays copyright notices, you must include the
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of these things:

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Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that
uses the Library", as object code and/or source code, so that the
user can modify the Library and then relink to produce a modified
executable containing the modified Library. (It is understood
that the user who changes the contents of definitions files in the
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to use the modified definitions.)

b) Accompany the
work with a written offer, valid for at
least three years, to give the same user the materials
specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy
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specified materials from the same place.

d) Verify that the user has already received a copy of these
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distributed (in either source or binary form) with the major
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which the executable runs, unless that component itself accompanies
the executable.

It may happen that this requirement contradicts the license
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accompany the operating system. Such a contradiction means you cannot
use both them and the Library together in an executable that you
distribute.

7. You may place library facilities that are a work based on the

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END OF TERMS AND CONDITIONS

Appendix: How to Apply These Terms to Your New Libraries

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To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the

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<one line to give the library's name and a brief idea of what it does.>
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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

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Version 3, 29 June 2007

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Some devices are designed to deny users access to install or run modified versions of the software inside them, although the manufacturer can do so. This is fundamentally incompatible with the aim of protecting users' freedom to change the software. The systematic pattern of such abuse occurs in the area of products for individuals to use, which is precisely where it is most unacceptable. Therefore, we have designed this version of the GPL to prohibit the practice for those products. If such problems arise substantially in other domains, we stand

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Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

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"Copyright" also means copyright-like laws that apply to other kinds of works, such as semiconductor masks.

"The Program" refers to any copyrightable work licensed under this License. Each licensee is addressed as "you". "Licensees" and "recipients" may be individuals or organizations.

To "modify" a work means to copy from or adapt all or part of the work in a fashion requiring copyright permission, other than the making of an exact copy. The resulting work is called a "modified version" of the earlier work or a work "based on" the earlier work.

A "covered work" means either the unmodified Program or a work based on the Program.

To "propagate" a work means to do anything with it that, without permission, would make you directly or secondarily liable for infringement under applicable copyright law, except executing it on a computer or modifying a private copy. Propagation includes copying, distribution (with or without modification), making available to the public, and in some countries other activities as well.

To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices"

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1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The
"System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally
available free
programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

The Corresponding Source for a work in source code form is that same work.

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You may charge any price or no price for each copy that you convey, and you may offer support or warranty protection for a fee.

5. Conveying Modified Source Versions.

You may convey a work based on the Program, or the modifications to produce it from the Program, in the form of source code under the terms of section 4, provided that you also meet all of these conditions:

a) The work must carry prominent notices stating that you modified it, and giving a relevant date.

b) The work must carry prominent notices stating that it is released under this License and any conditions added under section 7. This requirement modifies the requirement in section 4 to
"keep intact all notices".

c) You must license the entire work, as a whole, under this License to anyone who comes into possession of a copy. This License will therefore apply, along with any applicable section 7 additional terms, to the whole of the work, and all its parts, regardless of how they are packaged. This License gives no permission to license the work in any other way, but it does not invalidate such permission if you have separately received it.

d) If the work has interactive user interfaces, each must display Appropriate Legal Notices; however, if the Program has interactive interfaces that do not display Appropriate Legal Notices, your work need not make them do so.

A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution
medium, is called an
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beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

6. Conveying Non-Source Forms.

You may convey a covered work in object code form under the terms of sections 4 and 5, provided that you also convey the machine-readable Corresponding Source under the terms of this License, in one of these ways:

a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a copy of the Corresponding Source for all the software in the product that is covered by this License, on a durable physical medium customarily used for software interchange, for a price no more than your reasonable cost of physically performing this conveying of source, or (2) access to copy the Corresponding Source from a network server at no charge.

c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

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"Installation Information" for a User Product means any methods, procedures, authorization keys, or other information required to install and execute modified versions of a covered work in that User Product from a modified version of its Corresponding Source. The information must suffice to ensure that the continued functioning of the modified object code is in no case prevented or interfered with solely because modification has been made.

If you convey an object code work under this section in, or with, or specifically for use in, a User Product, and the conveying occurs as part of a transaction in which the right of possession and use of the User Product is transferred to the recipient in perpetuity or for a fixed term (regardless of how the transaction is characterized), the Corresponding Source conveyed under this section must be accompanied by the Installation Information. But this requirement does not apply if neither you nor any third party retains the ability to install modified object code on the User Product (for example, the work has been installed in ROM).

The requirement to provide Installation Information does not include a requirement to continue to provide support service, warranty, or updates for a work that has been modified or installed by the recipient, or for

the User Product in which it has been modified or installed. Access to a network may be denied when the modification itself materially and adversely affects the operation of the network or violates the rules and protocols for communication across the network.

Corresponding Source conveyed, and Installation Information provided, in accord with this section must be in a format that is publicly documented (and with an implementation available to the public in source code form), and must require no special password or key for unpacking, reading or copying.

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# 1.36 sed 4.1.5

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*/
```

```
#ifndef UV_BSD_H
#define UV_BSD_H

#define UV_PLATFORM_FS_EVENT_FIELDS                                   \
 uv__io_t event_watcher;                                              \

#define UV_IO_PRIVATE_PLATFORM_FIELDS                                 \
 int rcount;                                                          \
 int wcount;                                                          \

#define UV_HAVE_KQUEUE 1

#endif /* UV_BSD_H */
```

Files: *

========

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Files: getopt.c

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a) Accompany
the work with the complete corresponding
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# 1.42 wget 1.15

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The

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available free
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If you've contributed to gas and your name isn't listed here, it is
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the documentation, and info on specific files will go into an AUTHORS
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++++++++++++++++

Dean Elsner wrote the original gas for vax.  [more details?]

Jay Fenlason maintained gas for a while, adding support for
gdb-specific debug information and the 68k series machines, most of
the preprocessing pass, and extensive changes in messages.c,
input-file.c, write.c.

K. Richard Pixley maintained gas for a while, adding various
enhancements and many bug fixes, including merging support for several
processors, breaking gas up to handle multiple object file format
backends (including heavy rewrite, testing, an integration of the coff
and b.out backends), adding configuration
 including heavy testing and
verification of cross assemblers and file splits and renaming,

converted gas to strictly ansi C including full prototypes, added support for m680[34]0 & cpu32, considerable work on i960 including a coff port (including considerable amounts of reverse engineering), a sparc opcode file rewrite, decstation, rs6000, and hp300hpux host ports, updated "know" assertions and made them work, much other reorganization, cleanup, and lint.

Ken Raeburn wrote the high-level BFD interface code to replace most of the code in format-specific I/O modules.

The original Vax-VMS support was contributed by David L. Kashtan. Eric Youngdale and Pat Rankin have done much work with it since.

The Intel 80386 machine description was written by Eliot Dresselhaus.

Minh Tran-Le at IntelliCorp contributed some AIX 386 support.

The Motorola 88k machine description was contributed by Devon Bowen of Buffalo University and Torbjorn Granlund of the Swedish Institute of Computer Science.

Keith
Knowles at the Open Software Foundation wrote the original MIPS back end (tc-mips.c, tc-mips.h), and contributed Rose format support that hasn't been merged in yet. Ralph Campbell worked with the MIPS code to support a.out format.

Support for the Zilog Z8k and Hitachi H8/300, H8/500 and SH processors (tc-z8k, tc-h8300, tc-h8500, tc-sh), and IEEE 695 object file format (obj-ieee), was written by Steve Chamberlain of Cygnus Solutions. Steve also modified the COFF back end (obj-coffbfd) to use BFD for some low-level operations, for use with the Hitachi, 29k and Zilog targets.

John Gilmore built the AMD 29000 support, added .include support, and simplified the configuration of which versions accept which pseudo-ops. He updated the 68k machine description so that Motorola's opcodes always produced fixed-size instructions (e.g. jsr), while synthetic instructions remained shrinkable (jbsr). John fixed many bugs, including true tested cross-compilation support, and one bug in relaxation
that took a week and required the proverbial one-bit fix.

Ian Lance Taylor of Cygnus Solutions merged the Motorola and MIT syntaxes for the 68k, completed support for some COFF targets (68k, i386 SVR3, and SCO Unix), wrote the ECOFF support based on Michael Meissner's mips-tfile program, wrote the PowerPC and RS/6000 support, and made a few other minor patches. He handled the binutils releases

for versions 2.7 through 2.9.

David Edelsohn contributed fixes for the PowerPC and AIX support.

Steve Chamberlain made gas able to generate listings.

Support for the HP9000/300 was contributed by Glenn Engel of HP.

Support for ELF format files has been worked on by Mark Eichin of
Cygnus Solutions (original, incomplete implementation), Pete
Hoogenboom at the University of Utah (HPPA mainly), Michael Meissner
of the Open Software Foundation (i386 mainly), and Ken Raeburn of
Cygnus Solutions (sparc, initial 64-bit support).

Several engineers at Cygnus Solutions have also provided many
small
bug fixes and configuration enhancements.

The initial Alpha support was contributed by Carnegie-Mellon
University. Additional work was done by Ken Raeburn of Cygnus
Solutions. Richard Henderson then rewrote much of the Alpha support.

Ian Dall updated the support code for the National Semiconductor 32000
series, and added support for Mach 3 and NetBSD running on the PC532.

Klaus Kaempf ported the assembler and the binutils to openVMS/Alpha.

Steve Haworth contributed the support for the Texas Instruction c30
(tms320c30).

H.J. Lu has contributed many patches and much testing.

Alan Modra reworked much of the i386 backend, improving the error
checking, updating the code, and improving the 16 bit support, using
patches from the work of Martynas Kunigelis and H.J. Lu.

Many others have contributed large or small bugfixes and enhancements. If
you've contributed significant work and are not mentioned on this list, and
want to be, let us know. Some of the history has been lost;
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can use it too, but we
suggest you first think carefully about whether
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strategy to use in any particular case, based on the explanations below.

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code. If you link other code with the library, you must provide
complete object files to the recipients, so that they can relink them
with the library after making changes to the library and recompiling
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We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free

library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we
use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without
limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated

interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish
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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified
Library refers to a function or a
table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the

application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves,
then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License
to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which

must be
distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
linked with it, is called a "work that uses the Library". Such a
work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that uses the
library". The executable is therefore covered
by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute the object code for the work under the terms of Section 6.
Any
executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse

engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is

normally distributed (in either source or binary form) with
the major
components (compiler, kernel, and so on) of the operating system on
which the executable runs, unless that component itself accompanies
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It may happen that this requirement contradicts the license
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use both them and the Library together in an executable that you
distribute.

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the Library and of the other library facilities is otherwise
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facilities. This must be distributed
under the terms of the
Sections above.

b) Give prominent notice with the combined library of the fact
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Ty Coon, President of Vice

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[This is the first released version of the library GPL. It is
numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

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Our method of protecting your rights has two steps: (1) copyright
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Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's

complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of

this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition,
mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the
Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a

work, in isolation, is not a derivative
work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of
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# 1.49 ntp 4.2.8p6

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copyright = {
  date  = "1992-2017";
  owner = "The University of Delaware and Network Time Foundation";

```
  eaddr = "http://bugs.ntp.org, bugs@ntp.org";
  type  = ntp;
};

long-opts;
config-header  = config.h;
environrc;
no-misuse-usage;
version-proc = ntpOptionPrintVersion;

version        = `
eval VERSION=\`sed -e 's/.*,\\[//' -e 's/\\].*//' < ../sntp/m4/version.m4\`
[ -z "${VERSION}" ] && echo "Cannot determine VERSION" && kill -TERM $AG_pid
echo $VERSION`;

version-value = ''; /* Don't use -v as a shortcut for --version */

/*
* HMS: man pages already have this, and texi pages can use the
* values in sntp/include/version.texi .
*/
// doc-sub = {
//     sub-name = version;
//     sub-text = 's/#VERSION#/<<version>>/g';
// };
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">
<html>
<head>
<meta http-equiv="content-type" content="text/html;charset=iso-8859-1">
<title>Copyright Notice</title>
<!-- Changed by: Harlan Stenn, 10-Mar-2014 -->
<link href="scripts/style.css" type="text/css" rel="stylesheet">
</head>
<body>
<h3>Copyright Notice</h3>
<img src="pic/sheepb.jpg" alt="jpg" align="left"> "Clone me," says Dolly sheepishly.
<p>Last update:
 <!-- #BeginDate format:En2m -->2-Jan-2017  11:58<!-- #EndDate -->
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<br clear="left">
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46. [50]Wilfredo Snchez <wsanchez@apple.com> added support for NetInfo
47. [51]Nick Sayer <mrapple@quack.kfu.com> SunOS streams modules
48. [52]Jack Sasportas <jack@innovativeinternet.com> Saved a Lot of space on the stuff in the html/pic/ subdirectory
49. [53]Ray Schnitzler <schnitz@unipress.com> Unixware1 port
50. [54]Michael Shields <shields@tembel.org> USNO clock driver
51. [55]Jeff Steinman <jss@pebbles.jpl.nasa.gov> Datum PTS clock driver
52. [56]Harlan Stenn <harlan@pfcs.com> GNU automake/autoconfigure makeover, various other bits (see the ChangeLog)
53. [57]Kenneth Stone <ken@sdd.hp.com> HP-UX port
54. [58]Ajit Thyagarajan <ajit@ee.udel.edu>IP multicast/anycast support
55. [59]Tomoaki TSURUOKA <tsuruoka@nc.fukuoka-u.ac.jp>TRAK clock driver
56. [60]Brian Utterback <brian.utterback@oracle.com> General codebase, Solaris issues
57. [61]Loganaden Velvindron <loganaden@gmail.com> Sandboxing (libseccomp) support
58. [62]Paul A Vixie <vixie@vix.com> TrueTime GPS driver, generic TrueTime clock driver
59. [63]Ulrich Windl <Ulrich.Windl@rz.uni-regensburg.de> corrected and validated HTML documents according to the HTML DTD

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# 1.56 bridgeutils 1.2

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abstract: 'Build and install Perl modules'
author:
 - 'Ken Williams <kwilliams@cpan.org>'
 - "Development questions, bug reports, and patches should be sent to the\nModule-Build mailing list at <module-build@perl.org>."
build_requires:
 File::Temp: 0.15
 Test::Harness: 3.16
 Test::More: 0.49
generated_by: 'Module::Build version 0.3608'
license: gpl
meta-spec:
 url: http://module-build.sourceforge.net/META-spec-v1.4.html
 version: 1.4
name: Module-Build
resources:
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 repository: http://github.com/dagolden/module-build/
version: 3

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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The End
#!perl

=head1 NAME

copyright.t

=head1 DESCRIPTION

Tests that the latest copyright years in the top-level README file and the
C<perl -v> output match each other.

If the test fails, update at least one of README and perl.c so that they match
reality.

Optionally you can pass the C<--now> option to check they are at the current
year. This isn't checked by default, so that it doesn't fail for people
working on older releases. It should be run before making a new release.

=cut

use strict;
use Config;
BEGIN { require './test.pl' }

if ( $Config{usecrosscompile} ) {
 skip_all( "Not all files are available during cross-compilation" );
}

my ($opt) = @ARGV;

```
my $readme_year = readme_year();
my $v_year = v_year();

# Check that both copyright dates are up-to-date, but only if requested, so
# that tests still pass for people intentionally working on older versions:
if ($opt eq '--now')
{
 my $current_year = (gmtime)[5] + 1900;
 is $v_year, $current_year, 'perl -v copyright includes current
 year';
 is $readme_year, $current_year, 'README copyright includes current year';
}

# Otherwise simply check that the two copyright dates match each other:
else
{
 is $readme_year, $v_year, 'README and perl -v copyright dates match';
}

done_testing;


sub readme_year
# returns the latest copyright year from the top-level README file
{

 open my $readme, '<', '../README' or die "Opening README failed: $!";

 # The copyright message is the first paragraph:
 local $/ = '';
 my $copyright_msg = <$readme>;

 my ($year) = $copyright_msg =~ /.*\b(\d{4,})/s
    or die "Year not found in README copyright message '$copyright_msg'";

 $year;
}


sub v_year
# returns the latest copyright year shown in perl -v
{

 my $output = runperl switches => ['-v'];
 my ($year) = $output =~ /copyright 1987.*\b(\d{4,})/i
    or die "Copyright statement not found in perl -v output '$output'";
```

$year;
}

# 1.58 log-rotate 3.7.8

## 1.58.1 Available under license :

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This option is useful when you wish to copy part of the code of the
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1. Source Code.

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@setfilename gpl
@settitle GNU General Public License
@c man begin SEEALSO
gfdl(7), fsf-funding(7).

@c man end
@c man begin COPYRIGHT
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@c man end
@end ignore
@node Copying
@c man begin DESCRIPTION
@appendix GNU GENERAL PUBLIC LICENSE
@c The GNU General Public License.
@center Version 3, 29 June 2007

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@enumerate 0

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if you want it, that you can change the software or use pieces of it
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To protect your rights, we need to make restrictions that forbid
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These restrictions translate to certain responsibilities for you if
you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis
or for a fee, you must give the recipients all the rights that we gave
you. You must make sure that they, too, receive or can get the source
code. If you link a program with the library, you must provide
complete object files to the recipients so that they can relink them
with the library, after making changes
to the library and recompiling
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Our method of protecting your rights has two steps: (1) copyright
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The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference

between a
"work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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The "Library", below, refers to any such software library or work which has been distributed
under these terms. A "work based on the
Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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the use of the Library in a tool for
writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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it.

Thus, it is not the intent of this section to claim rights or contest
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This option is useful when you wish to copy part of the code of
the
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4. You may copy and distribute the Library (or a portion or
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must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
distribute the source code, even though third parties are not
compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the
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work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of
the object
file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under

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b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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b) Give prominent notice with the combined library of the fact
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the names:

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library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

# 1.70 rpm 4.8.0

## 1.70.1 Available under license :

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This alternative is provided to enable applications to be linked against
the RPM library (commonly called librpm) without forcing such applications
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c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making
modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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<one line to give the program's name and a brief idea of what it does.>
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# 1.71 beecrypt 7.0.0

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- Seth Arnold, for contributing to the documentation.
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- ARM Ltd, for donating a copy of "ARM Architecture Reference Manual".
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platforms.
- FSF France, for providing me with access to the GCC Compile Farm.
- SourceForge, for their excellent open source development platform.

Last but not least: thanks to everyone who provided bits of information,
reported bugs, provided feedback, or works on including BeeCrypt in any

other distros.

If I've missed anyone, it's due to oversight. Drop me a line and I'll
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/* nicstar.c  v0.22  Jawaid Bazyar (bazyar@hypermall.com)
* nicstar.c, M. Welsh (matt.welsh@cl.cam.ac.uk)
*
* Hacked October, 1997 by Jawaid Bazyar, Interlink Advertising Services Inc.
*  http://www.hypermall.com/
* 10/1/97 - commented out CFG_PHYIE bit - we don't care when the PHY
* interrupts us (except possibly for removal/insertion of the cable?)
* 10/4/97 - began heavy inline documentation of the code. Corrected typos

```
* and spelling mistakes.
* 10/5/97 - added code to handle PHY interrupts, disable PHY on
* loss of link, and correctly re-enable PHY when link is
* re-established. (put back CFG_PHYIE)
*
*   Modified to work with the IDT7721 nicstar -- AAL5 (tested) only.
*
* R. D. Rechenmacher <ron@fnal.gov>, Aug. 6, 1997
*
* Linux driver for the IDT77201 NICStAR PCI ATM controller.
* PHY component is expected to be 155 Mbps S/UNI-Lite or IDT 77155;
* see init_nicstar() for PHY initialization to change this. This driver
* expects the Linux ATM stack to support scatter-gather
 lists
* (skb->atm.iovcnt != 0) for Rx skb's passed to vcc->push.
*
* Implementing minimal-copy of received data:
*   IDT always receives data into a small buffer, then large buffers
*    as needed. This means that data must always be copied to create
*    the linear buffer needed by most non-ATM protocol stacks (e.g. IP)
*    Fix is simple: make large buffers large enough to hold entire
*    SDU, and leave <small_buffer_data> bytes empty at the start. Then
*    copy small buffer contents to head of large buffer.
*   Trick is to avoid fragmenting Linux, due to need for a lot of large
*    buffers. This is done by 2 things:
*      1) skb->destructor / skb->atm.recycle_buffer
*          combined, allow nicstar_free_rx_skb to be called to
*          recycle large data buffers
*      2) skb_clone of received buffers
*   See nicstar_free_rx_skb and linearize_buffer for implementation
*    details.
*
*
*
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*
* M. Welsh, 6 July 1996
*
*
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for his work on the initial Linux DVB driver

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for their continuing work on the DVB driver

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for his contributions to the dvb-net driver

Diego Picciani <d.picciani@novacomp.it>
for CyberLogin for Linux which allows logging onto EON
(in case you are wondering where CyberLogin is, EON changed its login
procedure and CyberLogin is no longer used.)

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for patching the cable card decoder driver

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for the nxt2004 frontend driver

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for the or51211 and or51132 frontend drivers, and
for merging the nxt2002 and nxt2004 modules into a
single nxt200x frontend driver.

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> (May be used for SSL/TLS support) Uses an Original BSD-style license
> with an announcement clause that makes it "incompatible" with GPL. You
> are not allowed to ship binaries that link with OpenSSL that includes
> GPL code (unless that specific GPL code includes an exception for
> OpenSSL - a habit that is growing more and more common). If OpenSSL's
> licensing is a problem for you, consider using GnuTLS or yassl
> instead.

GnuTLS  http://www.gnutls.org/

(May be used for SSL/TLS support) Uses the LGPL[3] license. If this is a problem for you, consider using OpenSSL instead. Also note that GnuTLS itself depends on and uses other libs (libgcrypt and libgpg-error) and they too are LGPL- or GPL-licensed.

yassl http://www.yassl.com/

(May be used for SSL/TLS support) Uses the GPL[1] license. If this is a problem for you, consider using OpenSSL or GnuTLS instead.

NSS http://www.mozilla.org/projects/security/pki/nss/

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axTLS http://axtls.sourceforge.net/

(May be used for SSL/TLS support) Uses a Modified BSD-style license.

c-ares http://daniel.haxx.se/projects/c-ares/license.html

(Used for asynchronous name resolves) Uses an MIT license that is very liberal and imposes no restrictions on any other library or part you may link with.

zlib http://www.gzip.org/zlib/zlib_license.html

(Used for compressed Transfer-Encoding support) Uses an MIT-style license that shouldn't collide with any other library.

krb4

While nothing in particular says that a Kerberos4 library must use any particular license, the one I've tried and used successfully so far (kth-krb4) is partly Original BSD-licensed with the announcement clause. Some of the code in libcurl that is written to deal with Kerberos4 is Modified BSD-licensed.

MIT Kerberos http://web.mit.edu/kerberos/www/dist/

(May be used for GSS support) MIT licensed, that shouldn't collide with any other parts.

Heimdal http://www.pdc.kth.se/heimdal/

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GNU GSS http://www.gnu.org/software/gss/

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fbopenssl

(Used for SPNEGO support) Unclear license. Based on its name, I assume that it uses the OpenSSL license and thus shares the same issues as described for OpenSSL above.

libidn http://josefsson.org/libidn/

(Used for IDNA support) Uses the GNU Lesser General Public License [3]. LGPL is a variation of GPL with slightly less aggressive "copyleft". This license requires more requirements to be met when distributing binaries, see the license for details. Also note that if you distribute a binary that includes this library, you must also include the full LGPL license text. Please properly point out what parts of the distributed package that the license addresses.

OpenLDAP http://www.openldap.org/software/release/license.html

(Used for LDAP support) Uses a Modified BSD-style license. Since libcurl uses OpenLDAP as a shared library only, I have not heard of anyone that ships OpenLDAP linked with libcurl in an app.

libssh2 http://www.libssh2.org/

(Used for scp and sftp support) libssh2 uses a Modified BSD-style license.

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# 1.83 fuse 2.8.7

## 1.83.1 Available under license :

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[This is the first released version of the library GPL. It is
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The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the

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Ty Coon, President of Vice

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- GMP is no longer used, and instead we call BN code from OpenSSL
- Zlib is now external, in a library
- The make-ssh-known-hosts script is no longer included
- TSS has been removed
- MD5 is now external, in the OpenSSL library
- RC4 support has been replaced with ARC4 support from OpenSSL
- Blowfish is now external, in the OpenSSL library

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 * @version 3.0 (December 2000)
 *
 * Optimised ANSI C code for the Rijndael cipher (now AES)
 *
 * @author Vincent Rijmen <vincent.rijmen@esat.kuleuven.ac.be>
 * @author Antoon Bosselaers <antoon.bosselaers@esat.kuleuven.ac.be>
 * @author Paulo Barreto <paulo.barreto@terra.com.br>
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 ------
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```

# 1.88 tftp-hpa 5.2

## 1.88.1 Available under license :

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```

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/MCONFIG.in
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```

* ---------------------------------------------------------------------- */

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/recvfrom.c
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/recvfrom.h
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Found
 in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/tftpd.c
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.\"
.\"------------------------------------------------------------------------ */
```

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftp/tftp.1.in
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.\"---------------------------------------------------------------------- */

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* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/tftpd.8.in
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Summary: The client for the Trivial File Transfer Protocol (TFTP).
Name: tftp
Version: 5.2
Release: 1
License: BSD
Group: Applications/Internet
Source0: http://www.kernel.org/pub/software/network/tftp/tftp-hpa-%{version}.tar.gz
BuildRequires: tcp_wrappers-devel
BuildRoot: %{_tmppath}/%{name}-root

%description
The Trivial File Transfer Protocol (TFTP) is normally used only for
booting diskless workstations.  The tftp package provides the user
interface for TFTP, which allows users to transfer files to and from a
remote machine.  This program and TFTP provide very little security,
and should not be enabled unless it is expressly needed.

%package server
Group: System Environment/Daemons
Summary: The server for the Trivial File Transfer Protocol (TFTP).

```
Requires: xinetd

%description server
The Trivial File Transfer Protocol (TFTP) is normally used only for
booting diskless workstations.  The tftp-server package provides
 the
server for TFTP, which allows users to transfer files to and from a
remote machine. TFTP provides very little security, and should not be
enabled unless it is expressly needed.  The TFTP server is run from
/etc/xinetd.d/tftp, and is disabled by default on Red Hat Linux systems.

%prep
%setup -q -n tftp-hpa-%{version}

%build

%configure
make %{?_smp_mflags}

%install
rm -rf ${RPM_BUILD_ROOT}
mkdir -p ${RPM_BUILD_ROOT}%{_bindir}
mkdir -p ${RPM_BUILD_ROOT}%{_mandir}/man{1,8}
mkdir -p ${RPM_BUILD_ROOT}%{_sbindir}

make INSTALLROOT=${RPM_BUILD_ROOT} \
   SBINDIR=%{_sbindir} MANDIR=%{_mandir} \
 install
install -m755 -d ${RPM_BUILD_ROOT}%{_sysconfdir}/xinetd.d/ ${RPM_BUILD_ROOT}/tftpboot
install -m644 tftp-xinetd ${RPM_BUILD_ROOT}%{_sysconfdir}/xinetd.d/tftp

%post server
/sbin/service xinetd reload > /dev/null 2>&1 || :

%postun server
if [ $1 = 0 ]; then
   /sbin/service xinetd reload > /dev/null 2>&1 || :
fi

%clean
rm -rf ${RPM_BUILD_ROOT}

%files
%defattr(-,root,root)
%{_bindir}/tftp
%{_mandir}/man1/*

%files
```

server
%defattr(-,root,root)
%config(noreplace) %{_sysconfdir}/xinetd.d/tftp
%dir /tftpboot
%{_sbindir}/in.tftpd
%{_mandir}/man8/*

%changelog
* Tue Sep 14 2004 H. Peter Anvin <hpa@zytor.com>
- removed completely broken "Malta" patch.
- integrated into build machinery so rpm -ta works.

* Fri Feb 13 2004 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Wed Jun 04 2003 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Fri Apr 11 2003 Elliot Lee <sopwith@redhat.com>
- 0.33
- Add /tftpboot directory (#88204)

* Mon Feb 24 2003 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Sun Feb 23 2003 Tim Powers <timp@redhat.com>
- add BuildPreReq on tcp_wrappers

* Wed Jan 22 2003 Tim Powers <timp@redhat.com>
- rebuilt

* Mon Nov 11 2002 Elliot Lee <sopwith@redhat.com> 0.32-1
- Update to 0.32

* Wed Oct 23 2002 Elliot Lee <sopwith@redhat.com> 0.30-1
- Fix #55789
- Update to 0.30

* Thu Jun 27 2002 Elliot Lee <sopwith@redhat.com>
- Try applying HJ's patch from #65476

* Fri Jun
21 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Mon Jun 17 2002 Elliot Lee <sopwith@redhat.com>
- Update to 0.29

* Thu May 23 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Wed Jan 09 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Tue Dec 18 2001 Elliot Lee <sopwith@redhat.com> 0.17-15
- Add patch4: netkit-tftp-0.17-defaultport.patch for bug #57562
- Update to tftp-hpa-0.28 (bug #56131)
- Remove include/arpa/tftp.h to fix #57259
- Add resource limits in tftp-xinetd (#56722)

* Sun Jun 24 2001 Elliot Lee <sopwith@redhat.com>
- Bump release + rebuild.

* Tue Jun 12 2001 Helge Deller <hdeller@redhat.de> (0.17-13)
- updated tftp-hpa source to tftp-hpa-0.17
- tweaked specfile with different defines for tftp-netkit and tftp-hpa version
- use hpa's tftpd.8 man page instead of the netkits one

* Mon May 07 2001 Helge Deller <hdeller@redhat.de>
- rebuilt in 7.1.x

* Wed Apr 18 2001 Helge Deller <hdeller@redhat.de>
- fix tftp client's put problems (#29529)
- update
 to tftp-hpa-0.16

* Wed Apr  4 2001 Jakub Jelinek <jakub@redhat.com>
- don't let configure to guess compiler, it can pick up egcs

* Thu Feb 08 2001 Helge Deller <hdeller@redhat.de>
- changed "wait" in xinetd file to "yes" (hpa-tftpd forks and exits) (#26467)
- fixed hpa-tftpd to handle files greater than 32MB (#23725)
- added "-l" flag to hpa-tftpd for file-logging (#26467)
- added description for "-l" to the man-page

* Thu Feb 08 2001 Helge Deller <hdeller@redhat.de>
- updated tftp client to 0.17 stable (#19640),
- drop dependency on xinetd for tftp client (#25051),

* Wed Jan 17 2001 Jeff Johnson <jbj@redhat.com>
- xinetd shouldn't wait on tftp (which forks) (#23923).

* Sat Jan  6 2001 Jeff Johnson <jbj@redhat.com>
- fix to permit tftp put's (#18128).
- startup as root with chroot to /tftpboot with early reversion to nobody
 is preferable to starting as nobody w/o ability to chroot.

- %%post is needed by server, not client. Add %%postun for erasure as well.

* Wed Aug 23 2000
Nalin Dahyabhai <nalin@redhat.com>
- default to being disabled

* Thu Aug 17 2000 Jeff Johnson <jbj@redhat.com>
- correct group.

* Tue Jul 25 2000 Nalin Dahyabhai <nalin@redhat.com>
- change user from root to nobody

* Sat Jul 22 2000 Jeff Johnson <jbj@redhat.com>
- update to tftp-hpa-0.14 (#14003).
- add server_args (#14003).
- remove -D_BSD_SOURCE (#14003).

* Fri Jul 21 2000 Nalin Dahyabhai <nalin@redhat.com>
- cook up an xinetd config file for tftpd

* Wed Jul 12 2000 Prospector <bugzilla@redhat.com>
- automatic rebuild

* Sun Jun 18 2000 Jeff Johnson <jbj@redhat.com>
- FHS packaging.
- update to 0.17.

* Fri May  5 2000 Matt Wilson <msw@redhat.com>
- use _BSD_SOURCE for hpa's tftpd so we get BSD signal semantics.

* Fri Feb 11 2000 Bill Nottingham <notting@redhat.com>
- fix description

* Wed Feb  9 2000 Jeff Johnson <jbj@redhat.com>
- compress man pages (again).

* Wed Feb 02 2000 Cristian Gafton <gafton@redhat.com>
- man pages are compressed
- fix description and summary

* Tue
Jan  4 2000 Bill Nottingham <notting@redhat.com>
- split client and server

* Tue Dec 21 1999 Jeff Johnson <jbj@redhat.com>
- update to 0.16.

* Sat Aug 28 1999 Jeff Johnson <jbj@redhat.com>

- update to 0.15.

* Wed Apr  7 1999 Jeff Johnson <jbj@redhat.com>
- tftpd should truncate file when overwriting (#412)

* Sun Mar 21 1999 Cristian Gafton <gafton@redhat.com>
- auto rebuild in the new build environment (release 22)

* Mon Mar 15 1999 Jeff Johnson <jbj@redhat.com>
- compile for 6.0.

* Fri Aug  7 1998 Jeff Johnson <jbj@redhat.com>
- build root

* Mon Apr 27 1998 Prospector System <bugs@redhat.com>
- translations modified for de, fr, tr

* Mon Sep 22 1997 Erik Troan <ewt@redhat.com>
- added check for getpwnam() failure

* Tue Jul 15 1997 Erik Troan <ewt@redhat.com>
- initial build

Found in path(s):
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*
* ------------------------------------------------------------------------ */

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/config.h
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Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftp/extern.h
*
 /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/common/tftpsubs.h
No license file was found, but licenses were detected in source scan.

Summary: The client for the Trivial File Transfer Protocol (TFTP).
Name: tftp
Version: @@VERSION@@
Release: 1
License: BSD
Group: Applications/Internet
Source0: http://www.kernel.org/pub/software/network/tftp/tftp-hpa-%{version}.tar.gz
BuildRequires: tcp_wrappers-devel
BuildRoot: %{_tmppath}/%{name}-root

%description
The Trivial File Transfer Protocol (TFTP) is normally used only for
booting diskless workstations.  The tftp package provides the user
interface for TFTP, which allows users to transfer files to and from a
remote machine.  This program and TFTP provide very little security,

```
and should not be enabled unless it is expressly needed.

%package server
Group: System Environment/Daemons
Summary: The server for the Trivial File Transfer Protocol (TFTP).
Requires: xinetd

%description server
The Trivial File Transfer Protocol (TFTP) is normally used only for
booting diskless workstations.  The tftp-server package
 provides the
server for TFTP, which allows users to transfer files to and from a
remote machine. TFTP provides very little security, and should not be
enabled unless it is expressly needed.  The TFTP server is run from
/etc/xinetd.d/tftp, and is disabled by default on Red Hat Linux systems.

%prep
%setup -q -n tftp-hpa-%{version}

%build

%configure
make %{?_smp_mflags}

%install
rm -rf ${RPM_BUILD_ROOT}
mkdir -p ${RPM_BUILD_ROOT}%{_bindir}
mkdir -p ${RPM_BUILD_ROOT}%{_mandir}/man{1,8}
mkdir -p ${RPM_BUILD_ROOT}%{_sbindir}

make INSTALLROOT=${RPM_BUILD_ROOT} \
   SBINDIR=%{_sbindir} MANDIR=%{_mandir} \
 install
install -m755 -d ${RPM_BUILD_ROOT}%{_sysconfdir}/xinetd.d/ ${RPM_BUILD_ROOT}/tftpboot
install -m644 tftp-xinetd ${RPM_BUILD_ROOT}%{_sysconfdir}/xinetd.d/tftp

%post server
/sbin/service xinetd reload > /dev/null 2>&1 || :

%postun server
if [ $1 = 0 ]; then
   /sbin/service xinetd reload > /dev/null 2>&1 || :
fi

%clean
rm -rf ${RPM_BUILD_ROOT}

%files
```

```
%defattr(-,root,root)
%{_bindir}/tftp
%{_mandir}/man1/*

%files
 server
%defattr(-,root,root)
%config(noreplace) %{_sysconfdir}/xinetd.d/tftp
%dir /tftpboot
%{_sbindir}/in.tftpd
%{_mandir}/man8/*

%changelog
* Tue Sep 14 2004 H. Peter Anvin <hpa@zytor.com>
- removed completely broken "Malta" patch.
- integrated into build machinery so rpm -ta works.

* Fri Feb 13 2004 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Wed Jun 04 2003 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Fri Apr 11 2003 Elliot Lee <sopwith@redhat.com>
- 0.33
- Add /tftpboot directory (#88204)

* Mon Feb 24 2003 Elliot Lee <sopwith@redhat.com>
- rebuilt

* Sun Feb 23 2003 Tim Powers <timp@redhat.com>
- add BuildPreReq on tcp_wrappers

* Wed Jan 22 2003 Tim Powers <timp@redhat.com>
- rebuilt

* Mon Nov 11 2002 Elliot Lee <sopwith@redhat.com> 0.32-1
- Update to 0.32

* Wed Oct 23 2002 Elliot Lee <sopwith@redhat.com> 0.30-1
- Fix #55789
- Update to 0.30

* Thu Jun 27 2002 Elliot Lee <sopwith@redhat.com>
- Try applying HJ's patch from #65476

*
```

Fri Jun 21 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Mon Jun 17 2002 Elliot Lee <sopwith@redhat.com>
- Update to 0.29

* Thu May 23 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Wed Jan 09 2002 Tim Powers <timp@redhat.com>
- automated rebuild

* Tue Dec 18 2001 Elliot Lee <sopwith@redhat.com> 0.17-15
- Add patch4: netkit-tftp-0.17-defaultport.patch for bug #57562
- Update to tftp-hpa-0.28 (bug #56131)
- Remove include/arpa/tftp.h to fix #57259
- Add resource limits in tftp-xinetd (#56722)

* Sun Jun 24 2001 Elliot Lee <sopwith@redhat.com>
- Bump release + rebuild.

* Tue Jun 12 2001 Helge Deller <hdeller@redhat.de> (0.17-13)
- updated tftp-hpa source to tftp-hpa-0.17
- tweaked specfile with different defines for tftp-netkit and tftp-hpa version
- use hpa's tftpd.8 man page instead of the netkits one

* Mon May 07 2001 Helge Deller <hdeller@redhat.de>
- rebuilt in 7.1.x

* Wed Apr 18 2001 Helge Deller <hdeller@redhat.de>
- fix tftp client's put problems (#29529)
-
update to tftp-hpa-0.16

* Wed Apr  4 2001 Jakub Jelinek <jakub@redhat.com>
- don't let configure to guess compiler, it can pick up egcs

* Thu Feb 08 2001 Helge Deller <hdeller@redhat.de>
- changed "wait" in xinetd file to "yes" (hpa-tftpd forks and exits) (#26467)
- fixed hpa-tftpd to handle files greater than 32MB (#23725)
- added "-l" flag to hpa-tftpd for file-logging (#26467)
- added description for "-l" to the man-page

* Thu Feb 08 2001 Helge Deller <hdeller@redhat.de>
- updated tftp client to 0.17 stable (#19640),
- drop dependency on xinetd for tftp client (#25051),

* Wed Jan 17 2001 Jeff Johnson <jbj@redhat.com>

- xinetd shouldn't wait on tftp (which forks) (#23923).

* Sat Jan  6 2001 Jeff Johnson <jbj@redhat.com>
- fix to permit tftp put's (#18128).
- startup as root with chroot to /tftpboot with early reversion to nobody
 is preferable to starting as nobody w/o ability to chroot.
- %%post is needed by server, not client. Add %%postun for erasure as well.

* Wed Aug
 23 2000 Nalin Dahyabhai <nalin@redhat.com>
- default to being disabled

* Thu Aug 17 2000 Jeff Johnson <jbj@redhat.com>
- correct group.

* Tue Jul 25 2000 Nalin Dahyabhai <nalin@redhat.com>
- change user from root to nobody

* Sat Jul 22 2000 Jeff Johnson <jbj@redhat.com>
- update to tftp-hpa-0.14 (#14003).
- add server_args (#14003).
- remove -D_BSD_SOURCE (#14003).

* Fri Jul 21 2000 Nalin Dahyabhai <nalin@redhat.com>
- cook up an xinetd config file for tftpd

* Wed Jul 12 2000 Prospector <bugzilla@redhat.com>
- automatic rebuild

* Sun Jun 18 2000 Jeff Johnson <jbj@redhat.com>
- FHS packaging.
- update to 0.17.

* Fri May  5 2000 Matt Wilson <msw@redhat.com>
- use _BSD_SOURCE for hpa's tftpd so we get BSD signal semantics.

* Fri Feb 11 2000 Bill Nottingham <notting@redhat.com>
- fix description

* Wed Feb  9 2000 Jeff Johnson <jbj@redhat.com>
- compress man pages (again).

* Wed Feb 02 2000 Cristian Gafton <gafton@redhat.com>
- man pages are compressed
- fix description and summary

*

Tue Jan  4 2000 Bill Nottingham <notting@redhat.com>
- split client and server

* Tue Dec 21 1999 Jeff Johnson <jbj@redhat.com>
- update to 0.16.

* Sat Aug 28 1999 Jeff Johnson <jbj@redhat.com>
- update to 0.15.

* Wed Apr  7 1999 Jeff Johnson <jbj@redhat.com>
- tftpd should truncate file when overwriting (#412)

* Sun Mar 21 1999 Cristian Gafton <gafton@redhat.com>
- auto rebuild in the new build environment (release 22)

* Mon Mar 15 1999 Jeff Johnson <jbj@redhat.com>
- compile for 6.0.

* Fri Aug  7 1998 Jeff Johnson <jbj@redhat.com>
- build root

* Mon Apr 27 1998 Prospector System <bugs@redhat.com>
- translations modified for de, fr, tr

* Mon Sep 22 1997 Erik Troan <ewt@redhat.com>
- added check for getpwnam() failure

* Tue Jul 15 1997 Erik Troan <ewt@redhat.com>
- initial build

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftp.spec.in
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*
* ---------------------------------------------------------------------- */

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/tftpd.h
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*/

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftp/main.c
*
 /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftp/tftp.c
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/common/tftpsubs.c
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```

*
* ---------------------------------------------------------------------- */

Found in path(s):
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/remap.c
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/misc.c
* /opt/cola/permits/1127995194_1611893805.73/0/tftp-hpa-5-2-tar-bz2/tftp-hpa-5.2/tftpd/remap.h

# 1.89 psmisc 22.6

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```

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# 1.90 ganymed-ssh2 262

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```
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#
# dmalloc_summarize -- summarizes dmalloc log files
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# $Id: dmalloc_summarize.pl,v 1.1.1.1 2012/09/18
```

09:28:11 mohammr1 Exp $
#
/*
*
* Copyright (c) 1994, Textil Computer Design GmbH, Dresden
*
* Author: J"org Wunsch
*
* Dumb atexit() implementation. It is far from being elegant. It is
* only here to provide a workaround for systems where the existing
* atexit() implementation is known to cause problems due to doing
* own mallocs. The problem arose originally on a Data General
* machine running DG/UX 5.4R*, along with gcc compiling C++ code.
* In order to have global and static variables called their const-
* ructors, a chunk of code has been placed by the compiler that
* ran before invoking main(). This code registered the desctructors
* with atexit() at this very early stage, but the existing atexit()
* bypassed the normal memory allocation scheme, and hence caused
* grievous troubles in combination with the dmalloc library.
*
* Known problem for DG/UX: the crt0.o (at least in a COFF environ-
* ment) passes the return value from main() to _real_exit() instead
* of exit().
Hence programs which return from main instead of calling
* exit() do not work as expected. I do not see any good workaround
* for this so far (since crt0.o always happens to reference the
* _real_exit() from the library, even if we would provide our very
* own symbol for it).
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[This is the first released version of the library GPL. It is
numbered 2 because it goes with version 2 of the ordinary GPL.]

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Because of this blurred distinction, using the ordinary General
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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the

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# 1.103 grpc-go 1.4.0

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   ====================

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# 1.106 tdb 1.41.9

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trivial database library

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# 1.116 gnutls 2.10.5

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@smallexample
@var{one line to give the program's name and a brief idea of what it does.}
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@var{program} Copyright (C) @var{year} @var{name of author}
This program comes with ABSOLUTELY NO WARRANTY;
 for details type @samp{show w}.
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under certain conditions; type @samp{show c} for details.
@end smallexample

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# 1.117 grub2 2

## 1.117.1 Available under license :

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[Will this become part of a larger GNU package?  If so, what package?]

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative
of the original library. The ordinary
General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the @dfn{Lesser} General Public License because it does @emph{Less} to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many

libraries. However, the Lesser license provides advantages in certain special circumstances.

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@enumerate a
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table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application.  Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)
@end enumerate

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Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library.  The

threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

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if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

@item
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@enumerate a
@item
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@item
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library already present on the user's computer system, rather than
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and (2) will operate
properly with a modified version of the library, if the user installs
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@item
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@item
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@item
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@end enumerate

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@enumerate a
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That's all there is to it!

Description:
Concatenate two arbitrary file names.

Files:
lib/filenamecat.h
lib/filenamecat-lgpl.c
m4/filenamecat.m4

Depends-on:
dirname-lgpl

configure.ac:
gl_FILE_NAME_CONCAT_LGPL

Makefile.am:
lib_SOURCES += filenamecat-lgpl.c

Include:
"filenamecat.h"

License:
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the "copyright" line and a pointer to where
the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>

This program is free software: you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation, either version 3 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
GNU General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program. If not, see <https://www.gnu.org/licenses/>.

Also add information on how to contact you by electronic and paper mail.

If the program does terminal interaction, make it output a short
notice like this when it starts in an interactive mode:

<program> Copyright (C) <year> <name of author>
This program comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the appropriate
parts of the General Public License. Of course, your program's commands

might be different; for a GUI interface, you would use an "about box".

You should also get your employer (if you work as a programmer) or school,
if any, to sign a "copyright disclaimer" for the program, if necessary.
For more information on this, and how to apply and follow the GNU GPL, see
<https://www.gnu.org/licenses/>.

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into proprietary programs. If your program is a subroutine library, you
may consider it more useful to permit linking proprietary applications with
the library. If this is what you want
to do, use the GNU Lesser General
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<https://www.gnu.org/licenses/why-not-lgpl.html>.
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Except as contained in this notice, the name of a copyright holder shall not be used in advertising or otherwise to promote the sale, use or other dealings in these Data Files or Software without prior written authorization of the copyright holder.
Description:
Provide the GNU Free Documentation License in Texinfo format.

Files:
doc/fdl.texi

Depends-on:

configure.ac:

Makefile.am:

Include:

License:
unmodifiable license text

Maintainer:
all
Legal Issues about Contributing Code to GNU last updated 14 July 2015

Project GNU has to be careful to obey copyright laws, even though
these laws are wrong when they stop people from sharing generally
useful published information such as software, because we are in the
public eye.  We also use copyright to defend users' freedom, by means
of copyleft (though this does not excuse copyright law for helping
to make software proprietary).

This means that if you want to contribute software to GNU, you have to
do something to give us legal permission to use it.  There are three
ways this can be done:

* Assign the copyright to the Free Software Foundation.
This allows the FSF to act to stop violations of the GPL.

* Keep the copyright and release the program yourself under the GNU
GPL.  (This alternative is too impractical for contributions to a
preexisting FSF-copyrighted GNU program.)

* Put the code in the public domain.  Then there is nothing to stop
hoarding of modified versions, but we
 can still use the program in GNU.

Most of these alternatives require a signed piece of paper, or in some
cases a digital signature, to make it happen.

* Assigning copyright.

Assigning the copyright means signing a contract that makes the Free
Software Foundation the "owner" of the program according to the law.
As the copyright holder, the Foundation can sue anyone who tries to
distribute the program as a proprietary product.  We are willing to
keep your name on the program as the author for as long as the program
remains recognizably distinct.  ("Owner" is in quotes to show that we
don't really believe in this kind of ownership.)

The assignment contract commits the foundation to setting distribution terms that permit free redistribution.

Often we don't want to do the work of starting to distribute a program right away. There are many things which we will need in order to have a complete system but which aren't really useful until the rest of the system is done. But signing the
assignment does not stop you from
distributing the program yourself--as long as you do so under the GNU terms. You don't have to wait for us to start distributing. You can start distributing as soon as you attach our standard copyleft to the files. (Ask for our advice on how to do this.)

The assignment contract we normally use has a clause that permits you to use your code in proprietary programs, on 30 days' notice. (The 30 days' notice is there because, through a legal technicality, it would improve our position in a suit against a hoarder.) Although we believe that proprietary software is wrong, we include this clause because it would serve no purpose to ask you to promise not to do it. You're giving us a gift in the first place.

You don't need to invoke this clause in order to distribute copies as free software under the GNU GPL, since everyone is allowed to do that.

* Releasing it yourself.

You can release a program yourself under copyleft distribution terms such as the
GNU GPL. (In order to accept the program as GNU software, we would have to be happy with your choice of terms.) This does not require a contract between you and the FSF, but we would appreciate having a signed piece of paper to confirm your decision.

If someone violates your terms--for example, if someone gets a copy from us, and uses it as a basis for a proprietary product in violation of the terms--we cannot sue him. You would have to sue, or he gets away with it.

* Public domain.

If you put the program in the public domain, we prefer to have a signed piece of paper--a disclaimer of rights--from you confirming this. If the program is not very important, we can do without one; the worst that could happen is that we might some day be forced to stop using it.

The law says that anyone can copyright a modified version of the public domain work. (This doesn't restrict the original, which remains in the

public domain; only the changes are copyrighted.) If we make extensive changes,
we will probably do this and add our usual copyleft. If we make small changes, we will leave the version we distribute in the public domain.

* What about your employer?

If you are employed to do programming, or have made an agreement with your employer that says it owns programs you write, we need a signed piece of paper from your employer disclaiming rights to the program. It should be signed by a vice president or general manager of the company. If you can't get at them, it is almost as good to find someone who signs licenses for software that is purchased. Here is a sample wording:

Digital Simulation Corporation hereby disclaims all copyright interest in the program "sample.el" (a program to direct assemblers to make passes at compilers under GNU Emacs) written by Hugh Hacker.

<signature of Mo Ghoul>, 1 April 1987
Mo Ghoul, President of Vice, Digital Simulation Corp.

The description of what the program does is just to make it clearer what the disclaimer covers.

If
what you did was change an existing program, it should say this:

...in the changes and enhancements made by Hugh Hacker to the program "sample.el".

* Did anyone else contribute?

If someone else contributed more than a few lines here or there to the program, then that person too is an author, and that person too needs to sign papers just as you do. So may that person's employer. However, if his contribution is just a fraction of the whole work, it is satisfactory if he disclaims his own rights, even if you are assigning yours. (If just the minor contributors' work goes in the public domain, that doesn't leave much of a loophole for hoarders.)

If you incorporated packages which you found floating around as "public domain", we might still want to track down their authors, to get disclaimers to reassure us that they really are in the public domain. So keep track of what these packages are and who wrote them.

* A reminder:

In working on a project for GNU, DO NOT study and
follow any Unix
sources or other non-free software that might have any bearing on the
project. Don't refer to them at all, unless you are forced to for
non-GNU reasons.

It is not considered a serious problem if you have read Unix sources
or other non-free source code in the past for other purposes, provided
you don't copy anything in particular from them. However, referring
to them while you do the work could cause us legal problems later.
Please email the following information to assign@gnu.org, and we
will send you the assignment form for your past and future changes.

Please use your full legal name (in ASCII characters) as the subject
line of the message.
---
REQUEST: SEND FORM FOR PAST AND FUTURE CHANGES

[What is the name of the program or package you're contributing to?]

[Did you copy any files or text written by someone else in these changes?
Even if that material is free software, we need to know about it.]

[Do you have an employer who might have a basis to claim to own
your changes? Do you attend a school which might make such a claim?]

[For the copyright registration, what country are you a citizen of?]

[What year were you born?]

[Please write your email address here.]

[Please write your postal address here.]

[Which files have you changed so far, and which new files have you written
so far?]
Description:
Ensure getcwd(NULL, 0) returns a buffer allocated by the malloc() function.

Files:
lib/getcwd-lgpl.c
m4/getcwd.m4

Depends-on:
unistd
strdup          [test $REPLACE_GETCWD = 1]

configure.ac:
gl_FUNC_GETCWD_LGPL
if test $REPLACE_GETCWD = 1; then
 AC_LIBOBJ([getcwd-lgpl])
fi
gl_UNISTD_MODULE_INDICATOR([getcwd])

Makefile.am:

Include:
<unistd.h>

License:
LGPLv2+

Maintainer:
Eric Blake
The files in this directory describe the gnulib modules.
The following copyright notice applies to each of these
description files.

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This file is free software; the Free Software Foundation
gives unlimited permission to copy and/or distribute it,
with or without modifications, as long as this notice is preserved.
Please email the following information to assign@gnu.org, and we will
send you the assignment form that covers the changes you have already
written.  That form will cover subsequent corrections to those
changes, but it will not cover other unrelated future changes to the
same program.

Please use your full legal name (in ASCII characters) as the subject line of the message.
---
REQUEST:  SEND FORM FOR CHANGES ALREADY MADE

[What is the name of the program or package you're contributing to?]

[Did you copy any files or text written by someone else in these changes?

Even if that material is free software, we need to know about it.]

[Do you have an employer who might have a basis to claim to own
your changes?  Do you attend a school which might make such a claim?]

[For the copyright registration, what country are you a citizen of?]

[What year were you born?]

[Please write your email address here.]

[Please write your
 postal address here.]

[Which files have you changed so far, and which new files have you written
so far?]
Please email the following information to assign@gnu.org, and we will
send you the disclaimer form for your changes.  This form is preferred
when your changes are small, they do not add any nontrivial new
files, and you are finished making them (aside perhaps from small bug
fixes).

If you would like to make further contributions to the same package,
and you would like to avoid the need to sign more papers when you
contribute them, you have another option: to sign a copyright
assignment covering your future changes.  If that is what you want to
do, please tell the maintainer you would prefer to sign an assignment
of past and future changes.

Please use your full legal name (in ASCII characters) as the subject
line of the message.
---
REQUEST: SEND DISCLAIMER FORM

[What is the name of the program or package you're contributing to?]

[Did you copy any files or text written by someone else in these changes?

Even if that
material is free software, we need to know about it.]

[Do you have an employer who might have a basis to claim to own
your changes?]

[Please write your email address here.]

[Please write your snail address here.]

[Please list the files involved, or give a brief description of the changes
being disclaimed.]
Description:
Extract specific portions of filenames.

Files:
lib/dirname.h
lib/dirname-lgpl.c
lib/basename-lgpl.c
lib/stripslash.c
m4/dirname.m4

Depends-on:
dosname
double-slash-root
malloc-posix
stdbool

configure.ac:
gl_DIRNAME_LGPL

Makefile.am:
lib_SOURCES += dirname-lgpl.c basename-lgpl.c stripslash.c

Include:
"dirname.h"

License:
LGPLv2+

Maintainer:

Jim Meyering, Eric Blake
Description:
realpath, canonicalize_file_name: Provide canonical absolute file name

Files:
lib/canonicalize-lgpl.c
m4/canonicalize.m4
m4/double-slash-root.m4

Depends-on:
extensions
stdlib
nocrash
alloca-opt [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
errno [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
lstat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
malloca [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
memmove [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
pathmax [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
readlink [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]
sys_stat [test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1]

configure.ac:
gl_CANONICALIZE_LGPL
if
 test $HAVE_CANONICALIZE_FILE_NAME = 0 || test $REPLACE_CANONICALIZE_FILE_NAME = 1; then
 AC_LIBOBJ([canonicalize-lgpl])
fi
gl_MODULE_INDICATOR([canonicalize-lgpl])
gl_STDLIB_MODULE_INDICATOR([canonicalize_file_name])
gl_STDLIB_MODULE_INDICATOR([realpath])

Makefile.am:

Include:
<stdlib.h>

License:
LGPLv2+

Maintainer:
all
Files:
tests/test-update-copyright.sh

Depends-on:

configure.ac:
abs_aux_dir=`cd "$ac_aux_dir"; pwd`
AC_SUBST([abs_aux_dir])

Makefile.am:
TESTS += test-update-copyright.sh
TESTS_ENVIRONMENT += abs_aux_dir='$(abs_aux_dir)'
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Version 3, 29 June 2007

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other than an Application or a Combined Work as defined below.

An "Application" is any work that makes use of an interface provided
by the Library, but which is not otherwise based on the Library.
Defining a subclass of a class defined by
the Library is deemed a mode
of using an interface provided by the Library.

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Application with the Library. The particular version of the Library
with which the Combined Work was made is also called the "Linked
Version".

The "Minimal Corresponding Source" for a Combined Work means the
Corresponding Source for the Combined Work, excluding any source code

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You may convey a covered work under sections 3 and 4 of this License without being bound by section 3 of the GNU GPL.

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If you modify a copy of the Library, and, in your modifications, a facility refers to a function or data to be supplied by an Application that uses the facility (other than as an argument passed when the facility is invoked), then you may convey a copy of the modified version:

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c) For a Combined Work that displays copyright notices during execution, include the copyright notice for the Library among these notices, as well as a reference directing the user to the copies of the GNU GPL and this license document.

d) Do one of the following:

0) Convey the Minimal Corresponding Source under the terms of this License, and the Corresponding Application Code in a form suitable for, and under terms that permit, the user to recombine or relink the Application with a modified version of the Linked Version to produce a modified Combined Work, in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.

1) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (a) uses at run time a copy of the Library already present on the user's computer system, and (b) will operate properly with a modified version of the Library that is interface-compatible with the Linked Version.

e) Provide Installation Information, but only if you would otherwise be required to provide such information under section 6 of the GNU GPL, and only to the extent that such information is necessary to install and execute a modified version of the Combined Work produced by recombining or relinking the Application with a modified version of the Linked Version. (If you use option 4d0, the Installation Information must accompany the Minimal Corresponding Source and Corresponding Application Code. If you use option 4d1, you must provide the Installation Information in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.)

5. Combined Libraries.

You may place library facilities that are a work based on the
Library side by side in a single library together with other library
facilities that are not Applications and are not covered by this
License, and convey such a combined
library under terms of your
choice, if you do both of the following:

a) Accompany the combined library with a copy of the same work based
on the Library, uncombined with any other library facilities,
conveyed under the terms of this License.

b) Give prominent notice with the combined library that part of it
is a work based on the Library, and explaining where to find the
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Many modules are provided dual-license, either GPL or LGPL at your
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state GPL for convenience, since the bulk of current gnulib users are

GPL'd programs.  But the files in the modules directory (e.g.,
modules/error) state the true license of each file, and when you use
'gnulib-tool --lgpl --import <modules>', gnulib-tool either rewrites
the files to have an LGPL header as part of copying them from gnulib
to your project directory, or fails because the modules you requested
were not licensed under LGPL.

Some of the source files in lib/ have different licenses.  Also, the
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@center Version 2, June 1991

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Program (independent of having been
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@enumerate a
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stating
 that you changed the files and the date of any change.

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announcement including an appropriate copyright notice and a
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a warranty) and that users may redistribute the program under
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does not normally print such an announcement, your work based on
the Program is not required to print an announcement.)
@end enumerate

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@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

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@var{one line to give the program's name
and a brief idea of what it does.}
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@end smallexample

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when it starts in an interactive mode:

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This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

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necessary. Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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consider it more useful to permit linking proprietary applications with the
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Public License instead of this License.
Files:
tests/test-canonicalize-lgpl.c
tests/signature.h
tests/null-ptr.h
tests/macros.h

Depends-on:
ignore-value
same-inode
symlink

configure.ac:

Makefile.am:
TESTS += test-canonicalize-lgpl
check_PROGRAMS += test-canonicalize-lgpl
Description:
Help make libraries relocatable, that is, to allow them to function
properly when copied to an arbitrary directory.

Files:
doc/relocatable.texi
lib/relocatable.h
lib/relocatable.c
lib/relocatable.valgrind
m4/relocatable-lib.m4

Depends-on:
strdup

configure.ac:
gl_RELOCATABLE_LIBRARY
if test $RELOCATABLE = yes; then
 AC_LIBOBJ([relocatable])
fi

Makefile.am:
DEFS += -DNO_XMALLOC

Include:
"relocatable.h"

License:
LGPLv2+

Maintainer:
Ben Pfaff

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Version 2.1, February 1999

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Files:
tests/test-getcwd-lgpl.c
tests/signature.h

tests/macros.h

Depends-on:

configure.ac:

Makefile.am:
TESTS += test-getcwd-lgpl
check_PROGRAMS += test-getcwd-lgpl
test_getcwd_lgpl_LDADD = $(LDADD) $(LIBINTL)
Description:
Locating a program in PATH (LGPLed version).

Files:
lib/findprog.h
lib/findprog.c
lib/findprog-lgpl.c
m4/findprog.m4
m4/eaccess.m4

Depends-on:
stdbool
strdup
concat-filename
unistd

configure.ac:
gl_FINDPROG
gl_MODULE_INDICATOR([findprog-lgpl])

Makefile.am:
lib_SOURCES += findprog.h findprog.c

Include:
"findprog.h"

License:
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Maintainer:
all

# 1.118 iproute 2.6.32

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

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If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.
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operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

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# 1.123 libconfig 1.4.6

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Mark Lindner - Lead developer & maintainer.
Daniel Marjamdki - Enhancements & bugfixes.
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@c
@c %**start of header

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# 1.124 libgcrypt 1.4.0

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convey the exclusion of warranty; and each file should have at least
the "copyright" line and a pointer to where the full notice is found.

  <one line to give the program's name and a brief idea of what it does.>
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when it starts in an interactive mode:

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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it with the complete corresponding
machine-readable source code, which
must be distributed under the terms of Sections 1 and 2 above on a
medium customarily used for software interchange.

If distribution of object code is made by offering access to copy
from a designated place, then offering equivalent access to copy the
source code from the same place satisfies the requirement to
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5. A program that contains no derivative of any portion of the
Library, but is designed to work with the Library by being compiled or
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work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a "work that
uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the
object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

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a) Accompany
the work with the complete corresponding
machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate
properly with a modified version of the library, if
the user installs one, as long as the modified version is

interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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Specification RFC2695:  Authentication Mechanisms for ONC RPC

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 /opt/cola/permits/1312824191_1652762165.6295753/0/netkit-tftp-develop-zip/netkit-tftp-develop/tftp_subs.cpp
* /opt/cola/permits/1312824191_1652762165.6295753/0/netkit-tftp-develop-zip/netkit-tftp-develop/tftp/main.c
* /opt/cola/permits/1312824191_1652762165.6295753/0/netkit-tftp-develop-zip/netkit-tftp-develop/tftpd/tftpd.c
* /opt/cola/permits/1312824191_1652762165.6295753/0/netkit-tftp-develop-zip/netkit-tftp-develop/tftp/tftpsubs.c
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*	@(#)tftp.h	8.1 (Berkeley) 6/2/93
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# 1.131 parted 1.8.6

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# 1.137 autogen 1.2

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Metadata-Version: 1.1
Name: argparse-autogen
Version: 1.2
Summary: Parser with automatic creation of parsers and subparsers for paths.
Home-page: https://github.com/sashgorokhov/argparse-autogen
Author: sashgorokhov
Author-email: sashgorokhov@gmail.com
License: MIT License
Download-URL: https://github.com/sashgorokhov/argparse-autogen/archive/v1.2.zip
Description: argparse-autogen
==========

|PyPI version| |GitHub release| |Build Status| |codecov| |GitHub license|

Parser with automatic creation of parsers and subparsers for paths.

Installation
---

Supported versions of python: **``3.3+``** (because of
inspect.Signature, which was introduced in python 3.3)

.. code:: shell

    pip install argparse-autogen

Usage
-----

``argparse_autogen.EndpointParser``
is intended to replace basic
``argparse.ArgumentParser``. It extends subparsers creation logic, and
adds a new special method ``add_endpoint``.

Simple example:

.. code:: python

    import argparse_autogen

    class MyCli():
      def do_stuff(self, target, force=False):
        """
        This does cool stuff!

        :param str target: Target to execute a cool stuff
        :param bool force: Force doing cool stuff
        """
        print(target, force)

    cli = MyCli()

    parser = argparse_autogen.EndpointParser()
    parser.add_endpoint('do_stuff', cli.do_stuff)
    parser.parse_and_call(['do_stuff', 'my target']) # this will print "my target false"
    parser.parse_and_call(['do_stuff', '--force', 'my target']) # this will print "my target true"

``add_endpoint`` method is clever enough to parse methods docstring and
add corresponding helps in arguments. For example,
``parser.parse_args(['do_stuff', '--help'])`` in above example will show
something like

::

    usage: example.py do_stuff [-h] [--force]

    This does cool stuff!

```
optional arguments:
  -h, --help  show this help message and exit
  --force     Force doing cool stuff
```

This magic is done by ``argparse_autogen.autospec`` function. It introspects function signature, and adds corresponding argparse arguments to parser. ``*args`` aguments in function are not supported - this parameter will be skipped. ``**kwargs`` are supported and can be passed as ``[key=value [key=value ...]]``. You can override argument settings by passing ``argument_overrides`` option to ``add_endpoint``.

This must be a ``dict[str, dict]`` where keys are parameter name, and values are parameters to override defaults passed to ``parser.add_argument``

More endpoint examples

---

Nested class and complex paths:

.. code:: python

```
import argparse_autogen

class MyCli():
  def __init__(self):
    self.users = self.Users()
    self.groups = self.Groups()

  class Users():
    def get(self, user_id): pass
    def list(self, **filter): pass
    def update(self, user_id, **fields): pass

  class Groups():
    def get(self, group_id): pass

cli = MyCli()

parser = argparse_autogen.EndpointParser()

parser.add_endpoint('users.get', cli.users.get, argument_overrides={'user_id':
{'help': 'Users id'}})
parser.add_endpoint('users.list', cli.users.list)
parser.add_endpoint(cli.users.update)
# this will use __qualname__ of update func as path, lowercased and trailing and ending underscores
removed.
```

```
    # The first item of qualname is skipped, so it would be `users.update`, not `mycli.users.update`

    groups_get_parser = parser.add_endpoint('groups get', cli.groups.get, autospec=False)
    groups_get_parser.add_argument('group_id', help='Group id')

    users_parser = parser.get_endpoint_parser('users')
    users_parser.description = 'Users operations'

    parser.parse_and_call()
```

History
-------

1.2 (2017-03-01)
~~~~~~~~~~~~~~~~

- Ability to automatically generate path from func's qualname

1.1 (2017-02-28)
~~~~~~~~~~~~~~~~

- Filter args from
func signature in call method #1

1.0 (2017-02-26)
~~~~~~~~~~~~~~~~

- First release

0.1 (2017-02-25)
~~~~~~~~~~~~~~~~

- Initial commit

.. |PyPI version| image:: https://badge.fury.io/py/argparse-autogen.svg
  :target: https://badge.fury.io/py/argparse-autogen
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 :target: https://raw.githubusercontent.com/sashgorokhov/argparse-autogen/master/LICENSE

Keywords: python,argparse,generate
Platform: UNKNOWN

Found in path(s):
* /opt/cola/permits/1328610500_1652761164.793856/0/argparse-autogen-1-2-tar-gz/argparse-autogen-1.2/PKG-INFO
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```
from distutils.core import setup

with open('README.md') as readme:
  with open('HISTORY.md') as history:
    long_description = readme.read() + '\n\n' + history.read()

try:
  import pypandoc

  long_description = pypandoc.convert(long_description, 'rst', 'markdown')
except(IOError, ImportError):
  long_description = long_description

VERSION = '1.2'

setup(
  name='argparse-autogen',
  py_modules=['argparse_autogen'],
  version=VERSION,
  url='https://github.com/sashgorokhov/argparse-autogen',
  download_url='https://github.com/sashgorokhov/argparse-autogen/archive/v%s.zip' % VERSION,
  keywords=['python', 'argparse', 'generate'],
  classifiers=[],
  long_description=long_description,
  license='MIT License',
  author='sashgorokhov',
  author_email='sashgorokhov@gmail.com',
  description="Parser with automatic creation of parsers and subparsers for paths.",
)
```

Found in path(s):
*
/opt/cola/permits/1328610500_1652761164.793856/0/argparse-autogen-1-2-tar-gz/argparse-autogen-1.2/setup.py

# 1.138 sqlite 3.3.17

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```
/*
* This code implements the MD5 message-digest algorithm.
```

```
* The algorithm is due to Ron Rivest.  This code was
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*
* Equivalent code is available from RSA Data Security, Inc.
* This code has been tested against that, and is equivalent,
* except that you don't need to include two pages of legalese
* with every copy.
*
* To compute the message digest of a chunk of bytes, declare an
* MD5Context structure, pass it to MD5Init, call MD5Update as
* needed on buffers full of bytes, and then call MD5Final, which
* will fill a supplied 16-byte array with the digest.
*/
```

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/src/test_md5.c
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puts {
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   </li>
</ul>

If you feel like you really have to purchase a license for SQLite,
<a href="http://www.hwaci.com/">Hwaci</a>, the company that employs
the architect and principal developers of SQLite, will sell you
one.
Please contact:

<blockquote>
D. Richard Hipp <br />
Hwaci - Applied Software Research <br />
704.948.4565 <br />
<a
 href="mailto:drh@hwaci.com">drh@hwaci.com</a>
</blockquote>

<h2>Contributed Code</h2>

In order to keep SQLite completely free and unencumbered by copyright,
all new contributors to the SQLite code base are asked to dedicate
their contributions to the public domain.
If you want to send a patch or enhancement for possible inclusion in the
SQLite source tree, please accompany the patch with the following statement:

<blockquote>
The author or authors of this code dedicate any and all copyright interest
in this code to the public domain.  We make this dedication for the benefit
of the public at large and to the detriment of our heirs and successors.
We intend this dedication to be an overt act of relinquishment in
perpetuity of all present and future rights this code under copyright law.
</blockquote>

We are not able to accept patches or changes to
SQLite that are not accompanied by a statement such as the above.
In addition, if you make
changes or enhancements as an
 employee, then a simple statement such as the
above is insufficient.  You must also send by surface mail a copyright release
signed by a company officer.
A signed original of the copyright release should be mailed to:

<blockquote>
Hwaci<br>
6200 Maple Cove Lane<br>
Charlotte, NC 28269<br>
USA
</blockquote>

A template copyright release is available
in <a href="copyright-release.pdf">PDF</a> or

<a href="copyright-release.html">HTML</a>.
You can use this release to make future changes.

}
footer $rcsid

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/copyright.tcl
No license file was found, but licenses were detected in source scan.

<a href="copyright.html">public domain</a>.  No claim of ownership is made

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/faq.tcl
No license file was found, but licenses were detected in source scan.

/opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/art/SQLite.eps: binary file matches

Found in path(s):
* /bin/grep
No license file was found, but licenses were detected in source scan.

set rcsid {$Id: support.tcl,v 1.6 2005/12/05 22:22:40 drh Exp $}
source common.tcl
header {SQLite Support Options}
puts {
<h2>SQLite Support Options</h2>


<h3>Mailing List</h3>

A mailing list has been set up for asking questions and
for open discussion of problems
and issues by the SQLite user community.
To subscribe to the mailing list, send an email to
<a href="mailto:sqlite-users-subscribe@sqlite.org">
sqlite-users-subscribe@sqlite.org</a>.
If you would prefer to get digests rather than individual
emails, send a message to to
<a href="mailto:sqlite-users-digest-subscribe@sqlite.org">
sqlite-users-digest-subscribe@sqlite.org</a>.
For additional information about operating and using this
mailing list, send a message to
<a href="mailto:sqlite-users-help@sqlite.org">
sqlite-users-help@sqlite.org</a> and instructions will be
sent by to you by return email.

There are multiple archives of the mailing list:

<blockquote>
<a
 href="http://www.mail-archive.com/sqlite-users%40sqlite.org/">
http://www.mail-archive.com/sqlite-users%40sqlite.org</a><br>
<a href="http://marc.10east.com/?l=sqlite-users&r=1&w=2">
http://marc.10east.com/?l=sqlite-users&r=1&w=2</a><br>
<a href="http://news.gmane.org/gmane.comp.db.sqlite.general">
http://news.gmane.org/gmane.comp.db.sqlite.general</a>
</blockquote>

<a name="directemail">
<h3>Direct E-Mail To The Author</h3>

Use the mailing list.
Please do not send email directly to the author of SQLite
unless:
<ul>
<li>You have or intend to acquire a professional support contract
as described below, or</li>
<li>You are working on an open source project.</li>
</ul>
You are welcomed to use SQLite in closed source, proprietary, and/or
commerical projects and to ask questions about such use on the public
mailing list.  But please do not ask to receive free direct technical
support.  The software is free; direct technical support is not.

<h3>Professional
 Support</h3>

If you would like professional support for SQLite
or if you want custom modifications to SQLite performed by the
original author, these services are available for a modest fee.
For additional information visit
<a href="http://www.hwaci.com/sw/sqlite/prosupport.html">
http://www.hwaci.com/sw/sqlite/prosupport.html</a> or contact:

<blockquote>

D. Richard Hipp <br />
Hwaci - Applied Software Research <br />
704.948.4565 <br />
<a href="mailto:drh@hwaci.com">drh@hwaci.com</a>
</blockquote>

}
footer $rcsid

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/support.tcl
No license file was found, but licenses were detected in source scan.

SQLite is in the public domain.  This document describes what that means

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/docs.tcl
No license file was found, but licenses were detected in source scan.

```
# 2006 October 1
#
# The author disclaims copyright to this source code.  In place of
# a legal notice, here is a blessing:
#
#    May you do good and not evil.
#    May you find forgiveness for yourself and forgive others.
#    May you share freely, never taking more than you give.
#
#***********************************************************************
# This file implements regression tests for SQLite library.  The
# focus of this script is testing the FTS1 module, and in particular
# the Porter stemmer.
#
# $Id: fts1porter.test,v 1.5 2006/10/03 19:37:37 drh Exp $
#

set testdir [file dirname $argv0]
source $testdir/tester.tcl

# If SQLITE_ENABLE_FTS1 is defined, omit this file.
ifcapable !fts1 {
 finish_test
 return
}

# Test data for the Porter stemmer.  The first word of each line
# is the input.  The second word is the desired output.
#
```

```
# This test data is taken from http://www.tartarus.org/martin/PorterStemmer/
#
 There is no claim of copyright made on that page, but you should
# probably contact the author (Martin Porter - the inventor of the
# Porter Stemmer algorithm) if you want to use this test data in a
# commerical product of some kind.  The stemmer code in FTS1 is a
# complete rewrite from scratch based on the algorithm specification
# and does not contain any code under copyright.
#
set porter_test_data {
  a                 a
  aaron             aaron
  abaissiez         abaissiez
  abandon           abandon
  abandoned         abandon
  abase             abas
  abash             abash
  abate             abat
  abated            abat
  abatement         abat
  abatements        abat
  abates            abat
  abbess            abbess
  abbey             abbei
  abbeys            abbei
  abbominable       abbomin
  abbot             abbot
  abbots            abbot
  abbreviated
   abbrevi
  abed              ab
  abel              abel
  aberga            aberga
  abergavenny       abergavenni
  abet              abet
  abetting          abet
  abhominable       abhomin
  abhor             abhor
  abhorr            abhorr
  abhorred          abhor
  abhorring         abhor
  abhors            abhor
  abhorson          abhorson
  abide             abid
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| abroach | abroach |
| abroad | abroad |
| abrogate | abrog |
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| absolutely | absolut |
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additions addit
addle addl
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addrest addrest
adds add
adhere adher
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adjoining adjoin
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aggravate aggrav
aggrief aggrief
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alps alp
already alreadi
also also
alt alt
altar altar
altars
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alter alter
alteration alter
altered alter
alters alter
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although although
altitude altitud
altogether altogeth
alton alton
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| ancient | ancient |
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| anew | anew |
| ang | ang |
| angel | angel |
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| angle | angl |
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| anglish | anglish |
| angrily | angrili |
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| anguish | anguish |
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| animal | anim |
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| animis | animi |
| anjou | anjou |
| ankle | ankl |
| anna | anna |
| annals | annal |
| anne | ann |
| annex | annex |
| annexed | annex |
| annexions | annexion |
| annexment | annex |
| annothanize | annothan |
| announces | announc |
| annoy | annoi |
| annoyance | annoy |
| annoying | annoi |
| annual | annual |
| anoint | anoint |
| anointed | anoint |
| anon | anon |
| another | anoth |
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| answer | answer |
| answerable | answer |
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| answerest | answerest |
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| ant | ant |
| ante | ant |
| antenor | antenor |
| antenorides | antenorid |
| anteroom | anteroom |
| anthem | anthem |
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antipathy antipathi
antipholus antipholu
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antiquary antiquari
antique antiqu
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antium antium
antoniad antoniad
antonio antonio
antonius antoniu
antony antoni
antres antr
anvil anvil
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appellant appel
appellants appel
appelons appelon
appendix appendix
apperil apperil
appertain appertain
appertaining appertain
appertainings appertain
appertains appertain
appertinent appertin
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appetite appetit
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applaud applaud
applauded applaud
applauding applaud
applause applaus
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appliance applianc
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|---|---|
| april | april |
| apron | apron |
| aprons | apron |
| apt | apt |
| apter | apter |
| aptest | aptest |
| aptly | aptli |
| aptness | apt |
| aqua | aqua |
| aquilon | aquilon |
| aquitaine | aquitain |
| arabia | arabia |
| arabian | arabian |
| araise | arais |
| arbitrate | arbitr |
| arbitrating | arbitr |
| arbitrator | arbitr |
| arbitrement | arbitr |
| arbors | arbor |
| arbour | arbour |
| arc | arc |
| arch | arch |
| archbishop | archbishop |
| archbishopric | archbishopr |
| archdeacon | archdeacon |
| arched | arch |
| archelaus | archelau |
| archer | archer |
| archers | archer |
| archery | archeri |
| archibald | archibald |
| archidamus | archidamu |
| architect | architect |
| arcu | arcu |
| arde | ard |
| arden | arden |
| ardent | ardent |
| ardour | ardour |
| are | ar |
| argal | argal |
| argier | argier |
| argo | argo |
| argosies | argosi |
| argosy | argosi |
| argu | argu |
| argue | argu |
| argued | argu |

argues argu
arguing argu
argument argument
arguments argument
argus argu
ariachne ariachn
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ariel ariel
aries ari
aright aright
arinado arinado
arinies arini
arion arion
arise aris
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ariseth ariseth
arising aris
aristode aristod
aristotle aristotl
arithmetic arithmet
arithmetician arithmetician
ark ark
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armado armado
armadoes armado
armagnac armagnac
arme arm
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armipotent armipot
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arrant arrant
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artificial artifici
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artists artist
artless artless
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ascend ascend

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| ascended | ascend |
| ascendeth | ascendeth |
| ascends | ascend |
| ascension | ascens |
| ascent | ascent |
| ascribe | ascrib |
| ascribes | ascrib |
| ash | ash |
| asham | asham |
| ashamed | asham |
| asher | asher |
| ashes | ash |
| ashford | ashford |
| ashore | ashor |
| ashouting | ashout |
| ashy | ashi |
| asia | asia |
| aside | asid |
| ask | ask |
| askance | askanc |
| asked | ask |
| asker | asker |
| asketh | asketh |
| asking | ask |
| asks | ask |
| aslant | aslant |
| asleep | asleep |
| asmath | asmath |
| asp | asp |
| aspect | aspect |
| aspects | aspect |
| aspen | aspen |
| aspersion | aspers |
| aspic | aspic |
| aspicious | aspici |
| aspics | aspic |
| aspir | aspir |
| aspiration | aspir |
| aspire | aspir |
| aspiring | aspir |
| asquint | asquint |
| ass | ass |
| assail | assail |
| assailable | assail |
| assailant | assail |
| assailants | assail |
| assailed | assail |
| assaileth | assaileth |

assailing assail
assails assail
assassination assassin
assault assault
assaulted assault
assaults assault
assay assai
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astonish astonish
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astraea astraea
astray astrai
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athol athol
athversary athversari
athwart athwart
atlas atla
atomies atomi
atomy atomi
atone aton
atonement aton
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atropos atropo
attach attach
attached attach
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attain attain
attainder attaind
attains attain
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attempt attempt
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attributed attribut
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audacious audaci
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auger auger
aught aught
augment augment
augmentation augment

augmented augment
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augurer augur
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auld auld
aumerle aumerl
aunchient aunchient
aunt aunt
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auricular
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aurora aurora
auspicious auspici
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austere auster
austerely auster
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austerity auster
austria austria
aut aut
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author author
authorities author
authority author
authorized author
authorizing author
authors author
autolycus autolycu
autre autr
autumn autumn
auvergne auvergn
avail avail
avails avail
avarice avaric
avaricious avarici
avaunt avaunt
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aveng aveng
avenge aveng
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avez avez
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avoids avoid
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avouched avouch
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avouchment avouch
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awaits await
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awakened awaken
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awakes awak
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award award
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awasy awasi
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aweary aweari
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awful aw
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awl awl
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ay ay
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ayez ayez
ayli ayli
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azure azur
b b
ba ba
baa baa
babbl babbl
babble babbl
babbling babbl
babe babe
babes babe
babies babi
baboon baboon
baboons baboon
baby babi
babylon babylon
bacare bacar
bacchanals bacchan
bacchus bacchu
bach bach
bachelor bachelor
bachelors bachelor
back back
backbite backbit
backbitten backbitten
backing back
backs back
backward backward
backwardly backwardli
backwards backward
bacon bacon
bacons bacon
bad bad
bade bade
badge badg
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badly badli
badness bad
baes bae
baffl baffl
baffle baffl
baffled baffl
bag bag
baggage baggag
bagot bagot
bagpipe bagpip
bags bag
bail bail
bailiff bailiff

baillez baillez
baily baili
baisant baisant
baisees baise
baiser baiser
bait bait
baited bait
baiting bait
baitings bait
baits bait
bajazet bajazet
bak bak
bake bake
baked bake
baker baker
bakers baker
bakes bake
baking bake
bal bal
balanc balanc
balance balanc
balcony balconi
bald bald
baldrick baldrick
bale bale
baleful bale
balk balk
ball ball
ballad ballad
ballads ballad
ballast ballast
ballasting ballast
ballet ballet
ballow ballow
balls ball
balm
balm
balms balm
balmy balmi
balsam balsam
balsamum balsamum
balth balth
balthasar balthasar
balthazar balthazar
bames bame
ban ban
banbury banburi
band band

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|---|---|
| bandied | bandi |
| banding | band |
| bandit | bandit |
| banditti | banditti |
| banditto | banditto |
| bands | band |
| bandy | bandi |
| bandying | bandi |
| bane | bane |
| banes | bane |
| bang | bang |
| bangor | bangor |
| banish | banish |
| banished | banish |
| banishers | banish |
| banishment | banish |
| banister | banist |
| bank | bank |
| bankrout | bankrout |
| bankrupt | bankrupt |
| bankrupts | bankrupt |
| banks | bank |
| banner | banner |
| bannerets | banneret |
| banners | banner |
| banning | ban |
| banns | bann |
| banquet | banquet |
| banqueted | banquet |
| banqueting | banquet |
| banquets | banquet |
| banquo | banquo |
| bans | ban |
| baptism | baptism |
| baptista | baptista |
| baptiz | baptiz |
| bar | bar |
| barbarian | barbarian |
| barbarians | barbarian |
| barbarism | barbar |
| barbarous | barbar |
| barbary | barbari |
| barbason | barbason |
| barbed | barb |
| barber | barber |
| barbermonger | barbermong |
| bard | bard |
| bardolph | bardolph |

bards bard
bare bare
bared bare
barefac barefac
barefaced barefac
barefoot barefoot
bareheaded barehead
barely bare
bareness bare
barful bar
bargain bargain
bargains bargain
barge barg
bargulus bargulu
baring bare
bark bark
barking bark
barkloughly barkloughli
barks bark
barky barki
barley barlei
barm barm
barn barn
barnacles barnacl
barnardine barnardin
barne barn
barnes barn
barnet barnet
barns barn
baron baron
barons baron
barony baroni
barr barr
barrabas barraba
barrel
barrel
barrels barrel
barren barren
barrenly barrenli
barrenness barren
barricado barricado
barricadoes barricado
barrow barrow
bars bar
barson barson
barter barter
bartholomew bartholomew
bas ba

basan basan
base base
baseless baseless
basely base
baseness base
baser baser
bases base
basest basest
bashful bash
bashfulness bash
basilisco basilisco
basilisk basilisk
basilisks basilisk
basimecu basimecu
basin basin
basingstoke basingstok
basins basin
basis basi
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basket basket
baskets basket
bass bass
bassanio bassanio
basset basset
bassianus bassianu
basta basta
bastard bastard
bastardizing bastard
bastardly bastardli
bastards bastard
bastardy bastardi
basted bast
bastes bast
bastinado bastinado
basting bast
bat bat
batailles batail
batch batch
bate bate
bated bate
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bath bath
bathe bath
bathed bath
bathing bath
baths bath
bating bate

batler batler
bats bat
batt batt
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battalions battalion
batten batten
batter batter
battering batter
batters batter
battery batteri
battle battl
battled battl
battlefield battlefield
battlements battlement
battles battl
batty batti
bauble baubl
baubles baubl
baubling baubl
baulk baulk
bavin bavin
bawcock bawcock
bawd bawd
bawdry bawdri
bawds bawd
bawdy bawdi
bawl bawl
bawling bawl
bay bai
baying bai
baynard baynard
bayonne bayonn
bays bai
be be
beach beach
beached
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beachy beachi
beacon beacon
bead bead
beaded bead
beadle beadl
beadles beadl
beads bead
beadsmen beadsmen
beagle beagl
beagles beagl

beak beak
beaks beak
beam beam
beamed beam
beams beam
bean bean
beans bean
bear bear
beard beard
bearded beard
beardless beardless
beards beard
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bearers bearer
bearest bearest
beareth beareth
bearing bear
bears bear
beast beast
beastliest beastliest
beastliness beastli
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beasts beast
beat beat
beated beat
beaten beaten
beating beat
beatrice beatric
beats beat
beau beau
beaufort beaufort
beaumond beaumond
beaumont beaumont
beauteous beauteou
beautied beauti
beauties beauti
beautified beautifi
beautiful beauti
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beauty beauti
beaver beaver
beavers beaver
became becam
because becaus
bechanc bechanc
bechance bechanc
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beck beck
beckon beckon
beckons beckon
becks beck
becom becom
become
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becomed becom
becomes becom
becoming becom
becomings becom
bed bed
bedabbled bedabbl
bedash bedash
bedaub bedaub
bedazzled bedazzl
bedchamber bedchamb
bedclothes bedcloth
bedded bed
bedeck bedeck
bedecking bedeck
bedew bedew
bedfellow bedfellow
bedfellows bedfellow
bedford bedford
bedlam bedlam
bedrench bedrench
bedrid bedrid
beds bed
bedtime bedtim
bedward bedward
bee bee
beef beef
beefs beef
beehives beehiv
been been
beer beer
bees bee
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beetle beetl
beetles beetl
beeves beev
befall befal
befallen befallen
befalls befal
befell befel
befits befit

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|---|---|
| befitted | befit |
| befitting | befit |
| befor | befor |
| before | befor |
| beforehand | beforehand |
| befortune | befortun |
| befriend | befriend |
| befriended | befriend |
| befriends | befriend |
| beg | beg |
| began | began |
| beget | beget |
| begets | beget |
| begetting | beget |
| begg | begg |
| beggar | beggar |
| beggared | beggar |
| beggarly | beggarli |
| beggarman | beggarman |
| beggars | beggar |
| beggary | beggari |
| begging | beg |
| begin | |
| begin | |
| beginners | beginn |
| beginning | begin |
| beginnings | begin |
| begins | begin |
| begnawn | begnawn |
| begone | begon |
| begot | begot |
| begotten | begotten |
| begrimed | begrim |
| begs | beg |
| beguil | beguil |
| beguile | beguil |
| beguiled | beguil |
| beguiles | beguil |
| beguiling | beguil |
| begun | begun |
| behalf | behalf |
| behalfs | behalf |
| behav | behav |
| behaved | behav |
| behavedst | behavedst |
| behavior | behavior |
| behaviors | behavior |
| behaviour | behaviour |

behaviours behaviour
behead behead
beheaded behead
beheld beheld
behest behest
behests behest
behind behind
behold behold
beholder behold
beholders behold
beholdest beholdest
beholding behold
beholds behold
behoof behoof
behooffull behoofful
behooves behoov
behove behov
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behowls behowl
being be
bel bel
belarius belariu
belch belch
belching belch
beldam beldam
beldame beldam
beldams beldam
belee bele
belgia belgia
belie beli
belied beli
belief belief
beliest beliest
believ believ
believe believ
believed believ
believes believ
believest believest
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belike belik
bell bell
bellario bellario
belle bell
bellied belli
bellies belli
bellman bellman
bellona bellona

bellow bellow
bellowed bellow
bellowing bellow
bellows bellow
bells bell
belly belli
bellyful belly
belman belman
belmont belmont
belock belock
belong belong
belonging belong
belongings belong
belongs belong
belov belov
beloved belov
beloving belov
below below
belt belt
belzebub belzebub
bemadding bemad
bemet bemet
bemete bemet
bemoan bemoan
bemoaned bemoan
bemock bemock
bemoil bemoil
bemonster bemonst
ben ben
bench bench
bencher bencher
benches bench
bend bend
bended bend
bending bend
bends bend
bene bene
beneath beneath
benedicite benedicit
benedick benedick
benediction benedict
benedictus benedictu
benefactors benefactor
benefice benefic
beneficial benefici
benefit benefit
benefited benefit
benefits benefit

benetted benet
benevolence benevol
benevolences benevol
benied beni
benison benison
bennet bennet
bent bent
bentii bentii
bentivolii bentivolii
bents bent
benumbed benumb
benvolio benvolio
bepaint bepaint
bepray beprai
bequeath bequeath
bequeathed bequeath
bequeathing bequeath
bequest bequest
ber ber
berard berard
berattle berattl
beray berai
bere bere
bereave bereav
bereaved bereav
bereaves bereav
bereft bereft
bergamo bergamo
bergomask bergomask
berhym berhym
berhyme berhym
berkeley berkelei
bermoothes bermooth
bernardo bernardo
berod berod
berowne berown
berri
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berries berri
berrord berrord
berry berri
bertram bertram
berwick berwick
bescreen bescreen
beseech beseech
beseeched beseech
beseechers beseech
beseeching beseech

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|---|---|
| beseek | beseek |
| beseem | beseem |
| beseemeth | beseemeth |
| beseeming | beseem |
| beseems | beseem |
| beset | beset |
| beshrew | beshrew |
| beside | besid |
| besides | besid |
| besieg | besieg |
| besiege | besieg |
| besieged | besieg |
| beslubber | beslubb |
| besmear | besmear |
| besmeared | besmear |
| besmirch | besmirch |
| besom | besom |
| besort | besort |
| besotted | besot |
| bespake | bespak |
| bespeak | |
| bespeak | |
| bespice | bespic |
| bespoke | bespok |
| bespotted | bespot |
| bess | bess |
| bessy | bessi |
| best | best |
| bestained | bestain |
| bested | best |
| bestial | bestial |
| bestir | bestir |
| bestirr | bestirr |
| bestow | bestow |
| bestowed | bestow |
| bestowing | bestow |
| bestows | bestow |
| bestraught | bestraught |
| bestrew | bestrew |
| bestrid | bestrid |
| bestride | bestrid |
| bestrides | bestrid |
| bet | bet |
| betake | betak |
| beteem | beteem |
| bethink | bethink |
| bethought | bethought |
| bethrothed | bethroth |

bethump bethump
betid betid
betide betid
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betoken betoken
betook betook
betossed betoss
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betraying betrai
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betrothed betroth
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bett bett
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bettering better
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bettre bettr
between between
betwixt betwixt
bevel bevel
beverage beverag
bevis bevi
bevy bevi
bewail bewail
bewailed bewail
bewailing bewail
bewails bewail
beware bewar
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beweep beweep
bewept bewept
bewet bewet
bewhored bewhor
bewitch bewitch
bewitched bewitch
bewitchment bewitch
bewray bewrai
beyond beyond

bezonian bezonian
bezonians bezonian
bianca bianca
bianco bianco
bias bia
bibble bibbl
bickerings bicker
bid bid
bidden bidden
bidding bid
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biddy biddi
bide bide
bides bide
biding bide
bids bid
bien bien
bier bier
bifold bifold
big big
bigamy bigami
biggen biggen
bigger bigger
bigness big
bigot bigot
bilberry bilberri
bilbo bilbo
bilboes bilbo
bilbow bilbow
bill bill
billeted billet
billets billet
billiards billiard
billing bill
billow billow
billows billow
bills bill
bin bin
bind bind
bindeth bindeth
binding bind
binds bind
biondello biondello
birch birch
bird bird
birding bird
birdlime birdlim

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|---|---|
| birds | bird |
| birnam | birnam |
| birth | birth |
| birthday | birthdai |
| birthdom | birthdom |
| birthplace | birthplac |
| birthright | birthright |
| birthrights | birthright |
| births | birth |
| bis | bi |
| biscuit | biscuit |
| bishop | bishop |
| bishops | bishop |
| bisson | bisson |
| bit | bit |
| bitch | bitch |
| bite | bite |
| biter | biter |
| bites | bite |
| biting | bite |
| bits | bit |
| bitt | bitt |
| bitten | bitten |
| bitter | bitter |
| bitterest | bitterest |
| bitterly | bitterli |
| bitterness | bitter |
| blab | blab |
| blabb | blabb |
| blabbing | blab |
| blabs | blab |
| black | black |
| blackamoor | blackamoor |
| blackamoors | blackamoor |
| blackberries | blackberri |
| blackberry | blackberri |
| blacker | blacker |
| blackest | blackest |
| blackfriars | blackfriar |
| blackheath | blackheath |
| blackmere | blackmer |
| blackness | black |
| blacks | black |
| bladder | bladder |
| bladders | bladder |
| blade | blade |
| bladed | blade |

| | |
|---|---|
| blades | blade |
| blains | blain |
| blam | blam |
| blame | blame |
| blamed | blame |
| blameful | blame |
| blameless | blameless |
| blames | blame |
| blanc | blanc |
| blanca | blanca |
| blanch | blanch |
| blank | blank |
| blanket | blanket |
| blanks | blank |
| blaspheme | blasphem |
| blaspheming | blasphem |
| blasphemous | blasphem |
| blasphemy | blasphemi |
| blast | blast |
| blasted | blast |
| blasting | blast |
| blastments | blastment |
| blasts | blast |
| blaz | blaz |
| blaze | blaze |
| blazes | blaze |
| blazing | blaze |
| blazon | blazon |
| blazoned | blazon |
| blazoning | blazon |
| bleach | bleach |
| bleaching | bleach |
| bleak | bleak |
| blear | blear |
| bleared | blear |
| bleat | bleat |
| bleated | bleat |
| bleats | bleat |
| bled | bled |
| bleed | bleed |
| bleedest | bleedest |
| bleedeth | bleedeth |
| bleeding | bleed |
| bleeds | bleed |
| blemish | blemish |
| blemishes | blemish |
| blench | blench |
| blenches | blench |

| | |
|---|---|
| blend | blend |
| blended | blend |
| blent | blent |
| bless | bless |
| blessed | bless |
| blessedly | |
| blessedli | |
| blessedness | blessed |
| blesses | bless |
| blesseth | blesseth |
| blessing | bless |
| blessings | bless |
| blest | blest |
| blew | blew |
| blind | blind |
| blinded | blind |
| blindfold | blindfold |
| blinding | blind |
| blindly | blindli |
| blindness | blind |
| blinds | blind |
| blink | blink |
| blinking | blink |
| bliss | bliss |
| blist | blist |
| blister | blister |
| blisters | blister |
| blithe | blith |
| blithild | blithild |
| bloat | bloat |
| block | block |
| blockish | blockish |
| blocks | block |
| blois | bloi |
| blood | blood |
| blooded | blood |
| bloodhound | bloodhound |
| bloodied | bloodi |
| bloodier | bloodier |
| bloodiest | bloodiest |
| bloodily | bloodili |
| bloodless | bloodless |
| bloods | blood |
| bloodshed | bloodsh |
| bloodshedding | bloodshed |
| bloodstained | bloodstain |
| bloody | bloodi |

bloom bloom
blooms bloom
blossom blossom
blossoming blossom
blossoms blossom
blot blot
blots blot
blotted blot
blotting blot
blount blount
blow blow
blowed blow
blowers blower
blowest blowest
blowing blow
blown blown
blows blow
blowse blows
blubb blubb
blubber blubber
blubbering blubber
blue blue
bluecaps
bluecap
bluest bluest
blunt blunt
blunted blunt
blunter blunter
bluntest bluntest
blunting blunt
bluntly bluntli
bluntness blunt
blunts blunt
blur blur
blurr blurr
blurs blur
blush blush
blushes blush
blushest blushest
blushing blush
blust blust
bluster bluster
blusterer bluster
blusters bluster
bo bo
boar boar
board board
boarded board

boarding board
boards board
boarish boarish
boars boar
boast boast
boasted boast
boastful boast
boasting boast
boasts boast
boat boat
boats boat
boatswain boatswain
bob bob
bobb bobb
boblibindo boblibindo
bobtail bobtail
bocchus bocchu
bode bode
boded bode
bodements bodement
bodes bode
bodg bodg
bodied bodi
bodies bodi
bodiless bodiless
bodily bodili
boding bode
bodkin bodkin
body bodi
bodykins bodykin
bog bog
boggle boggl
boggler boggler
bogs bog
bohemia bohemia
bohemian bohemian
bohun bohun
boil boil
boiling boil
boils boil
boist boist
boisterous boister
boisterously boister
boitier boitier
bold bold
bolden bolden

bolder bolder
boldest boldest
boldly boldli
boldness bold
bolds bold
bolingbroke bolingbrok
bolster bolster
bolt bolt
bolted bolt
bolter bolter
bolters bolter
bolting bolt
bolts bolt
bombard bombard
bombards bombard
bombast bombast
bon bon
bona bona
bond bond
bondage bondag
bonded bond
bondmaid bondmaid
bondman bondman
bondmen bondmen
bonds
bond
bondslave bondslav
bone bone
boneless boneless
bones bone
bonfire bonfir
bonfires bonfir
bonjour bonjour
bonne bonn
bonnet bonnet
bonneted bonnet
bonny bonni
bonos bono
bonto bonto
bonville bonvil
bood bood
book book
bookish bookish
books book
boon boon
boor boor
boorish boorish
boors boor

| | |
|---|---|
| boot | boot |
| booted | boot |
| booties | booti |
| bootless | bootless |
| boots | boot |
| booty | booti |
| bor | bor |
| bora | bora |
| borachio | borachio |
| bordeaux | |
| bordeaux | |
| border | border |
| bordered | border |
| borderers | border |
| borders | border |
| bore | bore |
| boreas | borea |
| bores | bore |
| boring | bore |
| born | born |
| borne | born |
| borough | borough |
| boroughs | borough |
| borrow | borrow |
| borrowed | borrow |
| borrower | borrow |
| borrowing | borrow |
| borrows | borrow |
| bosko | bosko |
| boskos | bosko |
| bosky | boski |
| bosom | bosom |
| bosoms | bosom |
| boson | boson |
| boss | boss |
| bosworth | bosworth |
| botch | botch |
| botcher | botcher |
| botches | botch |
| botchy | botchi |
| both | both |
| bots | bot |
| bottle | |
| bottl | |
| bottled | bottl |
| bottles | bottl |
| bottom | bottom |
| bottomless | bottomless |

| | |
|---|---|
| bottoms | bottom |
| bouciqualt | bouciqualt |
| bouge | boug |
| bough | bough |
| boughs | bough |
| bought | bought |
| bounce | bounc |
| bouncing | bounc |
| bound | bound |
| bounded | bound |
| bounden | bounden |
| boundeth | boundeth |
| bounding | bound |
| boundless | boundless |
| bounds | bound |
| bounteous | bounteou |
| bounteously | bounteous |
| bounties | bounti |
| bountiful | bounti |
| bountifully | bountifulli |
| bounty | bounti |
| bourbier | bourbier |
| bourbon | bourbon |
| bourchier | bourchier |
| bourdeaux | bourdeaux |
| bourn | bourn |
| bout | bout |
| bouts | bout |
| bove | bove |
| bow | bow |
| bowcase | bowcas |
| bowed | bow |
| bowels | bowel |
| bower | bower |
| bowing | bow |
| bowl | bowl |
| bowler | bowler |
| bowling | bowl |
| bowls | bowl |
| bows | bow |
| bowsprit | bowsprit |
| bowstring | bowstr |
| box | box |
| boxes | box |
| boy | boi |
| boyet | boyet |
| boyish | boyish |

boys boi
brabant brabant
brabantio brabantio
brabble brabbl
brabbler brabbler
brac brac
brace brace
bracelet bracelet
bracelets bracelet
brach brach
bracy braci
brag
brag
bragg bragg
braggardism braggard
braggards braggard
braggart braggart
braggarts braggart
bragged brag
bragging brag
bragless bragless
brags brag
braid braid
braided braid
brain brain
brained brain
brainford brainford
brainish brainish
brainless brainless
brains brain
brainsick brainsick
brainsickly brainsickli
brake brake
brakenbury brakenburi
brakes brake
brambles brambl
bran bran
branch branch
branches branch
branchless branchless
brand brand
branded brand
brandish brandish
brandon
brandon
brands brand
bras bra
brass brass

brassy brassi
brat brat
brats brat
brav brav
brave brave
braved brave
bravely brave
braver braver
bravery braveri
braves brave
bravest bravest
braving brave
brawl brawl
brawler brawler
brawling brawl
brawls brawl
brawn brawn
brawns brawn
bray brai
braying brai
braz braz
brazen brazen
brazier brazier
breach breach
breaches breach
bread bread
breadth breadth
break break
breaker
breaker
breakfast breakfast
breaking break
breaks break
breast breast
breasted breast
breasting breast
breastplate breastplat
breasts breast
breath breath
breathe breath
breathed breath
breather breather
breathers breather
breathes breath
breathest breathest
breathing breath
breathless breathless
breaths breath

brecknock brecknock
bred bred
breech breech
breeches breech
breeching breech
breed breed
breeder breeder
breeders breeder
breeding breed
breeds breed
breese brees
breeze breez
breff breff
bretagne bretagn
brethen brethen
bretheren bretheren
brethren brethren
brevis brevi
brevity breviti
brew brew
brewage brewag
brewer brewer
brewers brewer
brewing brew
brews brew
briareus briareu
briars briar
brib brib
bribe bribe
briber briber
bribes bribe
brick brick
bricklayer bricklay
bricks brick
bridal bridal
bride bride
bridegroom bridegroom
bridegrooms bridegroom
brides bride
bridge bridg
bridgenorth bridgenorth
bridges bridg
bridget bridget
bridle bridl
bridled bridl
brief brief
briefer briefer
briefest briefest

briefly briefli
briefness brief
brier brier
briers brier
brigandine brigandin
bright bright
brighten brighten
brightest brightest
brightly brightli
brightness bright
brim brim
brimful brim
brims brim
brimstone brimston
brinded brind
brine brine
bring bring
bringer bringer
bringeth bringeth
bringing bring
bringings bring
brings bring
brinish brinish
brink brink
brisk brisk
brisky briski
bristle
bristl
bristled bristl
bristly bristli
bristol bristol
bristow bristow
britain britain
britaine britain
britaines britain
british british
briton briton
britons briton
brittany brittani
brittle brittl
broach broach
broached broach
broad broad
broader broader
broadsides broadsid
brocas broca
brock brock
brogues brogu

broil broil
broiling broil
broils broil
broke broke
broken broken
brokenly brokenli
broker broker
brokers broker
brokes broke
broking broke
brooch
brooch
brooches brooch
brood brood
brooded brood
brooding brood
brook brook
brooks brook
broom broom
broomstaff broomstaff
broth broth
brothel brothel
brother brother
brotherhood brotherhood
brotherhoods brotherhood
brotherly brotherli
brothers brother
broths broth
brought brought
brow brow
brown brown
browner browner
brownist brownist
browny browni
brows brow
browse brows
browsing brows
bruis brui
bruise bruis
bruised bruis
bruises bruis
bruising bruis
bruit
bruit
bruited bruit
brundusium brundusium
brunt brunt
brush brush

brushes brush
brute brute
brutish brutish
brutus brutu
bubble bubbl
bubbles bubbl
bubbling bubbl
bubukles bubukl
buck buck
bucket bucket
buckets bucket
bucking buck
buckingham buckingham
buckle buckl
buckled buckl
buckler buckler
bucklers buckler
bucklersbury bucklersburi
buckles buckl
buckram buckram
bucks buck
bud bud
budded bud
budding bud
budge budg
budger budger
budget budget
buds
bud
buff buff
buffet buffet
buffeting buffet
buffets buffet
bug bug
bugbear bugbear
bugle bugl
bugs bug
build build
builded build
buildeth buildeth
building build
buildings build
builds build
built built
bulk bulk
bulks bulk
bull bull
bullcalf bullcalf

| | |
|---|---|
| bullen | bullen |
| bullens | bullen |
| bullet | bullet |
| bullets | bullet |
| bullocks | bullock |
| bulls | bull |
| bully | bulli |
| bulmer | bulmer |
| bulwark | bulwark |
| bulwarks | bulwark |
| bum | bum |
| bumbast | bumbast |
| bump | bump |
| bumper | bumper |
| bums | bum |
| bunch | bunch |
| bunches | bunch |
| bundle | bundl |
| bung | bung |
| bunghole | bunghol |
| bungle | bungl |
| bunting | bunt |
| buoy | buoi |
| bur | bur |
| burbolt | burbolt |
| burd | burd |
| burden | burden |
| burdened | burden |
| burdening | burden |
| burdenous | burden |
| burdens | burden |
| burgh | burgh |
| burgher | burgher |
| burghers | burgher |
| burglary | burglari |
| burgomasters | burgomast |
| burgonet | burgonet |
| burgundy | burgundi |
| burial | burial |
| buried | buri |
| burier | burier |
| buriest | buriest |
| burly | burli |
| burn | burn |
| burned | burn |
| burnet | burnet |

| | |
|---|---|
| burneth | burneth |
| burning | burn |
| burnish | burnish |
| burns | burn |
| burnt | burnt |
| burr | burr |
| burrows | burrow |
| burs | bur |
| burst | burst |
| bursting | burst |
| bursts | burst |
| burthen | burthen |
| burthens | burthen |
| burton | burton |
| bury | buri |
| burying | buri |
| bush | bush |
| bushels | bushel |
| bushes | bush |
| bushy | bushi |
| busied | busi |
| busily | busili |
| busines | busin |
| business | busi |
| businesses | busi |
| buskin | buskin |
| busky | buski |
| buss | buss |
| busses | buss |
| bussing | buss |
| | |
| bustle | bustl |
| bustling | bustl |
| busy | busi |
| but | but |
| butcheed | butche |
| butcher | butcher |
| butchered | butcher |
| butcheries | butcheri |
| butcherly | butcherli |
| butchers | butcher |
| butchery | butcheri |
| butler | butler |
| butt | butt |
| butter | butter |
| buttered | butter |
| butterflies | butterfli |
| butterfly | butterfli |

butterwoman butterwoman
buttery butteri
buttock buttock
buttocks buttock
button button
buttonhole buttonhol
buttons button
buttress buttress
buttry buttri
butts butt
buxom buxom
buy bui
buyer buyer
buying bui
buys bui
buzz buzz
buzzard buzzard
buzzards buzzard
buzzers buzzer
buzzing buzz
by by
bye bye
byzantium byzantium
c c
ca ca
cabbage cabbag
cabileros cabilero
cabin cabin
cabins cabin
cable cabl
cables cabl
cackling cackl
cacodemon cacodemon
caddis caddi
caddisses caddiss
cade cade
cadence cadenc
cadent cadent
cades cade
cadmus cadmu
caduceus caduceu
cadwal cadwal
cadwallader cadwallad
caelius caeliu
caelo caelo
caesar caesar
caesarion caesarion
caesars caesar

| | |
|---|---|
| cage | cage |
| caged | cage |
| cagion | cagion |
| cain | cain |
| caithness | caith |
| caitiff | caitiff |
| caitiffs | caitiff |
| caius | caiu |
| cak | cak |
| cake | cake |
| cakes | cake |
| calaber | calab |
| calais | calai |
| calamities | calam |
| calamity | calam |
| calchas | calcha |
| calculate | calcul |
| calen | calen |
| calendar | calendar |
| calendars | calendar |
| calf | calf |
| caliban | caliban |
| calibans | caliban |
| calipolis | calipoli |
| cality | caliti |
| caliver | caliv |
| call | call |
| callat | callat |
| called | call |
| callet | callet |
| calling | call |
| calls | call |
| calm | calm |
| calmest | calmest |
| calmly | calmli |
| calmness | calm |
| calms | calm |
| calpurnia | calpurnia |
| calumniate | calumni |
| calumniating | calumni |
| calumnious | calumni |
| calumny | calumni |
| calve | calv |
| calved | calv |
| calves | calv |
| calveskins | calveskin |
| calydon | calydon |

cam cam
cambio cambio
cambria cambria
cambric cambric
cambrics cambric
cambridge cambridg
cambyses cambys
came came
camel camel
camelot camelot
camels camel
camest camest
camillo camillo
camlet camlet
camomile camomil
camp camp
campeius campeiu
camping camp
camps camp
can can
canakin canakin
canaries canari
canary canari
cancel cancel
cancell cancel
cancelled cancel
cancelling cancel
cancels cancel
cancer cancer
candidatus candidatu
candied candi
candle candl
candles candl
candlesticks candlestick
candy candi
canidius canidiu
cank cank
canker canker
cankerblossom cankerblossom
cankers canker
cannibally cannib
cannibals cannib
cannon cannon
cannoneer cannon
cannons cannon
cannot cannot
canon canon

| | |
|---|---|
| canoniz | canoniz |
| canonize | canon |
| canonized | canon |
| canons | canon |
| canopied | canopi |
| canopies | canopi |
| canopy | canopi |
| canst | canst |
| canstick | canstick |
| canterbury | canterburi |
| cantle | cantl |
| cantons | canton |
| canus | canu |
| canvas | canva |
| canvass | canvass |
| canzonet | canzonet |
| cap | cap |
| capability | capabl |
| capable | capabl |
| capacities | capac |
| capacity | capac |
| caparison | caparison |
| capdv | capdv |
| cape | cape |
| capel | capel |
| capels | capel |
| caper | caper |
| capers | caper |
| capet | capet |
| caphis | caphi |
| capilet | capilet |
| capitaine | capitain |
| capital | capit |
| capite | capit |
| capitol | capitol |
| capitulate | capitul |
| capocchia | capocchia |
| capon | capon |
| capons | capon |
| capp | capp |
| cappadocia | cappadocia |
| capriccio | capriccio |
| capricious | caprici |
| caps | cap |
| capt | capt |
| captain | captain |
| captains | captain |

captainship captainship
captious captiou
captivate captiv
captivated captiv
captivates captiv
captive captiv
captives captiv
captivity captiv
captum captum
capucius capuciu
capulet capulet
capulets capulet
car car
carack carack
caracks carack
carat carat
caraways carawai
carbonado carbonado
carbuncle carbuncl
carbuncled carbuncl
carbuncles carbuncl
carcanet carcanet
carcase carcas
carcases carcas
carcass carcass
carcasses carcass
card card
cardecue cardecu
carded card
carders carder
cardinal cardin
cardinally cardin
cardinals cardin
cardmaker cardmak
cards card
carduus carduu
care care
cared care
career career
careers career
careful care
carefully carefulli
careless careless
carelessly carelessli
carelessness careless
cares care

caret caret
cargo cargo
carl carl
carlisle carlisl
carlot carlot
carman carman
carmen carmen
carnal carnal
carnally carnal
carnarvonshire carnarvonshir
carnation carnat
carnations carnat
carol carol
carous carou
carouse carous
caroused carous
carouses carous
carousing carous
carp carp
carpenter carpent
carper carper
carpet carpet
carpets carpet
carping carp
carriage carriag
carriages carriag
carried carri
carrier carrier
carriers carrier
carries
carri
carrion carrion
carrions carrion
carry carri
carrying carri
cars car
cart cart
carters carter
carthage carthag
carts cart
carv carv
carve carv
carved carv
carver carver
carves carv
carving carv
cas ca
casa casa

casaer casaer
casca casca
case case
casement casement
casements casement
cases case
cash cash
cashier cashier
casing case
cask cask
casket casket
casketed casket
caskets casket
casque casqu
casques casqu
cassado cassado
cassandra cassandra
cassibelan cassibelan
cassio cassio
cassius cassiu
cassocks cassock
cast cast
castalion castalion
castaway castawai
castaways castawai
casted cast
caster caster
castigate castig
castigation castig
castile castil
castiliano castiliano
casting cast
castle castl
castles castl
casts cast
casual casual
casually casual
casualties casualti
casualty casualti
cat cat
cataian cataian
catalogue catalogu
cataplasm cataplasm
cataracts cataract
catarrhs catarrh
catastrophe catastroph
catch catch

| | |
|---|---|
| catcher | catcher |
| catches | catch |
| catching | catch |
| cate | cate |
| catechising | catechis |
| catechism | catech |
| catechize | catech |
| cater | cater |
| caterpillars | caterpillar |
| caters | cater |
| caterwauling | caterwaul |
| cates | cate |
| catesby | catesbi |
| cathedral | cathedr |
| catlike | catlik |
| catling | catl |
| catlings | catl |
| cato | cato |
| cats | cat |
| cattle | cattl |
| caucasus | caucasu |
| caudle | caudl |
| cauf | cauf |
| caught | caught |
| cauldron | cauldron |
| caus | cau |
| cause | caus |
| caused | caus |
| causeless | causeless |
| causer | causer |
| causes | caus |
| causest | causest |
| causeth | causeth |
| cautel | cautel |
| cautelous | cautel |
| cautels | cautel |
| cauterizing | cauter |
| caution | caution |
| cautions | caution |
| cavaleiro | cavaleiro |
| cavalery | cavaleri |
| cavaliers | cavali |
| cave | cave |
| cavern | cavern |
| caverns | cavern |
| caves | cave |
| caveto | caveto |
| caviary | caviari |

cavil cavil
cavilling cavil
cawdor cawdor
cawdron cawdron
cawing caw
ce ce
ceas cea
cease ceas
ceases ceas
ceaseth ceaseth
cedar cedar
cedars cedar
cedius cediu
celebrate celebr
celebrated celebr
celebrates celebr
celebration celebr
celerity celer
celestial celesti
celia celia
cell cell
cellar cellar
cellarage cellarag
celsa celsa
cement cement
censer censer
censor censor
censorinus censorinu
censur censur
censure censur
censured censur
censurers censur
censures censur
censuring censur
centaur centaur
centaurs centaur
centre centr
cents cent
centuries centuri
centurion centurion
centurions centurion
century centuri
cerberus cerberu
cerecloth cerecloth
cerements cerement
ceremonial ceremoni

ceremonies ceremoni
ceremonious ceremoni
ceremoniously ceremoni
ceremony ceremoni
ceres cere
cerns cern
certain certain
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certainly certainli
certainties certainti
certainty certainti
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certificate certif
certified certifi
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ces ce
cesario cesario
cess cess
cesse cess
cestern cestern
cetera cetera
cette cett
chaces chace
chaf chaf
chafe chafe
chafed chafe
chafes chafe
chaff chaff
chaffless chaffless
chafing chafe
chain chain
chains chain
chair chair
chairs chair
chalic chalic
chalice chalic
chalices chalic
chalk chalk
chalks chalk
chalky chalki
challeng challeng
challenge challeng
challenged challeng
challenger challeng
challengers challeng
challenges challeng

cham cham
chamber chamber
chamberers chamber
chamberlain chamberlain
chamberlains chamberlain
chambermaid chambermaid
chambermaids chambermaid
chambers chamber
chameleon chameleon
champ champ
champagne champagn
champain champain
champains
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champion champion
champions champion
chanc chanc
chance chanc
chanced chanc
chancellor chancellor
chances chanc
chandler chandler
chang chang
change chang
changeable changeabl
changed chang
changeful chang
changeling changel
changelings changel
changer changer
changes chang
changest changest
changing chang
channel channel
channels channel
chanson chanson
chant chant
chanticleer chanticl
chanting chant
chantries chantri
chantry chantri
chants chant
chaos chao
chap chap
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chapel chapel
chapeless chapeless

chapels chapel
chaplain chaplain
chaplains chaplain
chapless chapless
chaplet chaplet
chapmen chapmen
chaps chap
chapter chapter
character charact
charactered charact
characterless characterless
characters charact
charactery characteri
characts charact
charbon charbon
chare chare
chares chare
charg charg
charge charg
charged charg
chargeful charg
charges charg
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chariest chariest
chariness chari
charing chare
chariot chariot
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charitable charit
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charlemain charlemain
charles charl
charm charm
charmed charm
charmer charmer
charmeth charmeth
charmian charmian
charming charm
charmingly charmingli
charms charm
charneco charneco
charnel charnel
charolois charoloi
charon charon

charter charter
charters charter
chartreux chartreux
chary chari
charybdis charybdi
chas cha
chase chase
chased chase
chaser chaser
chaseth chaseth
chasing chase
chaste chast
chastely chast
chastis chasti
chastise chastis
chastised chastis
chastisement chastis
chastity chastiti
chat chat
chatham chatham
chatillon chatillon
chats chat
chatt chatt
chattels chattel
chatter chatter
chattering chatter
chattles chattl
chaud chaud
chaunted chaunt
chaw chaw
chawdron chawdron
che che
cheap cheap
cheapen cheapen
cheaper cheaper
cheapest cheapest
cheaply cheapli
cheapside cheapsid
cheat cheat
cheated cheat
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cheaters cheater
cheating cheat
cheats cheat
check check
checked check
checker checker
checking check

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|---|---|
| checks | check |
| cheek | cheek |
| cheeks | cheek |
| cheer | cheer |
| cheered | cheer |
| cheerer | cheerer |
| cheerful | cheer |
| cheerfully | cheerfulli |
| cheering | cheer |
| cheerless | cheerless |
| cheerly | cheerli |
| cheers | cheer |
| cheese | chees |
| chequer | chequer |
| cher | cher |
| cherish | cherish |
| cherished | cherish |
| cherisher | cherish |
| cherishes | cherish |
| cherishing | cherish |
| cherries | cherri |
| cherry | cherri |
| cherrypit | cherrypit |
| chertsey | chertsei |
| cherub | cherub |
| cherubims | cherubim |
| cherubin | cherubin |
| cherubins | cherubin |
| cheshu | cheshu |
| chess | chess |
| chest | chest |
| chester | chester |
| chestnut | chestnut |
| chestnuts | chestnut |
| chests | chest |
| chetas | cheta |
| chev | chev |
| cheval | cheval |
| chevalier | chevali |
| chevaliers | chevali |
| cheveril | cheveril |
| chew | chew |
| chewed | chew |
| chewet | chewet |
| chewing | chew |
| chez | chez |
| chi | chi |
| chick | chick |

chicken chicken
chickens chicken
chicurmurco chicurmurco
chid chid
chidden chidden
chide chide
chiders chider
chides chide
chiding chide
chief
chief
chiefest chiefest
chiefly chiefli
chien chien
child child
childed child
childeric childer
childhood childhood
childhoods childhood
childing child
childish childish
childishness childish
childlike childlik
childness child
children children
chill chill
chilling chill
chime chime
chimes chime
chimney chimnei
chimneypiece chimneypiec
chimneys chimnei
chimurcho chimurcho
chin chin
china china
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chips chip
chiron chiron
chirping chirp
chirrah chirrah
chirurgeonly chirurgeonli

chisel chisel
chitopher chitoph
chivalrous chivalr
chivalry chivalri
choice choic
choicely choic
choicest choicest
choir choir
choirs choir
chok chok
choke choke
choked choke
chokes choke
choking choke
choler choler
choleric choler
cholers choler
chollors chollor
choose choos
chooser chooser
chooses choos
chooseth chooseth
choosing choos
chop chop
chopine chopin
choplogic
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chopp chopp
chopped chop
chopping chop
choppy choppi
chops chop
chopt chopt
chor chor
choristers chorist
chorus choru
chose chose
chosen chosen
chough chough
choughs chough
chrish chrish
christ christ
christen christen
christendom christendom
christendoms christendom
christening christen
christenings christen
christian christian

christianlike christianlik
christians christian
christmas christma
christom christom
christopher christoph
christophero christophero
chronicle chronicl
chronicled chronicl
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chroniclers chronicl
chronicles chronicl
chrysolite chrysolit
chuck chuck
chucks chuck
chud chud
chuffs chuff
church church
churches church
churchman churchman
churchmen churchmen
churchyard churchyard
churchyards churchyard
churl churl
churlish churlish
churlishly churlishli
churls churl
churn churn
chus chu
cicatrice cicatric
cicatrices cicatric
cicely cice
cicero cicero
ciceter cicet
ciel ciel
ciitzens ciitzen
cilicia cilicia
cimber cimber
cimmerian cimmerian
cinable cinabl
cincture
cinctur
cinders cinder
cine cine
cinna cinna
cinque cinqu
cipher cipher
ciphers cipher

circa circa
circe circ
circle circl
circled circl
circlets circlet
circling circl
circuit circuit
circum circum
circumcised circumcis
circumference circumfer
circummur circummur
circumscrib circumscrib
circumscribed circumscrib
circumscription circumscript
circumspect circumspect
circumstance circumst
circumstanced circumstanc
circumstances circumst
circumstantial circumstanti
circumvent circumv
circumvention circumvent
cistern cistern
citadel citadel
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cite cite
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cities citi
citing cite
citizen citizen
citizens citizen
cittern cittern
city citi
civet civet
civil civil
civility civil
civilly civilli
clack clack
clad clad
claim claim
claiming claim
claims claim
clamb clamb
clamber clamber
clammer clammer
clamor clamor
clamorous clamor

clamors clamor
clamour clamour
clamours clamour
clang clang
clangor clangor
clap clap
clapp clapp
clapped clap
clapper clapper
clapping clap
claps clap
clare clare
clarence clarenc
claret claret
claribel claribel
clasp clasp
clasps clasp
clatter clatter
claud claud
claudio claudio
claudius claudiu
clause claus
claw claw
clawed claw
clawing claw
claws claw
clay clai
clays clai
clean clean
cleanliest cleanliest
cleanly cleanli
cleans clean
cleanse cleans
cleansing cleans
clear clear
clearer clearer
clearest clearest
clearly clearli
clearness clear
clears clear
cleave cleav
cleaving cleav
clef clef
cleft cleft
cleitus cleitu
clemency clemenc
clement clement

cleomenes cleomen
cleopatpa cleopatpa
cleopatra cleopatra
clepeth clepeth
clept clept
clerestories clerestori
clergy clergi
clergyman clergyman
clergymen clergymen
clerk clerk
clerkly clerkli
clerks clerk
clew clew
client client
clients client
cliff cliff
clifford clifford
cliffords clifford
cliffs cliff
clifton clifton
climate climat
climature climatur
climb climb
climbed
climb
climber climber
climbeth climbeth
climbing climb
climbs climb
clime clime
cling cling
clink clink
clinking clink
clinquant clinquant
clip clip
clipp clipp
clipper clipper
clippeth clippeth
clipping clip
clipt clipt
clitus clitu
clo clo
cloak cloak
cloakbag cloakbag
cloaks cloak
clock clock
clocks clock
clod clod

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|---|---|
| cloddy | cloddi |
| clodpole | clodpol |
| clog | clog |
| clogging | clog |
| clogs | clog |
| cloister | cloister |
| cloistress | cloistress |
| cloquence | cloquenc |
| clos | clo |
| close | close |
| closed | close |
| closely | close |
| closeness | close |
| closer | closer |
| closes | close |
| closest | closest |
| closet | closet |
| closing | close |
| closure | closur |
| cloten | cloten |
| clotens | cloten |
| cloth | cloth |
| clothair | clothair |
| clotharius | clothariu |
| clothe | cloth |
| clothes | cloth |
| clothier | clothier |
| clothiers | clothier |
| clothing | cloth |
| cloths | cloth |
| clotpoles | clotpol |
| clotpoll | clotpol |
| cloud | cloud |
| clouded | cloud |
| cloudiness | cloudi |
| clouds | cloud |
| cloudy | cloudi |
| clout | clout |
| clouted | clout |
| clouts | clout |
| cloven | cloven |
| clover | clover |
| cloves | clove |
| clovest | clovest |
| clowder | clowder |
| clown | clown |
| clownish | clownish |

clowns clown
cloy cloi
cloyed cloi
cloying cloi
cloyless cloyless
cloyment cloyment
cloys cloi
club club
clubs club
cluck cluck
clung clung
clust clust
clusters cluster
clutch clutch
clyster clyster
cneius cneiu
cnemies cnemi
co co
coach coach
coaches coach
coachmakers coachmak
coact coact
coactive coactiv
coagulate coagul

coal coal
coals coal
coarse coars
coarsely coars
coast coast
coasting coast
coasts coast
coat coat
coated coat
coats coat
cobble cobbl
cobbled cobbl
cobbler cobbler
cobham cobham
cobloaf cobloaf
cobweb cobweb
cobwebs cobweb
cock cock
cockatrice cockatric
cockatrices cockatric
cockle cockl
cockled cockl
cockney cocknei

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|---|---|
| cockpit | cockpit |
| cocks | cock |
| cocksure | cocksur |
| coctus | coctu |
| cocytus | cocytu |
| cod | cod |
| codding | cod |
| codling | codl |
| codpiece | codpiec |
| codpieces | codpiec |
| cods | cod |
| coelestibus | coelestibu |
| coesar | coesar |
| coeur | coeur |
| coffer | coffer |
| coffers | coffer |
| coffin | coffin |
| coffins | coffin |
| cog | cog |
| cogging | cog |
| cogitation | cogit |
| cogitations | cogit |
| cognition | cognit |
| cognizance | cogniz |
| cogscomb | cogscomb |
| cohabitants | cohabit |
| coher | coher |
| cohere | coher |
| coherence | coher |
| coherent | coher |
| cohorts | cohort |
| coif | coif |
| coign | coign |
| coil | coil |
| coin | coin |
| coinage | coinag |
| coiner | coiner |
| coining | coin |
| coins | coin |
| col | col |
| colbrand | colbrand |
| colchos | colcho |
| cold | cold |
| colder | colder |
| coldest | coldest |
| coldly | coldli |
| coldness | cold |
| coldspur | coldspur |

colebrook colebrook
colic colic
collar collar
collars collar
collateral collater
colleagued colleagu
collect collect
collected collect
collection collect
college colleg
colleges colleg
collied colli
collier collier
colliers collier
collop collop
collusion collus
colme colm
colmekill colmekil
coloquintida coloquintida
color color
colors color
colossus colossu
colour colour
colourable colour
coloured colour
colouring colour
colours colour
colt colt
colted colt
colts colt
columbine columbin
columbines columbin
colville colvil
com com
comagene comagen
comart comart
comb comb
combat combat
combatant combat
combatants combat
combated combat
combating combat
combin combin
combinate combin
combination combin
combine combin
combined combin

combless combless
combustion combust
come come
comedian comedian
comedians comedian
comedy comedi
comeliness comeli
comely come
comer comer
comers comer
comes come
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comet comet
cometh cometh
comets comet
comfect comfect
comfit comfit
comfits comfit
comfort comfort
comfortable comfort
comforted comfort
comforter comfort
comforting comfort
comfortless comfortless
comforts comfort
comic comic
comical comic
coming come
comings come
cominius cominiu
comma comma
command command
commande command
commanded command
commander command
commanders command
commanding command
commandment command
commandments command
commands command
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commence commenc
commenced commenc
commencement commenc
commences commenc
commencing commenc
commend commend

commendable commend
commendation commend
commendations commend
commended commend
commending commend
commends commend
comment comment
commentaries commentari
commenting comment
comments comment
commerce commerc
commingled commingl
commiseration commiser
commission commiss
commissioners commission
commissions commiss
commit commit
commits commit
committ committ
committed commit
committing commit
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commixtion commixt
commixture commixtur
commodious commodi
commodities commod
commodity commod
common common
commonalty commonalti
commoner common
commoners common
commonly commonli
commons common
commonweal commonw
commonwealth commonwealth
commotion commot
commotions commot
commune commun
communicat communicat
communicate commun
communication commun
communities commun
community commun
comonty comonti
compact compact
companies compani

companion companion
companions companion
companionship companionship
company compani
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comparative compar
compare compar
compared compar
comparing compar
comparison comparison
comparisons comparison
compartner compartn
compass compass
compasses compass
compassing compass
compassion compass
compassionate compassion
compeers compeer
compel compel
compell compel
compelled compel
compelling compel
compels compel
compensation compens
competence compet
competency compet
competent compet
competitor competitor
competitors competitor
compil compil
compile compil
compiled compil
complain complain
complainer complain
complainest
complainest
complaining complain
complainings complain
complains complain
complaint complaint
complaints complaint
complement complement
complements complement
complete complet
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complexioned complexion
complexions complexion

complices complic
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compliment compliment
complimental compliment
compliments compliment
complot complot
complots complot
complotted complot
comply compli
compos compo
compose compos
composed compos
composition composit
compost compost
composture compostur
composure composur
compound compound
compounded compound
compounds compound
comprehend comprehend
comprehended comprehend
comprehends comprehend
compremises compremis
compris compri
comprising compris
compromis compromi
compromise compromis
compt compt
comptible comptibl
comptrollers comptrol
compulsatory compulsatori
compulsion compuls
compulsive compuls
compunctious compuncti
computation comput
comrade comrad
comrades comrad
comutual comutu
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concave concav
concavities concav
conceal conceal
concealed conceal
concealing conceal
concealment conceal
concealments conceal
conceals conceal
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conceitless conceitless
conceits conceit
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conceive conceiv
conceived conceiv
conceives conceiv
conceiving conceiv
conception concept
conceptions concept
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concern concern
concernancy concern
concerneth concerneth
concerning concern
concernings concern
concerns concern
conclave conclav
conclud conclud
conclude conclud
concluded conclud
concludes conclud
concluding conclud
conclusion conclus
conclusions conclus
concolinel concolinel
concord concord
concubine concubin
concupiscible concupisc
concupy
concupi
concur concur
concurring concur
concurs concur
condemn condemn
condemnation condemn
condemned condemn
condemning condemn
condemns condemn
condescend condescend
condign condign
condition condit
conditionally condition
conditions condit
condole condol
condolement condol
condoling condol

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|---|---|
| conduce | conduc |
| conduct | conduct |
| conducted | conduct |
| conducting | conduct |
| conductor | conductor |
| conduit | conduit |
| conduits | conduit |
| conected | conect |
| coney | conei |
| confection | confect |
| confectionary | confectionari |
| confections | confect |
| confederacy | confederaci |
| confederate | confeder |
| confederates | confeder |
| confer | confer |
| conference | confer |
| conferr | conferr |
| conferring | confer |
| confess | confess |
| confessed | confess |
| confesses | confess |
| confesseth | confesseth |
| confessing | confess |
| confession | confess |
| confessions | confess |
| confessor | confessor |
| confidence | confid |
| confident | confid |
| confidently | confid |
| confin | confin |
| confine | confin |
| confined | confin |
| confineless | confineless |
| confiners | confin |
| confines | confin |
| confining | confin |
| confirm | confirm |
| confirmation | confirm |
| confirmations | confirm |
| confirmed | confirm |
| confirmer | confirm |
| confirmers | confirm |
| confirming | confirm |
| confirmities | confirm |
| confirms | confirm |
| confiscate | confisc |

confiscated confisc
confiscation confisc
confixed confix
conflict conflict
conflicting conflict
conflicts conflict
confluence confluenc
conflux conflux
conform conform
conformable conform
confound confound
confounded confound
confounding confound
confounds confound
confront confront
confronted confront
confus confu
confused confus
confusedly confusedli
confusion confus
confusions confus
confutation confut
confutes confut
congeal congeal
congealed congeal
congealment congeal
congee conge
conger
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congest congest
congied congi
congratulate congratul
congreeing congre
congreeted congreet
congregate congreg
congregated congreg
congregation congreg
congregations congreg
congruent congruent
congruing congru
conies coni
conjectural conjectur
conjecture conjectur
conjectures conjectur
conjoin conjoin
conjoined conjoin
conjoins conjoin
conjointly conjointli

conjunct conjunct
conjunction conjunct
conjunctive conjunct
conjur conjur
conjuration conjur
conjurations conjur
conjure conjur
conjured conjur
conjurer conjur
conjurers conjur
conjures
conjur
conjuring conjur
conjuro conjuro
conn conn
connected connect
connive conniv
conqu conqu
conquer conquer
conquered conquer
conquering conquer
conqueror conqueror
conquerors conqueror
conquers conquer
conquest conquest
conquests conquest
conquring conqur
conrade conrad
cons con
consanguineous consanguin
consanguinity consanguin
conscienc conscienc
conscience conscienc
consciences conscienc
conscionable conscion
consecrate consecr
consecrated consecr
consecrations consecr
consent consent
consented consent
consenting consent
consents
consent
consequence consequ
consequences consequ
consequently consequ
conserve conserv
conserved conserv

conserves conserv
consider consid
considerance consider
considerate consider
consideration consider
considerations consider
considered consid
considering consid
considerings consid
considers consid
consign consign
consigning consign
consist consist
consisteth consisteth
consisting consist
consistory consistori
consists consist
consolate consol
consolation consol
consonancy conson
consonant conson
consort consort
consorted consort
consortest consortest
conspectuities conspectu
conspir conspir
conspiracy conspiraci
conspirant conspir
conspirator conspir
conspirators conspir
conspire conspir
conspired conspir
conspirers conspir
conspires conspir
conspiring conspir
constable constabl
constables constabl
constance constanc
constancies constanc
constancy constanc
constant constant
constantine constantin
constantinople constantinopl
constantly constantli
constellation constel
constitution constitut
constrain constrain
constrained constrain

| | |
|---|---|
| constraineth | constraineth |
| constrains | constrain |
| constraint | constraint |
| constring | constr |
| construction | construct |
| construe | constru |
| consul | consul |
| consuls | consul |
| consulship | consulship |
| consulships | consulship |
| consult | consult |
| consulting | consult |
| consults | consult |
| consum | consum |
| consume | consum |
| consumed | consum |
| consumes | consum |
| consuming | consum |
| consummate | consumm |
| consummation | consumm |
| consumption | consumpt |
| consumptions | consumpt |
| contagion | contagion |
| contagious | contagi |
| contain | contain |
| containing | contain |
| contains | contain |
| contaminate | contamin |
| contaminated | contamin |
| contemn | contemn |
| contemned | contemn |
| contemning | contemn |
| contemns | contemn |
| contemplate | contempl |
| contemplation | contempl |
| contemplative | contempl |
| contempt | contempt |
| contemptible | contempt |
| contempts | contempt |
| contemptuous | contemptu |
| contemptuously | contemptu |
| contend | contend |
| contended | contend |
| contending | contend |
| contendon | contendon |
| content | content |
| contenta | contenta |
| contented | content |

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|---|---|
| contenteth | contenteth |
| contention | content |
| contentious | contenti |
| contentless | contentless |
| contento | contento |
| contents | content |
| contest | contest |
| contestation | contest |
| continence | contin |
| continency | contin |
| continent | contin |
| continents | contin |
| continu | continu |
| continual | continu |
| continually | continu |
| continuance | continu |
| continuantly | continuantli |
| continuate | continu |
| continue | continu |
| continued | continu |
| continuer | continu |
| continues | continu |
| continuing | continu |
| contract | contract |
| contracted | contract |
| contracting | contract |
| contraction | contract |
| contradict | contradict |
| contradicted | contradict |
| contradiction | contradict |
| contradicts | contradict |
| contraries | contrari |
| contrarieties | contrarieti |
| contrariety | contrarieti |
| contrarious | contrari |
| contrariously | contrari |
| contrary | contrari |
| contre | contr |
| contribution | contribut |
| contributors | contributor |
| contrite | contrit |
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control control
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conversion convers
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converted convert

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coop coop
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cop cop
copatain copatain
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cophetua cophetua
copied copi
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copious copiou
copper copper
copperspur copperspur
coppice coppic
copulation copul
copulatives copul
copy copi
cor cor
coragio coragio
coral coral
coram coram
corambus corambu
coranto coranto
corantos coranto
corbo corbo
cord cord
corded cord
cordelia cordelia
cordial cordial
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core core
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corinthian corinthian
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corn corn
cornelia cornelia
cornelius corneliu
corner corner
corners corner
cornerstone cornerston
cornets cornet
cornish cornish
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cornuto cornuto
cornwall cornwal
corollary corollari
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corporal corpor
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corruption corrupt

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corslet corslet
cosmo cosmo
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costard costard
costermongers costermong
costlier costlier
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cotsall cotsal
cotsole cotsol
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cottage cottag
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counterpoints counterpoint
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cox cox
coxcomb coxcomb
coxcombs coxcomb
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coz coz
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cozenage cozenag
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craftsmen craftsmen
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cranking crank

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craveth craveth
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crawling crawl
crawls crawl
craz craz
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creaking creak
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creation creation
creator creator
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creditor creditor
creditors creditor
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creeks creek
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| creeps | creep |
| crept | crept |
| crescent | crescent |
| crescive | cresciv |
| cressets | cresset |
| cressid | cressid |
| cressida | cressida |
| cressids | cressid |
| cressy | cressi |
| crest | crest |
| crested | crest |
| crestfall | crestfal |
| crestless | crestless |
| crests | crest |
| cretan | cretan |
| crete | crete |
| crevice | crevic |
| crew | crew |
| crews | crew |
| crib | crib |
| cribb | cribb |
| cribs | crib |
| cricket | cricket |
| crickets | cricket |
| cried | cri |
| criedst | criedst |
| crier | crier |
| cries | cri |
| criest | criest |
| crieth | crieth |
| crime | crime |
| crimeful | crime |
| crimeless | crimeless |
| crimes | crime |
| criminal | crimin |
| crimson | crimson |
| cringe | cring |
| cripple | crippl |
| crisp | crisp |
| crisped | crisp |
| crispian | crispian |
| crispianus | crispianu |
| crispin | crispin |
| critic | critic |
| critical | critic |
| critics | critic |
| croak | croak |
| croaking | croak |

croaks croak
crocodile crocodil
cromer cromer
cromwell cromwel
crone crone
crook crook
crookback crookback
crooked crook
crooking crook
crop crop
cropp cropp
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cross cross
crossed cross
crosses cross
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crossing cross
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crossly crossli
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crost crost
crotchets crotchet
crouch crouch
crouching crouch
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crowing crow
crowkeeper crowkeep
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| cruelty | cruelti |
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| crumble | crumbl |
| crumbs | crumb |
| crupper | crupper |
| crusadoes | crusado |
| crush | crush |
| crushed | crush |
| crushest | crushest |
| crushing | crush |
| crust | crust |
| crusts | crust |
| crusty | crusti |
| crutch | crutch |
| crutches | crutch |
| cry | cry |
| crying | cry |
| crystal | crystal |
| crystalline | crystallin |
| crystals | crystal |
| cub | cub |
| cubbert | cubbert |
| cubiculo | cubiculo |
| cubit | cubit |
| cubs | cub |
| cuckold | cuckold |
| cuckoldly | cuckoldli |
| cuckolds | cuckold |
| cuckoo | cuckoo |
| cucullus | cucullu |
| cudgel | cudgel |
| cudgeled | cudgel |
| cudgell | cudgel |
| cudgelling | cudgel |
| cudgels | cudgel |
| cue | cue |
| cues | cue |
| cuff | cuff |
| cuffs | cuff |
| cuique | cuiqu |
| cull | cull |
| culling | cull |
| cullion | cullion |
| cullionly | cullionli |
| cullions | cullion |
| culpable | culpabl |
| culverin | culverin |
| cum | cum |

cumber cumber
cumberland cumberland
cunning cun
cunningly cunningli
cunnings cun
cuore cuor
cup cup
cupbearer cupbear
cupboarding cupboard
cupid cupid
cupids cupid
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cups cup
cur cur
curan curan
curate curat
curb curb
curbed curb
curbing curb
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cureless cureless
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curfew curfew
curing cure
curio curio
curiosity curios
curious curiou
curiously curious
curl curl
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currants currant
current current
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currish currish
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cursies cursi
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curtail curtail
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cushion cushion
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custalorum custalorum
custard custard
custody custodi
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customary customari

customed custom
customer custom
customers custom
customs custom
custure custur
cut cut
cutler cutler
cutpurse cutpurs
cutpurses cutpurs
cuts cut
cutter cutter
cutting cut
cuttle cuttl
cxsar cxsar
cyclops cyclop
cydnus cydnu
cygnet cygnet
cygnets cygnet
cym cym

cymbals cymbal
cymbeline cymbelin
cyme cyme
cynic cynic
cynthia cynthia
cypress cypress
cypriot cypriot
cyprus cypru
cyrus cyru
cytherea cytherea
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dabbled dabbl
dace dace
dad dad
daedalus daedalu
daemon daemon
daff daff
daffed daf
daffest daffest
daffodils daffodil
dagger dagger
daggers dagger
dagonet dagonet
daily daili
daintier daintier
dainties dainti
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dale dale
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dalmatians dalmatian
dam dam
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| dames | dame |
| damm | damm |
| damn | damn |
| damnable | damnabl |
| damnably | damnabl |
| damnation | damnat |
| damned | damn |
| damns | damn |
| damoiselle | damoisel |
| damon | damon |
| damosella | damosella |
| damp | damp |
| dams | dam |
| damsel | damsel |
| damsons | damson |
| dan | dan |
| danc | danc |
| dance | danc |
| dancer | dancer |
| dances | danc |
| dancing | danc |
| dandle | dandl |
| dandy | dandi |
| dane | dane |
| dang | dang |
| danger | danger |
| dangerous | danger |
| dangerously | danger |
| dangers | danger |
| dangling | dangl |
| daniel | daniel |
| danish | danish |
| dank | dank |
| dankish | dankish |
| danskers | dansker |
| daphne | daphn |
| dappled | dappl |
| dapples | dappl |
| dar | dar |
| dardan | dardan |
| dardanian | dardanian |
| dardanius | dardaniu |
| dare | dare |
| dared | dare |
| dareful | dare |
| dares | dare |
| darest | darest |

daring dare
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dark dark
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darling darl
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dartford dartford
darting dart
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daughter daughter
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dauphin dauphin
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debauch debauch
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debonair debonair
deborah deborah
debosh debosh
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delectable delect
deliberate deliber
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demand demand
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demanding demand
demands demand
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demeanour demeanour
demerits demerit
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demetrius demetriu
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demigod demigod
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demoiselles demoisel
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demure demur
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despairs despair
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despoiled despoil
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destiny destini
destitute destitut
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detestable detest
detested detest
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detractions detract
deucalion deucalion
deuce deuc
deum deum
deux deux
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device devic
devices devic
devil devil
devilish devilish
devils devil
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devise devis
devised devis
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devising devis
devoid devoid
devonshire devonshir
devote devot
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devotion devot
devour devour
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devourers devour
devouring devour
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dew dew
dewberries dewberri
dewdrops dewdrop
dewlap dewlap
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dews dew

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| dewy | dewi |
| dexter | dexter |
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| dexteriously | dexteri |
| dexterity | dexter |
| di | di |
| diable | diabl |
| diablo | diablo |
| diadem | diadem |
| dial | dial |
| dialect | dialect |
| dialogue | dialogu |
| dialogued | dialogu |
| dials | dial |
| diameter | diamet |
| diamond | diamond |
| diamonds | diamond |
| dian | dian |
| diana | diana |
| diaper | diaper |
| dibble | dibbl |
| dic | dic |
| dice | dice |
| dicers | dicer |
| dich | dich |
| dick | dick |
| dickens | dicken |
| dickon | dickon |
| dicky | dicki |
| dictator | dictat |
| diction | diction |
| dictynna | dictynna |
| did | did |
| diddle | diddl |
| didest | didest |
| dido | dido |
| didst | didst |
| die | die |
| died | di |
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| dive | dive |
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| diversely | divers |
| diversity | divers |
| divert | divert |
| diverted | divert |
| diverts | divert |
| dives | dive |
| divest | divest |
| dividable | divid |
| dividant | divid |
| divide | divid |
| divided | divid |
| divides | divid |
| divideth | divideth |
| divin | divin |
| divination | divin |
| divine | divin |
| divinely | divin |
| divineness | divin |
| diviner | divin |
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| divinest | divinest |
| divining | divin |
| divinity | divin |
| division | divis |
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| divorc | divorc |
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| do | do |
| doating | doat |
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| dock | dock |
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dole dole
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dolor dolor
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doorkeeper doorkeep
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| doubtfully | doubtfulli |
| doubting | doubt |
| doubtless | doubtless |
| doubts | doubt |
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| dough | dough |
| doughty | doughti |
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| douglas | dougla |
| dout | dout |
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| douts | dout |
| dove | dove |
| dovehouse | dovehous |
| dover | dover |
| doves | dove |
| dow | dow |
| dowager | dowag |
| dowdy | dowdi |
| dower | dower |
| dowerless | dowerless |
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| down | down |
| downfall | downfal |
| downright | downright |
| downs | down |
| downstairs | downstair |
| downtrod | downtrod |
| downward | downward |
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| downy | downi |
| dowries | dowri |
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| dowsabel | dowsabel |
| doxy | doxi |
| dozed | doze |
| dozen | dozen |
| dozens | dozen |
| dozy | dozi |
| drab | drab |
| drabbing | drab |
| drabs | drab |
| drachma | drachma |
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| drag | drag |
| dragg | dragg |
| dragged | drag |
| dragging | drag |
| dragon | dragon |
| dragonish | dragonish |
| dragons | dragon |
| drain | drain |
| drained | drain |
| drains | drain |
| drake | drake |
| dram | dram |
| dramatis | dramati |
| drank | drank |
| draught | draught |
| draughts | draught |
| drave | drave |
| draw | draw |
| drawbridge | drawbridg |
| drawer | drawer |
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| draweth | draweth |
| drawing | draw |
| drawling | |
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| drawn | drawn |
| draws | draw |
| drayman | drayman |
| draymen | draymen |
| dread | dread |
| dreaded | dread |
| dreadful | dread |
| dreadfully | dreadfulli |
| dreading | dread |
| dreads | dread |
| dream | dream |
| dreamer | dreamer |
| dreamers | dreamer |
| dreaming | dream |
| dreams | dream |
| dreamt | dreamt |
| drearning | drearn |
| dreary | dreari |
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| drought | drought |
| drove | drove |
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| drowning | drown |
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| drudge | drudg |
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| drunk | drunk |
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| eggs | egg |
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| egma | egma |
| ego | ego |
| egregious | egregi |
| egregiously | egregi |
| egress | egress |
| egypt | egypt |
| egyptian | egyptian |
| egyptians | egyptian |
| eie | eie |
| eight | eight |
| eighteen | eighteen |
| eighth | eighth |
| eightpenny | eightpenni |
| eighty | eighti |
| eisel | eisel |
| either | either |
| eject | eject |
| eke | ek |
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| elbe | elb |
| elbow | elbow |
| elbows | elbow |
| eld | eld |
| elder | elder |
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| eldest | eldest |
| eleanor | eleanor |
| elect | elect |
| elected | elect |
| election | elect |
| elegancy | eleg |
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| elements | element |
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| eleven | eleven |
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| faithful | faith |
| faithfull | faithful |
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| faithless | faithless |
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| faitors | faitor |
| fal | fal |
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| falcon | falcon |
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| falconer | falcon |
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| fall | fall |
| fallacy | fallaci |
| fallen | fallen |
| falleth | falleth |
| falliable | falliabl |
| fallible | fallibl |
| falling | fall |
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| false | fals |
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| falstaff | falstaff |
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| fam | fam |
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| famed | fame |
| familiar | familiar |
| familiarity | familiar |
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| fed | fed |
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| feel | feel |
| feeler | feeler |
| feeling | feel |
| feelingly | feelingli |
| feels | feel |
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| fell | fell |
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| fellow | fellow |
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| fellows | fellow |
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| fells | fell |
| felon | felon |
| felonious | feloni |
| felony | feloni |
| felt | felt |
| female | femal |
| females | femal |
| feminine | feminin |
| fen | fen |
| fenc | fenc |
| fence | fenc |
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| fer | fer |
| ferdinand | ferdinand |
| fere | fere |
| fernseed | fernse |
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| ferrers | ferrer |
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| ferry | ferri |
| ferryman | ferryman |
| fertile | fertil |
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| fery | feri |
| fest | fest |
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fiddler fiddler
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fidele fidel
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| figur | figur |
| figure | figur |
| figured | figur |
| figures | figur |
| figuring | figur |
| fike | fike |
| fil | fil |
| filberts | filbert |
| filch | filch |
| filches | filch |
| filching | filch |
| file | file |
| filed | file |
| files | file |
| filial | filial |
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| fill | fill |
| filled | fill |
| fillet | fillet |
| filling | fill |
| fillip | fillip |
| fills | fill |
| filly | filli |
| film | film |
| fils | fil |
| filth | filth |
| filths | filth |
| filthy | filthi |
| fin | fin |
| finally | final |
| finch | finch |
| find | find |
| finder | finder |
| findeth | findeth |
| finding | find |
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| fitly | fitli |
| fitment | fitment |
| fitness | fit |
| fits | fit |
| fitted | fit |
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| fittest | fittest |
| fitteth | fitteth |
| fitting | fit |
| fitzwater | fitzwat |
| five | five |
| fivepence | fivep |
| fives | five |
| fix | fix |
| fixed | fix |
| fixes | fix |
| fixeth | fixeth |
| fixing | fix |
| fixture | fixtur |
| fl | fl |
| flag | flag |
| flagging | flag |
| flagon | flagon |
| flagons | flagon |
| flags | flag |
| flail | flail |
| flakes | flake |
| flaky | flaki |
| flam | flam |
| flame | flame |
| flamen | flamen |
| flamens | flamen |
| flames | flame |
| flaming | flame |
| flaminius | flaminiu |
| flanders | flander |
| flannel | flannel |
| flap | flap |
| flaring | flare |
| flash | flash |
| flashes | flash |
| flashing | flash |
| flask | flask |
| flat | flat |
| flatly | flatli |
| flatness | flat |
| flats | flat |

flatt flatt
flatter flatter
flattered flatter
flatterer flatter
flatterers flatter
flatterest flatterest
flatteries flatteri
flattering flatter
flatters flatter
flattery flatteri
flaunts flaunt
flavio flavio
flavius flaviu
flaw flaw
flaws flaw
flax flax
flaxen flaxen
flay flai
flaying flai
flea flea
fleance fleanc
fleas flea
flecked fleck
fled fled
fledge fledg
flee flee
fleec fleec
fleece fleec
fleeces fleec
fleer fleer
fleering fleer
fleers fleer
fleet fleet
fleeter fleeter
fleeting fleet
fleming fleme
flemish flemish
flesh flesh
fleshes flesh
fleshly fleshli
fleshment fleshment
fleshmonger fleshmong
flew flew
flexible flexibl
flexure flexur
flibbertigibbet flibbertigibbet

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|---|---|
| flickering | flicker |
| flidge | flidg |
| fliers | flier |
| flies | fli |
| flieth | flieth |
| flight | flight |
| flights | flight |
| flighty | flighti |
| flinch | flinch |
| fling | fling |
| flint | flint |
| flints | flint |
| flinty | flinti |
| flirt | flirt |
| float | float |
| floated | float |
| floating | float |
| flock | flock |
| flocks | flock |
| flood | flood |
| floodgates | floodgat |
| floods | flood |
| floor | floor |
| flora | flora |
| florence | florenc |
| florentine | florentin |
| florentines | florentin |
| florentius | florentiu |
| florizel | florizel |
| flote | flote |
| floulish | floulish |
| flour | flour |
| flourish | flourish |
| flourishes | flourish |
| flourisheth | flourisheth |
| flourishing | flourish |
| flout | flout |
| flouted | flout |
| flouting | flout |
| flouts | flout |
| flow | flow |
| flowed | flow |
| flower | flower |
| flowerets | floweret |
| flowers | flower |
| flowing | flow |
| flown | flown |

| | |
|---|---|
| flows | flow |
| fluellen | fluellen |
| fluent | fluent |
| flung | flung |
| flush | flush |
| flushing | flush |
| fluster | fluster |
| flute | flute |
| flutes | flute |
| flutter | |
| flutter | |
| flux | flux |
| fluxive | fluxiv |
| fly | fly |
| flying | fly |
| fo | fo |
| foal | foal |
| foals | foal |
| foam | foam |
| foamed | foam |
| foaming | foam |
| foams | foam |
| foamy | foami |
| fob | fob |
| focative | foc |
| fodder | fodder |
| foe | foe |
| foeman | foeman |
| foemen | foemen |
| foes | foe |
| fog | fog |
| foggy | foggi |
| fogs | fog |
| foh | foh |
| foi | foi |
| foil | foil |
| foiled | foil |
| foils | foil |
| foin | foin |
| foining | foin |
| foins | foin |
| fois | foi |
| foison | foison |
| foisons | foison |
| foist | foist |
| foix | foix |
| fold | fold |
| folded | fold |

| | |
|---|---|
| folds | fold |
| folio | folio |
| folk | folk |
| folks | folk |
| follies | folli |
| follow | follow |
| followed | follow |
| follower | follow |
| followers | follow |
| followest | followest |
| following | follow |
| follows | follow |
| folly | folli |
| fond | fond |
| fonder | fonder |
| fondly | fondli |
| fondness | fond |
| font | font |
| fontibell | fontibel |
| food | food |
| fool | fool |
| fooleries | fooleri |
| foolery | fooleri |
| foolhardy | foolhardi |
| fooling | fool |
| foolish | foolish |
| foolishly | foolishli |
| foolishness | foolish |
| fools | fool |
| foot | foot |
| football | footbal |
| footboy | footboi |
| footboys | footboi |
| footed | foot |
| footfall | footfal |
| footing | foot |
| footman | footman |
| footmen | footmen |
| footpath | footpath |
| footsteps | footstep |
| footstool | footstool |
| fopp | fopp |
| fopped | fop |
| foppery | fopperi |
| foppish | foppish |
| fops | fop |
| for | for |

forage forag
foragers forag
forbade forbad
forbear forbear
forbearance forbear
forbears forbear
forbid forbid
forbidden forbidden
forbiddenly forbiddenli
forbids forbid
forbod forbod
forborne
forborn
forc forc
force forc
forced forc
forceful forc
forceless forceless
forces forc
forcible forcibl
forcibly forcibl
forcing forc
ford ford
fordid fordid
fordo fordo
fordoes fordo
fordone fordon
fore fore
forecast forecast
forefather forefath
forefathers forefath
forefinger forefing
forego forego
foregone foregon
forehand forehand
forehead forehead
foreheads forehead
forehorse forehors
foreign foreign
foreigner foreign
foreigners foreign
foreknowing foreknow
foreknowledge foreknowledg
foremost
foremost
forenamed forenam
forenoon forenoon
forerun forerun

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|---|---|
| forerunner | forerunn |
| forerunning | forerun |
| foreruns | forerun |
| foresaid | foresaid |
| foresaw | foresaw |
| foresay | foresai |
| foresee | forese |
| foreseeing | forese |
| foresees | forese |
| foreshow | foreshow |
| foreskirt | foreskirt |
| forespent | foresp |
| forest | forest |
| forestall | forestal |
| forestalled | forestal |
| forester | forest |
| foresters | forest |
| forests | forest |
| foretell | foretel |
| foretelling | foretel |
| foretells | foretel |
| forethink | forethink |
| forethought | forethought |
| foretold | foretold |
| forever | forev |
| foreward | foreward |
| forewarn | forewarn |
| forewarned | forewarn |
| forewarning | forewarn |
| forfeit | forfeit |
| forfeited | forfeit |
| forfeiters | forfeit |
| forfeiting | forfeit |
| forfeits | forfeit |
| forfeiture | forfeitur |
| forfeitures | forfeitur |
| forfend | forfend |
| forfended | forfend |
| forg | forg |
| forgave | forgav |
| forge | forg |
| forged | forg |
| forgeries | forgeri |
| forgery | forgeri |
| forges | forg |
| forget | forget |
| forgetful | forget |

forgetfulness forget
forgetive forget
forgets forget
forgetting forget
forgive forgiv
forgiven forgiven
forgiveness forgiv
forgo forgo
forgoing forgo
forgone forgon
forgot
forgot
forgotten forgotten
fork fork
forked fork
forks fork
forlorn forlorn
form form
formal formal
formally formal
formed form
former former
formerly formerli
formless formless
forms form
fornication fornic
fornications fornic
fornicatress fornicatress
forres forr
forrest forrest
forsake forsak
forsaken forsaken
forsaketh forsaketh
forslow forslow
forsook forsook
forsooth forsooth
forspent forspent
forspoke forspok
forswear forswear
forswearing forswear
forswore forswor
forsworn forsworn
fort fort
forted fort
forth forth
forthcoming forthcom
forthlight forthlight
forthright forthright

forthwith forthwith
fortification fortif
fortifications fortif
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fortinbras fortinbra
fortitude fortitud
fortnight fortnight
fortress fortress
fortresses fortress
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fortunately fortun
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fortuned fortun
fortunes fortun
fortward fortward
forty forti
forum forum
forward forward
forwarding forward
forwardness forward
forwards forward
forwearied forweari
fosset fosset
fost fost
foster foster
fostered foster
fought fought
foughten foughten
foul foul
fouler fouler
foulest foulest
foully foulli
foulness foul
found found
foundation foundat
foundations foundat
founded found
founder founder
fount fount
fountain fountain
fountains fountain
founts fount

four four
fourscore fourscor
fourteen fourteen
fourth fourth
foutra foutra
fowl fowl
fowler fowler
fowling fowl
fowls
fowl
fox fox
foxes fox
foxship foxship
fracted fract
fraction fraction
fractions fraction
fragile fragil
fragment fragment
fragments fragment
fragrant fragrant
frail frail
frailer frailer
frailties frailti
frailty frailti
fram fram
frame frame
framed frame
frames frame
frampold frampold
fran fran
francais francai
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frances franc
franchise franchis
franchised franchis
franchisement franchis
franchises franchis
franciae francia
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franciscan
francisco francisco
frank frank
franker franker
frankfort frankfort
franklin franklin
franklins franklin

| | |
|---|---|
| frankly | frankli |
| frankness | frank |
| frantic | frantic |
| franticly | franticli |
| frateretto | frateretto |
| fratrum | fratrum |
| fraud | fraud |
| fraudful | fraud |
| fraught | fraught |
| fraughtage | fraughtag |
| fraughting | fraught |
| fray | frai |
| frays | frai |
| freckl | freckl |
| freckled | freckl |
| freckles | freckl |
| frederick | frederick |
| free | free |
| freed | freed |
| freedom | freedom |
| freedoms | freedom |
| freehearted | freeheart |
| freelier | freelier |
| freely | freeli |
| freeman | freeman |
| freemen | freemen |
| freeness | freeness |
| freer | freer |
| frees | free |
| freestone | freeston |
| freetown | freetown |
| freeze | freez |
| freezes | freez |
| freezing | freez |
| freezings | freez |
| french | french |
| frenchman | frenchman |
| frenchmen | frenchmen |
| frenchwoman | frenchwoman |
| frenzy | frenzi |
| frequent | frequent |
| frequents | frequent |
| fresh | fresh |
| fresher | fresher |
| freshes | fresh |
| freshest | freshest |
| freshly | freshli |
| freshness | fresh |

| | |
|---|---|
| fret | fret |
| fretful | fret |
| frets | fret |
| fretted | fret |
| fretten | fretten |
| fretting | fret |
| friar | friar |
| friars | friar |
| friday | fridai |
| fridays | fridai |
| friend | friend |
| friended | friend |
| friending | friend |
| friendless | friendless |
| friendliness | friendli |
| friendly | friendli |
| friends | friend |
| friendship | friendship |
| friendships | friendship |
| frieze | friez |
| fright | fright |
| frighted | fright |
| frightened | frighten |
| frightful | fright |
| frighting | fright |
| frights | fright |
| fringe | fring |
| fringed | fring |
| frippery | fripperi |
| frisk | frisk |
| fritters | fritter |
| frivolous | frivol |
| fro | fro |
| frock | frock |
| frog | frog |
| frogmore | frogmor |
| froissart | froissart |
| frolic | frolic |
| from | from |
| front | front |
| fronted | front |
| frontier | frontier |
| frontiers | frontier |
| fronting | front |
| frontlet | frontlet |
| fronts | front |
| frost | frost |
| frosts | frost |

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|---|---|
| frosty | frosti |
| froth | froth |
| froward | froward |
| frown | frown |
| frowning | frown |
| frowningly | frowningli |
| frowns | frown |
| froze | froze |
| frozen | frozen |
| fructify | fructifi |
| frugal | frugal |
| fruit | fruit |
| fruiterer | fruiter |
| fruitful | fruit |
| fruitfully | fruitfulli |
| fruitfulness | fruit |
| fruition | fruition |
| fruitless | fruitless |
| fruits | fruit |
| frush | frush |
| frustrate | frustrat |
| frutify | frutifi |
| fry | fry |
| fubb | fubb |
| fuel | fuel |
| fugitive | fugit |
| fulfil | fulfil |
| fulfill | fulfil |
| fulfilling | fulfil |
| fulfils | fulfil |
| full | full |
| fullam | fullam |
| fuller | fuller |
| fullers | fuller |
| fullest | fullest |
| fullness | full |
| fully | fulli |
| fulness | ful |
| fulsome | fulsom |
| fulvia | fulvia |
| fum | fum |
| fumble | fumbl |
| fumbles | fumbl |
| fumblest | fumblest |
| fumbling | fumbl |
| fume | fume |
| fumes | fume |
| fuming | fume |

fumiter fumit
fumitory fumitori
fun fun
function function
functions function
fundamental fundament
funeral funer
funerals funer
fur fur
furbish furbish
furies furi
furious furiou
furlongs furlong
furnace furnac
furnaces furnac
furnish furnish
furnished furnish
furnishings furnish
furniture furnitur
furnival furniv
furor furor
furr furr
furrow furrow
furrowed furrow
furrows furrow
furth furth
further further
furtherance further
furtherer further
furthermore furthermor
furthest furthest
fury furi
furze furz
furzes furz
fust fust
fustian fustian
fustilarian fustilarian
fusty fusti
fut fut
future futur
futurity futur
g g
gabble gabbl
gaberdine gaberdin
gabriel gabriel
gad gad
gadding gad
gads gad

gadshill gadshil
gag gag
gage gage
gaged gage
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gaging gage
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gained gain
gainer gainer
gaingiving gaingiv
gains gain
gainsaid gainsaid
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gainsaying gainsai
gainsays gainsai
gainst gainst
gait gait
gaited gait
galathe galath
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galen galen
gales gale
gall gall
gallant gallant
gallantly gallantli
gallantry gallantri
gallants gallant
galled gall
gallery galleri
galley gallei
galleys gallei
gallia gallia
gallian gallian
galliard galliard
galliasses galliass
gallimaufry gallimaufri
galling gall
gallons gallon
gallop gallop
galloping gallop
gallops gallop
gallow gallow
galloway gallowai
gallowglasses gallowglass
gallows gallow
gallowses gallows

galls gall
gallus gallu
gam gam
gambol gambol

gambold gambold
gambols gambol
gamboys gamboi
game game
gamers gamer
games game
gamesome gamesom
gamester gamest
gaming game
gammon gammon
gamut gamut
gan gan
gangren gangren
ganymede ganymed
gaol gaol
gaoler gaoler
gaolers gaoler
gaols gaol
gap gap
gape gape
gapes gape
gaping gape
gar gar
garb garb
garbage garbag
garboils garboil
garcon garcon
gard gard
garde gard
garden garden
gardener garden
gardeners garden
gardens
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gardez gardez
gardiner gardin
gardon gardon
gargantua gargantua
gargrave gargrav
garish garish
garland garland
garlands garland
garlic garlic

garment garment
garments garment
garmet garmet
garner garner
garners garner
garnish garnish
garnished garnish
garret garret
garrison garrison
garrisons garrison
gart gart
garter garter
garterd garterd
gartering garter
garters garter
gascony gasconi
gash gash
gashes gash
gaskins gaskin
gasp gasp
gasping gasp
gasted
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gastness gast
gat gat
gate gate
gated gate
gates gate
gath gath
gather gather
gathered gather
gathering gather
gathers gather
gatories gatori
gatory gatori
gaud gaud
gaudeo gaudeo
gaudy gaudi
gauge gaug
gaul gaul
gaultree gaultre
gaunt gaunt
gauntlet gauntlet
gauntlets gauntlet
gav gav
gave gave
gavest gavest
gawded gawd

gawds gawd
gawsey gawsei
gay gai
gayness gay
gaz gaz
gaze gaze
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gazer gazer
gazers gazer
gazes gaze
gazeth gazeth
gazing gaze
gear gear
geck geck
geese gees
geffrey geffrei
geld geld
gelded geld
gelding geld
gelida gelida
gelidus gelidu
gelt gelt
gem gem
geminy gemini
gems gem
gen gen
gender gender
genders gender
general gener
generally gener
generals gener
generation gener
generations gener
generative gener
generosity generos
generous gener
genitive genit
genitivo genitivo
genius geniu

gennets gennet
genoa genoa
genoux genoux
gens gen
gent gent
gentilhomme gentilhomm
gentility gentil

gentle gentl
gentlefolks gentlefolk
gentleman gentleman
gentlemanlike gentlemanlik
gentlemen gentlemen
gentleness gentl
gentler gentler
gentles gentl
gentlest gentlest
gentlewoman gentlewoman
gentlewomen gentlewomen
gently gentli
gentry gentri
george georg
gerard gerard
germaines germain
germains germain
german german
germane german
germans german
germany germani
gertrude gertrud
gest gest
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gesture gestur
gestures gestur
get get
getrude getrud
gets get
getter getter
getting get
ghastly ghastli
ghost ghost
ghosted ghost
ghostly ghostli
ghosts ghost
gi gi
giant giant
giantess giantess
giantlike giantlik
giants giant
gib gib
gibber gibber
gibbet gibbet
gibbets gibbet
gibe gibe
giber giber

gibes gibe
gibing gibe
gibingly gibingli
giddily giddili
giddiness giddi
giddy giddi
gift gift
gifts gift
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giglets giglet
giglot giglot
gilbert gilbert
gild gild
gilded gild
gilding gild
gilliams gilliam
gillian gillian
gills gill
gillyvors gillyvor
gilt gilt
gimmal gimmal
gimmers gimmer
gin gin
ging ging
ginger ginger
gingerbread gingerbread
gingerly gingerli
ginn ginn
gins gin
gioucestershire gioucestershir
gipes gipe
gipsies gipsi
gipsy gipsi
gird gird
girded gird
girdle girdl
girdled girdl
girdles girdl
girdling girdl
girl girl
girls
girl
girt girt
girth girth
gis gi
giv giv
give give

given given
giver giver
givers giver
gives give
givest givest
giveth giveth
giving give
givings give
glad glad
gladded glad
gladding glad
gladly gladli
gladness glad
glamis glami
glanc glanc
glance glanc
glanced glanc
glances glanc
glancing glanc
glanders glander
glansdale glansdal
glare glare
glares glare
glass glass
glasses glass
glassy glassi
glaz glaz
glazed glaze
gleams gleam
glean glean
gleaned glean
gleaning glean
gleeful gleeful
gleek gleek
gleeking gleek
gleeks gleek
glend glend
glendower glendow
glib glib
glide glide
glided glide
glides glide
glideth glideth
gliding glide
glimmer glimmer
glimmering glimmer
glimmers glimmer
glimpse glimps

glimpses glimps
glist glist
glistening glisten
glister glister
glistering glister
glisters glister
glitt glitt
glittering glitter
globe globe
globes globe
glooming gloom
gloomy gloomi
glories glori
glorified glorifi
glorify glorifi
glorious gloriou
gloriously glorious
glory glori
glose glose
gloss gloss
glosses gloss
glou glou
glouceste gloucest
gloucester gloucest
gloucestershire gloucestershir
glove glove
glover glover
gloves glove
glow glow
glowed glow
glowing glow
glowworm glowworm
gloz gloz
gloze gloze
glozes gloze
glu glu
glue glue
glued glu
glues glue
glut glut
glutt glutt
glutted glut
glutton glutton
gluttoning glutton
gluttony gluttoni
gnarled gnarl

gnarling gnarl
gnat gnat
gnats gnat
gnaw gnaw
gnawing gnaw
gnawn gnawn
gnaws gnaw
go go
goad goad
goaded goad
goads goad
goal goal
goat goat
goatish goatish
goats goat
gobbets gobbet
gobbo gobbo
goblet goblet
goblets goblet
goblin goblin
goblins goblin
god god
godded god
godden godden
goddess goddess
goddesses goddess
goddild goddild
godfather godfath
godfathers godfath
godhead godhead
godlike godlik
godliness godli
godly godli
godmother godmoth
gods god
godson godson
goer goer
goers goer
goes goe
goest goest
goeth goeth
goffe goff
gogs gog
going go
gold gold
golden golden
goldenly goldenli

goldsmith goldsmith
goldsmiths goldsmith
golgotha golgotha
goliases golias
goliath goliath
gon gon
gondola gondola
gondolier gondoli
gone gone
goneril goneril
gong gong
gonzago gonzago
gonzalo gonzalo
good good
goodfellow goodfellow
goodlier goodlier
goodliest goodliest
goodly goodli
goodman goodman
goodness good
goodnight goodnight
goodrig goodrig
goods good
goodwife goodwif
goodwill goodwil
goodwin goodwin
goodwins goodwin
goodyear goodyear
goodyears goodyear
goose goos
gooseberry gooseberri
goosequills goosequil
goot goot
gor gor
gorbellied gorbelli
gorboduc gorboduc
gordian gordian
gore gore
gored gore
gorg gorg
gorge gorg
gorgeous gorgeou
gorget gorget
gorging
gorg
gorgon gorgon
gormandize gormand
gormandizing gormand

gory gori
gosling gosl
gospel gospel
gospels gospel
goss goss
gossamer gossam
gossip gossip
gossiping gossip
gossiplike gossiplik
gossips gossip
got got
goth goth
goths goth
gotten gotten
gourd gourd
gout gout
gouts gout
gouty gouti
govern govern
governance govern
governed govern
governess gover
government govern
governor governor
governors governor
governs govern
gower gower
gown gown
gowns gown
grac grac
grace grace
graced grace
graceful grace
gracefully gracefulli
graceless graceless
graces grace
gracing grace
gracious graciou
graciously gracious
gradation gradat
graff graff
graffing graf
graft graft
grafted graft
grafters grafter
grain grain
grained grain

grains grain
gramercies gramerci
gramercy gramerci
grammar grammar
grand grand
grandam grandam
grandame grandam
grandchild grandchild
grande grand
grandeur grandeur
grandfather grandfath
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| handed | hand |
| handful | hand |
| handicraft | handicraft |
| handicraftsmen | handicraftsmen |
| handing | hand |
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| inly | inli |
| inmost | inmost |
| inn | inn |
| inner | inner |
| innkeeper | innkeep |
| innocence | innoc |
| innocency | innoc |
| innocent | innoc |
| innocents | innoc |
| innovation | innov |
| innovator | innov |
| inns | inn |
| innumerable | innumer |
| inoculate | inocul |
| inordinate | inordin |
| inprimis | inprimi |
| inquir | inquir |
| inquire | inquir |
| inquiry | inquiri |
| inquisition | inquisit |
| inquisitive | inquisit |
| inroads | inroad |
| insane | insan |
| insanie | insani |
| insatiate | insati |
| insconce | insconc |
| inscrib | inscrib |
| inscription | inscript |
| inscriptions | inscript |
| inscroll | inscrol |
| inscrutable | inscrut |
| insculp | insculp |
| insculpture | insculptur |
| insensible | insens |
| inseparable | insepar |
| inseparate | insepar |
| insert | insert |
| inserted | insert |
| inset | inset |
| inshell | inshel |
| inshipp | inshipp |
| inside | insid |
| insinewed | insinew |
| insinuate | insinu |
| insinuateth | insinuateth |
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insisted insist
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insubstantial insubstanti
insufficience insuffici
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insultment insult
insults insult

insupportable insupport
insuppressive insuppress
insurrection insurrect
insurrections insurrect
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intellect intellect
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intercepted intercept
intercepter intercept
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intercepts intercept
intercession intercess
intercessors intercessor
interchained interchain
interchang interchang
interchange interchang
interchangeably interchang
interchangement interchang
interchanging interchang
interdiction interdict
interest interest
interim interim

interims
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interior interior
interjections interject
interjoin interjoin
interlude interlud
intermingle intermingl
intermission intermiss
intermissive intermiss
intermit intermit
intermix intermix
intermixed intermix
interpose interpos
interposer interpos
interposes interpos
interpret interpret
interpretation interpret
interpreted interpret
interpreter interpret
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interrogatories interrogatori
interrupt interrupt
interrupted interrupt
interrupter interrupt
interruptest interruptest
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intervallums intervallum
interview interview
intestate intest
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intolerable intoler
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ionia ionia
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ira ira
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ireful ir
ireland ireland
iris iri
irish irish
irishman irishman
irishmen irishmen
irks irk
irksome irksom
iron iron
irons iron
irreconcil irreconcil
irrecoverable irrecover
irregular irregular
irregulous irregul
irreligious irreligi
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irreparable irrepar
irresolute irresolut
irrevocable irrevoc
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isabel isabel
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island island
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isle isl
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issu issu
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italian italian
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item item
items item
iteration iter
ithaca ithaca
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itshall itshal
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iwis iwi
ix ix
j j
jacet jacet
jack jack
jackanapes jackanap
jacks jack
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jackslave jackslav
jacob jacob
jade jade
jaded jade
jades jade
jail jail
jakes jake
jamany jamani
james jame
jamy jami
jane jane
jangled jangl

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|---|---|
| jangling | jangl |
| january | januari |
| janus | janu |
| japhet | japhet |
| jaquenetta | jaquenetta |
| jaques | jaqu |
| jar | jar |
| jarring | jar |
| jars | jar |
| jarteer | jarteer |
| jasons | jason |
| jaunce | jaunc |
| jauncing | jaunc |
| jaundice | jaundic |
| jaundies | jaundi |
| jaw | jaw |
| jawbone | jawbon |
| jaws | jaw |
| jay | jai |
| jays | jai |
| jc | jc |
| je | je |
| jealous | jealou |
| jealousies | jealousi |
| jealousy | jealousi |
| jeer | jeer |
| jeering | jeer |
| jelly | jelli |
| jenny | jenni |
| jeopardy | jeopardi |
| jephtha | jephtha |
| jephthah | jephthah |
| jerkin | jerkin |
| jerkins | jerkin |
| jerks | jerk |
| jeronimy | jeronimi |
| jerusalem | jerusalem |
| jeshu | jeshu |
| jesses | jess |
| jessica | jessica |
| jest | jest |
| jested | jest |
| jester | jester |
| jesters | jester |
| jesting | jest |
| jests | jest |
| jesu | jesu |

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|---|---|
| jesus | jesu |
| jet | jet |
| jets | jet |
| jew | jew |
| jewel | jewel |
| jeweller | jewel |
| jewels | jewel |
| jewess | jewess |
| jewish | jewish |
| jewry | jewri |
| jews | jew |
| jezebel | jezebel |
| jig | jig |
| jigging | jig |
| jill | jill |
| jills | jill |
| jingling | jingl |
| joan | joan |
| job | job |
| jockey | jockei |
| jocund | jocund |
| jog | jog |
| jogging | jog |
| john | john |
| johns | john |
| join | join |
| joinder | joinder |
| joined | join |
| joiner | joiner |
| joineth | joineth |
| joins | join |
| joint | joint |
| jointed | joint |
| jointing | joint |
| jointly | jointli |
| jointress | jointress |
| joints | joint |
| jointure | jointur |
| jollity | jolliti |
| jolly | jolli |
| jolt | jolt |
| joltheads | jolthead |
| jordan | jordan |
| joseph | joseph |
| joshua | joshua |
| jot | jot |
| jour | jour |

jourdain jourdain
journal journal
journey journei
journeying journei
journeyman journeyman
journeymen journeymen
journeys journei
jove jove
jovem jovem
jovial jovial
jowl jowl
jowls jowl
joy joi
joyed joi
joyful joy
joyfully joyfulli
joyless joyless
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jud jud
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jude jude
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judicious judici
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juggle juggl
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juggler juggler
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julia julia

juliet juliet
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julio julio
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july juli
jump jump
jumpeth jumpeth
jumping jump
jumps jump
june june
junes june
junior junior
junius juniu
junkets junket
juno juno
jupiter jupit
jure jure
jurement jurement
jurisdiction jurisdict
juror juror
jurors juror
jury juri
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| katharine | katharin |
| katherina | katherina |
| katherine | katherin |
| kecksies | kecksi |
| keech | keech |
| keel | keel |
| keels | keel |
| keen | keen |
| keenness | keen |
| keep | keep |
| keepdown | keepdown |
| keeper | keeper |
| keepers | keeper |
| keepest | keepest |
| keeping | keep |
| keeps | keep |
| keiser | keiser |
| ken | ken |
| kendal | kendal |
| kennel | kennel |
| kent | kent |
| kentish | kentish |
| kentishman | kentishman |
| kentishmen | kentishmen |
| kept | kept |
| kerchief | kerchief |
| kerely | kere |
| kern | kern |
| kernal | kernal |
| kernel | kernel |
| kernels | kernel |
| kerns | kern |
| kersey | kersei |
| kettle | kettl |
| kettledrum | kettledrum |
| kettledrums | kettledrum |
| key | kei |
| keys | kei |
| kibe | kibe |
| kibes | kibe |
| kick | kick |
| kicked | kick |
| kickshaws | kickshaw |
| kickshawses | kickshaws |
| kicky | kicki |
| kid | kid |

kidney kidnei
kikely kike
kildare kildar
kill kill
killed kill
killer killer
killeth killeth
killing kill
killingworth killingworth
kills kill
kiln kiln
kimbolton kimbolton
kin kin
kind kind
kinder kinder
kindest kindest
kindle kindl
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kindless kindless
kindlier kindlier
kindling kindl
kindly kindli
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kindnesses kind
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kingdoms kingdom
kingly kingli
kings king
kinred kinr
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kinsman kinsman
kinsmen kinsmen
kinswoman kinswoman
kirtle kirtl
kirtles kirtl
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kissed kiss
kisses kiss
kissing kiss
kitchen kitchen
kitchens kitchen
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kneading knead
knee knee
kneel kneel
kneeling kneel
kneels kneel
knees knee
knell knell
knew knew
knewest knewest
knife knife
knight knight
knighted knight
knighthood knighthood
knighthoods knighthood
knightly knightli
knights knight
knit knit
knits knit
knitters knitter
knitteth knitteth
knives knive
knobs knob
knock knock
knocking knock
knocks knock
knog knog
knoll knoll
knot knot
knots knot
knotted knot
knotty knotti

know know
knower knower
knowest knowest
knowing know
knowingly knowingli
knowings know
knowledge knowledg
known known
knows know
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la la
laban laban
label label
labell label
labienus labienu
labio labio
labor labor
laboring labor
labors labor
labour labour
laboured labour
labourer labour
labourers labour
labouring labour
labours labour
laboursome laboursom
labras
labra
labyrinth labyrinth
lac lac
lace lace
laced lace
lacedaemon lacedaemon
laces lace
lacies laci
lack lack
lackbeard lackbeard
lacked lack
lackey lackei
lackeying lackei
lackeys lackei
lacking lack
lacks lack
lad lad
ladder ladder
ladders ladder
lade lade
laden laden

ladies ladi
lading lade
lads lad
lady ladi
ladybird ladybird
ladyship ladyship
ladyships ladyship
laer laer
laertes laert
lafeu lafeu
lag lag
lagging
lag
laid laid
lain lain
laissez laissez
lake lake
lakes lake
lakin lakin
lam lam
lamb lamb
lambert lambert
lambkin lambkin
lambkins lambkin
lambs lamb
lame lame
lamely lame
lameness lame
lament lament
lamentable lament
lamentably lament
lamentation lament
lamentations lament
lamented lament
lamenting lament
lamentings lament
laments lament
lames lame
laming lame
lammas lamma
lammastide lammastid
lamound lamound
lamp lamp
lampass lampass
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lanc lanc
lancaster lancast

lance lanc
lances lanc
lanceth lanceth
lanch lanch
land land
landed land
landing land
landless landless
landlord landlord
landmen landmen
lands land
lane lane
lanes lane
langage langag
langley langlei
langton langton
language languag
languageless languageless
languages languag
langues langu
languish languish
languished languish
languishes languish
languishing languish
languishings languish
languishment languish
languor languor
lank lank
lantern
lantern
lanterns lantern
lanthorn lanthorn
lap lap
lapis lapi
lapland lapland
lapp lapp
laps lap
lapse laps
lapsed laps
lapsing laps
lapwing lapw
laquais laquai
larded lard
larder larder
larding lard
lards lard
large larg
largely larg

largeness larg
larger larger
largess largess
largest largest
lark lark
larks lark
larron larron
lartius lartiu
larum larum
larums larum
las la
lascivious lascivi
lash lash
lass
lass
lasses lass
last last
lasted last
lasting last
lastly lastli
lasts last
latch latch
latches latch
late late
lated late
lately late
later later
latest latest
lath lath
latin latin
latten latten
latter latter
lattice lattic
laud laud
laudable laudabl
laudis laudi
laugh laugh
laughable laughabl
laughed laugh
laugher laugher
laughest laughest
laughing laugh
laughs laugh
laughter laughter
launce launc
launcelot launcelot
launces

launc
launch launch
laund laund
laundress laundress
laundry laundri
laur laur
laura laura
laurel laurel
laurels laurel
laurence laurenc
laus lau
lavache lavach
lave lave
lavee lave
lavender lavend
lavina lavina
lavinia lavinia
lavish lavish
lavishly lavishli
lavolt lavolt
lavoltas lavolta
law law
lawful law
lawfully lawfulli
lawless lawless
lawlessly lawlessli
lawn lawn
lawns lawn
lawrence lawrenc
laws law
lawyer lawyer
lawyers lawyer
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layer layer
layest layest
laying lai
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lazar lazar
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lazarus lazaru
lazy lazi
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lead lead
leaden leaden

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|---|---|
| leader | leader |
| leaders | leader |
| leadest | leadest |
| leading | lead |
| leads | lead |
| leaf | leaf |
| leagu | leagu |
| league | leagu |
| leagued | leagu |
| leaguer | leaguer |
| leagues | leagu |
| leah | leah |
| leak | leak |
| leaky | leaki |
| lean | lean |
| leander | leander |
| leaner | leaner |
| leaning | lean |
| leanness | lean |
| leans | lean |
| leap | leap |
| leaped | leap |
| leaping | leap |
| leaps | leap |
| leapt | leapt |
| lear | lear |
| learn | learn |
| learned | learn |
| learnedly | learnedli |
| learning | learn |
| learnings | learn |
| learns | learn |
| learnt | learnt |
| leas | lea |
| lease | leas |
| leases | leas |
| leash | leash |
| leasing | leas |
| least | least |
| leather | leather |
| leathern | leathern |
| leav | leav |
| leave | leav |
| leaven | leaven |
| leavening | leaven |
| leaver | leaver |
| leaves | leav |
| leaving | leav |

leavy leavi
lecher lecher
lecherous
lecher
lechers lecher
lechery lecheri
lecon lecon
lecture lectur
lectures lectur
led led
leda leda
leech leech
leeches leech
leek leek
leeks leek
leer leer
leers leer
lees lee
leese lees
leet leet
leets leet
left left
leg leg
legacies legaci
legacy legaci
legate legat
legatine legatin
lege lege
legerity leger
leges lege
legg legg
legion legion
legions legion
legitimate legitim
legitimation legitim
legs
leg
leicester leicest
leicestershire leicestershir
leiger leiger
leigers leiger
leisure leisur
leisurely leisur
leisures leisur
leman leman
lemon lemon
lena lena
lend lend

| | |
|---|---|
| lender | lender |
| lending | lend |
| lendings | lend |
| lends | lend |
| length | length |
| lengthen | lengthen |
| lengthens | lengthen |
| lengths | length |
| lenity | leniti |
| lennox | lennox |
| lent | lent |
| lenten | lenten |
| lentus | lentu |
| leo | leo |
| leon | leon |
| leonardo | leonardo |
| leonati | leonati |
| leonato | leonato |
| leonatus | leonatu |
| leontes | leont |
| leopard | leopard |
| leopards | leopard |
| leper | leper |
| leperous | leper |
| lepidus | lepidu |
| leprosy | leprosi |
| lequel | lequel |
| lers | ler |
| les | le |
| less | less |
| lessen | lessen |
| lessens | lessen |
| lesser | lesser |
| lesson | lesson |
| lessoned | lesson |
| lessons | lesson |
| lest | lest |
| lestrake | lestrak |
| let | let |
| lethargied | lethargi |
| lethargies | lethargi |
| lethargy | lethargi |
| lethe | leth |
| lets | let |
| lett | lett |
| letter | letter |
| letters | letter |
| letting | let |

lettuce lettuc
leur leur
leve leve
level level
levell level
levelled level
levels level
leven leven
levers lever
leviathan leviathan
leviathans leviathan
levied levi
levies levi
levity leviti
levy levi
levying levi
lewd lewd
lewdly lewdli
lewdness lewd
lewdsters lewdster
lewis lewi
liable liabl
liar liar
liars liar
libbard libbard
libelling libel
libels libel
liberal liber
liberality liber
liberte libert
liberties liberti
libertine libertin
libertines libertin
liberty liberti
library librari
libya
libya
licence licenc
licens licen
license licens
licentious licenti
lichas licha
licio licio
lick lick
licked lick
licker licker
lictors lictor
lid lid

lids lid
lie lie
lied li
lief lief
liefest liefest
liege lieg
liegeman liegeman
liegemen liegemen
lien lien
lies li
liest liest
lieth lieth
lieu lieu
lieutenant lieuten
lieutenantry lieutenantri
lieutenants lieuten
lieve liev
life life
lifeblood lifeblood
lifeless lifeless
lifelings
lifel
lift lift
lifted lift
lifter lifter
lifteth lifteth
lifting lift
lifts lift
lig lig
ligarius ligariu
liggens liggen
light light
lighted light
lighten lighten
lightens lighten
lighter lighter
lightest lightest
lightly lightli
lightness light
lightning lightn
lightnings lightn
lights light
lik lik
like like
liked like
likeliest likeliest
likelihood likelihood
likelihoods likelihood

likely like
likeness like
liker liker
likes like
likest likest
likewise likewis
liking like
likings like
lilies lili
lily lili
lim lim
limander limand
limb limb
limbeck limbeck
limbecks limbeck
limber limber
limbo limbo
limbs limb
lime lime
limed lime
limehouse limehous
limekilns limekiln
limit limit
limitation limit
limited limit
limits limit
limn limn
limp limp
limping limp
limps limp
lin lin
lincoln lincoln
lincolnshire lincolnshir
line line
lineal lineal
lineally lineal
lineament lineament
lineaments lineament
lined line
linen linen
linens linen
lines line
ling ling
lingare lingar
linger linger
lingered linger
lingers linger
linguist linguist

| | |
|---|---|
| lining | line |
| link | link |
| links | link |
| linsey | linsei |
| linstock | linstock |
| linta | linta |
| lion | lion |
| lionel | lionel |
| lioness | lioness |
| lions | lion |
| lip | lip |
| lipp | lipp |
| lips | lip |
| lipsbury | lipsburi |
| liquid | liquid |
| liquor | liquor |
| liquorish | liquorish |
| liquors | liquor |
| lirra | lirra |
| lisbon | lisbon |
| lisp | lisp |
| lisping | lisp |
| list | list |
| listen | listen |
| listening | listen |
| lists | list |
| literatured | literatur |
| lither | lither |
| litter | litter |
| little | littl |
| littlest | littlest |
| liv | liv |
| live | live |
| lived | live |
| livelier | liveli |
| livelihood | livelihood |
| livelong | livelong |
| lively | live |
| liver | liver |
| liveries | liveri |
| livers | liver |
| livery | liveri |
| lives | live |
| livest | livest |
| liveth | liveth |
| livia | livia |
| living | live |

livings live
lizard lizard
lizards lizard
ll ll
lll lll
llous
llou
lnd lnd
lo lo
loa loa
loach loach
load load
loaden loaden
loading load
loads load
loaf loaf
loam loam
loan loan
loath loath
loathe loath
loathed loath
loather loather
loathes loath
loathing loath
loathly loathli
loathness loath
loathsome loathsom
loathsomeness loathsom
loathsomest loathsomest
loaves loav
lob lob
lobbies lobbi
lobby lobbi
local local
lochaber lochab
lock lock
locked lock
locking lock
lockram lockram
locks lock
locusts locust
lode lode
lodg lodg
lodge lodg
lodged lodg
lodgers lodger
lodges lodg
lodging lodg

| | |
|---|---|
| lodgings | lodg |
| lodovico | lodovico |
| lodowick | lodowick |
| lofty | lofti |
| log | log |
| logger | logger |
| loggerhead | loggerhead |
| loggerheads | loggerhead |
| loggets | logget |
| logic | logic |
| logs | log |
| loins | loin |
| loiter | loiter |
| loiterer | loiter |
| loiterers | loiter |
| loitering | loiter |
| lolling | loll |
| lolls | loll |
| lombardy | lombardi |
| london | london |
| londoners | london |
| lone | lone |
| loneliness | loneli |
| lonely | lone |
| long | long |
| longaville | longavil |
| longboat | longboat |
| longed | long |
| longer | longer |
| longest | longest |
| longeth | longeth |
| longing | long |
| longings | long |
| longly | longli |
| longs | long |
| longtail | longtail |
| loo | loo |
| loof | loof |
| look | look |
| looked | look |
| looker | looker |
| lookers | looker |
| lookest | lookest |
| looking | look |
| looks | look |
| loon | loon |
| loop | loop |

loos loo
loose loos
loosed loos
loosely loos
loosen loosen
loosing loos
lop lop
lopp lopp

loquitur loquitur
lord lord
lorded lord
lording lord
lordings lord
lordliness lordli
lordly lordli
lords lord
lordship lordship
lordships lordship
lorenzo lorenzo
lorn lorn
lorraine lorrain
lorship lorship
los lo
lose lose
loser loser
losers loser
loses lose
losest losest
loseth loseth
losing lose
loss loss
losses loss
lost lost
lot lot
lots lot
lott lott
lottery lotteri
loud loud
louder louder
loudly loudli
lour
lour
loureth loureth
louring lour
louse lous
louses lous
lousy lousi

| | |
|---|---|
| lout | lout |
| louted | lout |
| louts | lout |
| louvre | louvr |
| lov | lov |
| love | love |
| loved | love |
| lovedst | lovedst |
| lovel | lovel |
| lovelier | loveli |
| loveliness | loveli |
| lovell | lovel |
| lovely | love |
| lover | lover |
| lovered | lover |
| lovers | lover |
| loves | love |
| lovest | lovest |
| loveth | loveth |
| loving | love |
| lovingly | lovingli |
| low | low |
| lowe | low |
| lower | lower |
| lowest | lowest |
| lowing | low |
| lowliness | lowli |
| lowly | lowli |
| lown | lown |
| lowness | low |
| loyal | loyal |
| loyally | loyal |
| loyalties | loyalti |
| loyalty | loyalti |
| lozel | lozel |
| lt | lt |
| lubber | lubber |
| lubberly | lubberli |
| luc | luc |
| luccicos | luccico |
| luce | luce |
| lucentio | lucentio |
| luces | luce |
| lucetta | lucetta |
| luciana | luciana |
| lucianus | lucianu |
| lucifer | lucif |

lucifier lucifi
lucilius luciliu
lucina lucina
lucio lucio
lucius luciu
luck luck
luckier luckier
luckiest luckiest
luckily luckili
luckless luckless
lucky lucki
lucre
lucr
lucrece lucrec
lucretia lucretia
lucullius luculliu
lucullus lucullu
lucy luci
lud lud
ludlow ludlow
lug lug
lugg lugg
luggage luggag
luke luke
lukewarm lukewarm
lull lull
lulla lulla
lullaby lullabi
lulls lull
lumbert lumbert
lump lump
lumpish lumpish
luna luna
lunacies lunaci
lunacy lunaci
lunatic lunat
lunatics lunat
lunes lune
lungs lung
lupercal luperc
lurch lurch
lure lure
lurk lurk
lurketh lurketh
lurking
lurk
lurks lurk
luscious lusciou

lush lush
lust lust
lusted lust
luster luster
lustful lust
lustier lustier
lustiest lustiest
lustig lustig
lustihood lustihood
lustily lustili
lustre lustr
lustrous lustrou
lusts lust
lusty lusti
lute lute
lutes lute
lutestring lutestr
lutheran lutheran
luxurious luxuri
luxuriously luxuri
luxury luxuri
ly ly
lycaonia lycaonia
lycurguses lycurgus
lydia lydia
lye lye
lyen lyen
lying ly
lym lym
lymoges
lymog
lynn lynn
lysander lysand
m m
ma ma
maan maan
mab mab
macbeth macbeth
maccabaeus maccabaeu
macdonwald macdonwald
macduff macduff
mace mace
macedon macedon
maces mace
machiavel machiavel
machination machin
machinations machin
machine machin

mack mack
macmorris macmorri
maculate macul
maculation macul
mad mad
madam madam
madame madam
madams madam
madcap madcap
madded mad
madding mad
made made
madeira madeira
madly madli
madman
madman
madmen madmen
madness mad
madonna madonna
madrigals madrig
mads mad
maecenas maecena
maggot maggot
maggots maggot
magic magic
magical magic
magician magician
magistrate magistr
magistrates magistr
magnanimity magnanim
magnanimous magnanim
magni magni
magnifi magnifi
magnificence magnific
magnificent magnific
magnifico magnifico
magnificoes magnifico
magnus magnu
mahomet mahomet
mahu mahu
maid maid
maiden maiden
maidenhead maidenhead
maidenheads maidenhead
maidenhood maidenhood
maidenhoods maidenhood
maidenliest maidenliest
maidenly maidenli

maidens maiden
maidhood maidhood
maids maid
mail mail
mailed mail
mails mail
maim maim
maimed maim
maims maim
main main
maincourse maincours
maine main
mainly mainli
mainmast mainmast
mains main
maintain maintain
maintained maintain
maintains maintain
maintenance mainten
mais mai
maison maison
majestas majesta
majestee majeste
majestic majest
majestical majest
majestically majest
majesties majesti
majesty majesti
major major
majority major
mak mak
make make
makeless makeless
maker maker
makers maker
makes make
makest makest
maketh maketh
making make
makings make
mal mal
mala mala
maladies maladi
malady maladi
malapert malapert
malcolm malcolm
malcontent malcont
malcontents malcont

male male
maledictions maledict
malefactions malefact
malefactor malefactor
malefactors malefactor
males male
malevolence malevol
malevolent malevol
malhecho malhecho
malice malic
malicious malici
maliciously malici
malign
malign
malignancy malign
malignant malign
malignantly malignantli
malkin malkin
mall mall
mallard mallard
mallet mallet
mallows mallow
malmsey malmsei
malt malt
maltworms maltworm
malvolio malvolio
mamillius mamilliu
mammering mammer
mammet mammet
mammets mammet
mammock mammock
man man
manacle manacl
manacles manacl
manage manag
managed manag
manager manag
managing manag
manakin manakin
manchus manchu
mandate mandat
mandragora mandragora
mandrake mandrak
mandrakes mandrak

mane mane
manent manent
manes mane

manet manet
manfully manfulli
mangle mangl
mangled mangl
mangles mangl
mangling mangl
mangy mangi
manhood manhood
manhoods manhood
manifest manifest
manifested manifest
manifests manifest
manifold manifold
manifoldly manifoldli
manka manka
mankind mankind
manlike manlik
manly manli
mann mann
manna manna
manner manner
mannerly mannerli
manners manner
manningtree manningtre
mannish mannish
manor manor
manors manor
mans man
mansion
mansion
mansionry mansionri
mansions mansion
manslaughter manslaught
mantle mantl
mantled mantl
mantles mantl
mantua mantua
mantuan mantuan
manual manual
manure manur
manured manur
manus manu
many mani
map map
mapp mapp
maps map
mar mar
marble marbl

| | |
|---|---|
| marbled | marbl |
| marcade | marcad |
| marcellus | marcellu |
| march | march |
| marches | march |
| marcheth | marcheth |
| marching | march |
| marchioness | marchio |
| marchpane | marchpan |
| marcians | marcian |
| marcius | marciu |
| marcus | marcu |
| mardian | |
| mardian | |
| mare | mare |
| mares | mare |
| marg | marg |
| margarelon | margarelon |
| margaret | margaret |
| marge | marg |
| margent | margent |
| margery | margeri |
| maria | maria |
| marian | marian |
| mariana | mariana |
| maries | mari |
| marigold | marigold |
| mariner | marin |
| mariners | marin |
| maritime | maritim |
| marjoram | marjoram |
| mark | mark |
| marked | mark |
| market | market |
| marketable | market |
| marketplace | marketplac |
| markets | market |
| marking | mark |
| markman | markman |
| marks | mark |
| marl | marl |
| marle | marl |
| marmoset | marmoset |
| marquess | marquess |
| marquis | marqui |
| marr | marr |
| marriage | marriag |
| marriages | marriag |

| | |
|---|---|
| married | marri |
| marries | marri |
| marring | mar |
| marrow | marrow |
| marrowless | marrowless |
| marrows | marrow |
| marry | marri |
| marrying | marri |
| mars | mar |
| marseilles | marseil |
| marsh | marsh |
| marshal | marshal |
| marshalsea | marshalsea |
| marshalship | marshalship |
| mart | mart |
| marted | mart |
| martem | martem |
| martext | martext |
| martial | martial |
| martin | martin |
| martino | martino |
| martius | martiu |
| martlemas | martlema |
| martlet | martlet |
| marts | mart |
| martyr | martyr |
| martyrs | martyr |
| marullus | marullu |

| | |
|---|---|
| marv | marv |
| marvel | marvel |
| marvell | marvel |
| marvellous | marvel |
| marvellously | marvel |
| marvels | marvel |
| mary | mari |
| mas | ma |
| masculine | masculin |
| masham | masham |
| mask | mask |
| masked | mask |
| masker | masker |
| maskers | masker |
| masking | mask |
| masks | mask |
| mason | mason |
| masonry | masonri |
| masons | mason |

masque masqu
masquers masquer
masques masqu
masquing masqu
mass mass
massacre massacr
massacres massacr
masses mass
massy massi
mast mast
mastcr mastcr
master master
masterdom masterdom
masterest masterest
masterless masterless
masterly masterli
masterpiece masterpiec
masters master
mastership mastership
mastic mastic
mastiff mastiff
mastiffs mastiff
masts mast
match match
matches match
matcheth matcheth
matching match
matchless matchless
mate mate
mated mate
mater mater
material materi
mates mate
mathematics mathemat
matin matin
matron matron
matrons matron
matter matter
matters matter
matthew matthew
mattock mattock
mattress mattress
mature matur
maturity
matur
maud maud
maudlin maudlin
maugre maugr

| | |
|---|---|
| maul | maul |
| maund | maund |
| mauri | mauri |
| mauritania | mauritania |
| mauvais | mauvai |
| maw | maw |
| maws | maw |
| maxim | maxim |
| may | mai |
| mayday | maydai |
| mayest | mayest |
| mayor | mayor |
| maypole | maypol |
| mayst | mayst |
| maz | maz |
| maze | maze |
| mazed | maze |
| mazes | maze |
| mazzard | mazzard |
| me | me |
| meacock | meacock |
| mead | mead |
| meadow | meadow |
| meadows | meadow |
| meads | mead |
| meagre | meagr |
| meal | meal |
| meals | meal |
| mealy | meali |
| mean | mean |
| meanders | meander |
| meaner | meaner |
| meanest | meanest |
| meaneth | meaneth |
| meaning | mean |
| meanings | mean |
| meanly | meanli |
| means | mean |
| meant | meant |
| meantime | meantim |
| meanwhile | meanwhil |
| measles | measl |
| measur | measur |
| measurable | measur |
| measure | measur |
| measured | measur |
| measureless | measureless |

measures measur
measuring measur
meat meat
meats meat
mechanic mechan
mechanical mechan
mechanicals mechan
mechanics mechan
mechante mechant
med med
medal medal
meddle meddl
meddler meddler
meddling meddl
mede mede
medea medea
media media
mediation mediat
mediators mediat
medice medic
medicinal medicin
medicine medicin
medicines medicin
meditate medit
meditates medit
meditating medit
meditation medit
meditations medit
mediterranean mediterranean
mediterraneum mediterraneum
medlar medlar
medlars medlar
meed meed
meeds meed
meek meek
meekly meekli
meekness meek
meet meet
meeter meeter
meetest meetest
meeting meet
meetings meet
meetly meetli
meetness meet
meets meet

| | |
|---|---|
| meg | meg |
| mehercle | mehercl |
| meilleur | meilleur |
| meiny | meini |
| meisen | meisen |
| melancholies | melancholi |
| melancholy | melancholi |
| melford | melford |
| mell | mell |
| mellifluous | melliflu |
| mellow | mellow |
| mellowing | mellow |
| melodious | melodi |
| melody | melodi |
| melt | melt |
| melted | melt |
| melteth | melteth |
| melting | melt |
| melts | melt |
| melun | melun |
| member | member |
| members | member |
| memento | memento |
| memorable | memor |
| memorandums | memorandum |
| memorial | memori |
| memorials | memori |
| memories | memori |
| memoriz | memoriz |
| memorize | memor |
| memory | memori |
| memphis | memphi |
| men | men |
| menac | menac |
| menace | menac |
| menaces | menac |
| menaphon | menaphon |
| menas | mena |
| mend | mend |
| mended | mend |
| mender | mender |
| mending | mend |
| mends | mend |
| menecrates | menecr |
| menelaus | menelau |
| menenius | meneniu |
| mental | mental |

menteith menteith
mention mention
mentis menti
menton menton
mephostophilus mephostophilu
mer mer
mercatante mercatant
mercatio mercatio
mercenaries mercenari
mercenary mercenari
mercer mercer
merchandise merchandis
merchandized merchand
merchant merchant
merchants merchant
mercies merci
merciful merci
mercifully mercifulli
merciless merciless
mercurial mercuri
mercuries mercuri
mercury mercuri
mercutio mercutio
mercy merci
mere mere
mered mere
merely mere
merest merest
meridian meridian
merit merit
merited merit
meritorious meritori
merits merit
merlin merlin
mermaid mermaid
mermaids mermaid
merops merop
merrier merrier
merriest merriest
merrily merrili
merriman merriman
merriment merriment
merriments merriment
merriness merri
merry merri
mervailous mervail
mes me
mesh mesh

meshes mesh
mesopotamia mesopotamia
mess mess
message messag
messages messag
messala messala
messaline messalin
messenger messeng
messengers messeng
messes mess
messina messina
met met
metal metal
metals metal
metamorphis metamorphi
metamorphoses metamorphos
metaphor metaphor
metaphysical metaphys
metaphysics metaphys
mete mete
metellus metellu
meteor meteor
meteors meteor
meteyard meteyard
metheglin metheglin
metheglins metheglin
methink methink
methinks methink
method
method
methods method
methought methought
methoughts methought
metre metr
metres metr
metropolis metropoli
mette mett
mettle mettl
mettled mettl
meus meu
mew mew
mewed mew
mewling mewl
mexico mexico
mi mi
mice mice
michael michael
michaelmas michaelma

micher micher
miching mich
mickle mickl
microcosm microcosm
mid mid
midas mida
middest middest
middle middl
middleham middleham
midnight midnight
midriff midriff
midst midst
midsummer midsumm

midway midwai
midwife midwif
midwives midwiv
mienne mienn
might might
mightful might
mightier mightier
mightiest mightiest
mightily mightili
mightiness mighti
mightst mightst
mighty mighti
milan milan
milch milch
mild mild
milder milder
mildest mildest
mildew mildew
mildews mildew
mildly mildli
mildness mild
mile mile
miles mile
milford milford
militarist militarist
military militari
milk milk
milking milk
milkmaid milkmaid
milks milk
milksops milksop
milky
milki
mill mill

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|---|---|
| mille | mill |
| miller | miller |
| milliner | millin |
| million | million |
| millioned | million |
| millions | million |
| mills | mill |
| millstones | millston |
| milo | milo |
| mimic | mimic |
| minc | minc |
| mince | minc |
| minces | minc |
| mincing | minc |
| mind | mind |
| minded | mind |
| minding | mind |
| mindless | mindless |
| minds | mind |
| mine | mine |
| mineral | miner |
| minerals | miner |
| minerva | minerva |
| mines | mine |
| mingle | mingl |
| mingled | mingl |
| mingling | mingl |
| minikin | minikin |
| minim | minim |
| minime | minim |
| minimo | minimo |
| minimus | minimu |
| mining | mine |
| minion | minion |
| minions | minion |
| minist | minist |
| minister | minist |
| ministers | minist |
| ministration | ministr |
| minnow | minnow |
| minnows | minnow |
| minola | minola |
| minority | minor |
| minos | mino |
| minotaurs | minotaur |
| minstrel | minstrel |
| minstrels | minstrel |

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|---|---|
| minstrelsy | minstrelsi |
| mint | mint |
| mints | mint |
| minute | minut |
| minutely | minut |
| minutes | minut |
| minx | minx |
| mio | mio |
| mir | mir |
| mirable | mirabl |
| miracle | miracl |
| miracles | miracl |
| miraculous | miracul |
| miranda | miranda |
| mire | mire |
| mirror | mirror |
| mirrors | mirror |
| mirth | mirth |
| mirthful | mirth |
| miry | miri |
| mis | mi |
| misadventur | misadventur |
| misadventure | misadventur |
| misanthropos | misanthropo |
| misapplied | misappli |
| misbecame | misbecam |
| misbecom | misbecom |
| misbecome | misbecom |
| misbegot | misbegot |
| misbegotten | misbegotten |
| misbeliever | misbeliev |
| misbelieving | misbeliev |
| misbhav | misbhav |
| miscall | miscal |
| miscalled | miscal |
| miscarried | miscarri |
| miscarries | miscarri |
| miscarry | miscarri |
| miscarrying | miscarri |
| mischance | mischanc |
| mischances | mischanc |
| mischief | mischief |
| mischiefs | mischief |
| mischievous | mischiev |
| misconceived | misconceiv |
| misconst | misconst |
| misconster | misconst |

misconstruction misconstruct
misconstrued misconstru
misconstrues misconstru
miscreant miscreant
miscreate miscreat
misdeed misde
misdeeds misde
misdemean misdemean
misdemeanours misdemeanour
misdoubt misdoubt
misdoubteth misdoubteth
misdoubts misdoubt
misenum misenum
miser miser
miserable miser
miserably miser
misericorde misericord
miseries miseri
misers miser
misery miseri
misfortune misfortun
misfortunes misfortun
misgive misgiv
misgives misgiv
misgiving misgiv
misgoverned misgovern
misgovernment misgovern
misgraffed misgraf
misguide misguid
mishap mishap
mishaps mishap
misheard misheard
misinterpret misinterpret
mislead mislead
misleader mislead
misleaders mislead
misleading mislead
misled misl
mislike mislik
misord misord
misplac misplac
misplaced misplac
misplaces misplac
mispris mispri
misprised mispris
misprision mispris
misprizing mispriz

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|---|---|
| misproud | misproud |
| misquote | misquot |
| misreport | misreport |
| miss | miss |
| missed | miss |
| misses | miss |
| misshap | misshap |
| misshapen | misshapen |
| missheathed | missheath |
| missing | miss |
| missingly | missingli |
| missions | mission |
| missive | missiv |
| missives | missiv |
| misspoke | misspok |
| mist | mist |
| mista | mista |
| mistak | mistak |
| mistake | mistak |
| mistaken | mistaken |
| mistakes | mistak |
| mistaketh | mistaketh |
| mistaking | mistak |
| mistakings | mistak |
| mistemp | mistemp |
| mistempered | mistemp |
| misterm | misterm |
| mistful | mist |
| misthink | misthink |
| misthought | misthought |
| mistletoe | mistleto |
| mistook | mistook |
| mistreadings | mistread |
| mistress | mistress |
| mistresses | mistress |
| mistresss | mistresss |
| mistriship | mistriship |
| mistrust | mistrust |
| mistrusted | mistrust |
| mistrustful | mistrust |
| mistrusting | mistrust |
| mists | mist |
| misty | misti |
| misus | misu |
| misuse | misus |
| misused | misus |
| misuses | misus |

mites mite
mithridates mithrid
mitigate mitig
mitigation mitig
mix mix
mixed mix
mixture mixtur
mixtures mixtur
mm mm
mnd mnd
moan moan
moans moan
moat moat
moated moat
mobled mobl
mock mock
mockable mockabl
mocker mocker
mockeries mockeri
mockers mocker
mockery mockeri
mocking mock
mocks mock
mockvater mockvat
mockwater mockwat
model model
modena
modena
moderate moder
moderately moder
moderation moder
modern modern
modest modest
modesties modesti
modestly modestli
modesty modesti
modicums modicum
modo modo
module modul
moe moe
moi moi
moiety moieti
moist moist
moisten moisten
moisture moistur
moldwarp moldwarp
mole mole
molehill molehil

moles mole
molest molest
molestation molest
mollification mollif
mollis molli
molten molten
molto molto
mome mome
moment moment
momentary momentari
moming
mome
mon mon
monachum monachum
monarch monarch
monarchies monarchi
monarchize monarch
monarcho monarcho
monarchs monarch
monarchy monarchi
monast monast
monastery monasteri
monastic monast
monday mondai
monde mond
money monei
moneys monei
mong mong
monger monger
mongers monger
monging mong
mongrel mongrel
mongrels mongrel
mongst mongst
monk monk
monkey monkei
monkeys monkei
monks monk
monmouth monmouth
monopoly monopoli
mons mon
monsieur monsieur
monsieurs monsieur
monster monster
monsters monster
monstrous monstrou
monstrously monstrous
monstrousness monstrous

monstruosity monstruos
montacute montacut
montage montag
montague montagu
montagues montagu
montano montano
montant montant
montez montez
montferrat montferrat
montgomery montgomeri
month month
monthly monthli
months month
montjoy montjoi
monument monument
monumental monument
monuments monument
mood mood
moods mood
moody moodi
moon moon
moonbeams moonbeam
moonish moonish
moonlight moonlight
moons moon
moonshine
moonshin
moonshines moonshin
moor moor
moorfields moorfield
moors moor
moorship moorship
mop mop
mope mope
moping mope
mopping mop
mopsa mopsa
moral moral
moraler moral
morality moral
moralize moral
mordake mordak
more more
moreover moreov
mores more
morgan morgan
mori mori
morisco morisco

morn morn
morning morn
mornings morn
morocco morocco
morris morri
morrow morrow
morrows morrow
morsel morsel
morsels morsel
mort mort

mortal mortal
mortality mortal
mortally mortal
mortals mortal
mortar mortar
mortgaged mortgag
mortified mortifi
mortifying mortifi
mortimer mortim
mortimers mortim
mortis morti
mortise mortis
morton morton
mose mose
moss moss
mossgrown mossgrown
most most
mote mote
moth moth
mother mother
mothers mother
moths moth
motion motion
motionless motionless
motions motion
motive motiv
motives motiv
motley motlei
mots mot
mought mought
mould mould
moulded
mould
mouldeth mouldeth
moulds mould
mouldy mouldi
moult moult

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|---|---|
| moulten | moulten |
| mounch | mounch |
| mounseur | mounseur |
| mounsieur | mounsieur |
| mount | mount |
| mountain | mountain |
| mountaineer | mountain |
| mountaineers | mountain |
| mountainous | mountain |
| mountains | mountain |
| mountant | mountant |
| mountanto | mountanto |
| mountebank | mountebank |
| mountebanks | mountebank |
| mounted | mount |
| mounteth | mounteth |
| mounting | mount |
| mounts | mount |
| mourn | mourn |
| mourned | mourn |
| mourner | mourner |
| mourners | mourner |
| mournful | mourn |
| mournfully | mournfulli |
| mourning | mourn |
| mourningly | mourningli |
| mournings | mourn |
| mourns | mourn |
| mous | mou |
| mouse | mous |
| mousetrap | mousetrap |
| mousing | mous |
| mouth | mouth |
| mouthed | mouth |
| mouths | mouth |
| mov | mov |
| movables | movabl |
| move | move |
| moveable | moveabl |
| moveables | moveabl |
| moved | move |
| mover | mover |
| movers | mover |
| moves | move |
| moveth | moveth |
| moving | move |
| movingly | movingli |
| movousus | movousu |

mow mow
mowbray mowbrai
mower mower
mowing mow
mows mow
moy moi
moys moi
moyses moys
mrs mr
much much
muck
muck
mud mud
mudded mud
muddied muddi
muddy muddi
muffins muffin
muffl muffl
muffle muffl
muffled muffl
muffler muffler
muffling muffl
mugger mugger
mugs mug
mulberries mulberri
mulberry mulberri
mule mule
mules mule
muleteers mulet
mulier mulier
mulieres mulier
muliteus muliteu
mull mull
mulmutius mulmutiu
multiplied multipli
multiply multipli
multiplying multipli
multipotent multipot
multitude multitud
multitudes multitud
multitudinous multitudin
mum mum
mumble
mumbl
mumbling mumbl
mummers mummer
mummy mummi
mun mun

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|---|---|
| munch | munch |
| muniments | muniment |
| munition | munit |
| murd | murd |
| murder | murder |
| murdered | murder |
| murderer | murder |
| murderers | murder |
| murdering | murder |
| murderous | murder |
| murders | murder |
| mure | mure |
| murk | murk |
| murkiest | murkiest |
| murky | murki |
| murmur | murmur |
| murmurers | murmur |
| murmuring | murmur |
| murrain | murrain |
| murray | murrai |
| murrion | murrion |
| murther | murther |
| murtherer | murther |
| murtherers | murther |
| murthering | murther |
| murtherous | murther |
| murthers | murther |

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|---|---|
| mus | mu |
| muscadel | muscadel |
| muscovites | muscovit |
| muscovits | muscovit |
| muscovy | muscovi |
| muse | muse |
| muses | muse |
| mush | mush |
| mushrooms | mushroom |
| music | music |
| musical | music |
| musician | musician |
| musicians | musician |
| musics | music |
| musing | muse |
| musings | muse |
| musk | musk |
| musket | musket |
| muskets | musket |
| muskos | musko |

muss muss
mussel mussel
mussels mussel
must must
mustachio mustachio
mustard mustard
mustardseed mustardse
muster muster
mustering muster
musters muster
musty musti
mutability mutabl
mutable mutabl
mutation mutat
mutations mutat
mute mute
mutes mute
mutest mutest
mutine mutin
mutineer mutin
mutineers mutin
mutines mutin
mutinies mutini
mutinous mutin
mutiny mutini
mutius mutiu
mutter mutter
muttered mutter
mutton mutton
muttons mutton
mutual mutual
mutualities mutual
mutually mutual
muzzl muzzl
muzzle muzzl
muzzled muzzl
mv mv
mww mww
my my
mynheers mynheer
myrmidon myrmidon
myrmidons myrmidon
myrtle myrtl
myself myself
myst myst
mysteries mysteri

mystery mysteri
n n
nag nag
nage nage
nags nag
naiads naiad
nail nail
nails nail
nak nak
naked nake
nakedness naked
nal nal
nam nam
name name
named name
nameless nameless
namely name
names name
namest namest
naming name
nan nan
nance nanc
nap nap
nape nape
napes nape
napkin napkin
napkins napkin
naples napl
napless napless
napping nap
naps
nap
narbon narbon
narcissus narcissu
narines narin
narrow narrow
narrowly narrowli
naso naso
nasty nasti
nathaniel nathaniel
natifs natif
nation nation
nations nation
native nativ
nativity nativ
natur natur
natural natur
naturalize natur

naturally natur
nature natur
natured natur
natures natur
natus natu
naught naught
naughtily naughtili
naughty naughti
navarre navarr
nave nave
navel navel
navigation navig
navy navi
nay nai
nayward nayward

nayword nayword
nazarite nazarit
ne ne
neaf neaf
neamnoins neamnoin
neanmoins neanmoin
neapolitan neapolitan
neapolitans neapolitan
near near
nearer nearer
nearest nearest
nearly nearli
nearness near
neat neat
neatly neatli
neb neb
nebour nebour
nebuchadnezzar nebuchadnezzar
nec nec
necessaries necessari
necessarily necessarili
necessary necessari
necessitied necess
necessities necess
necessity necess
neck neck
necklace necklac
necks neck
nectar nectar
ned ned
nedar nedar

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|---|---|
| need | need |
| needed | need |
| needer | needer |
| needful | need |
| needfull | needful |
| needing | need |
| needle | needl |
| needles | needl |
| needless | needless |
| needly | needli |
| needs | need |
| needy | needi |
| neer | neer |
| neeze | neez |
| nefas | nefa |
| negation | negat |
| negative | neg |
| negatives | neg |
| neglect | neglect |
| neglected | neglect |
| neglecting | neglect |
| neglectingly | neglectingli |
| neglection | neglect |
| negligence | neglig |
| negligent | neglig |
| negotiate | negoti |
| negotiations | negoti |
| negro | negro |
| neigh | neigh |
| neighbors | neighbor |
| neighbour | neighbour |
| neighbourhood | neighbourhood |
| neighbouring | neighbour |
| neighbourly | neighbourli |
| neighbours | neighbour |
| neighing | neigh |
| neighs | neigh |
| neither | neither |
| nell | nell |
| nemean | nemean |
| nemesis | nemesi |
| neoptolemus | neoptolemu |
| nephew | nephew |
| nephews | nephew |
| neptune | neptun |
| ner | ner |
| nereides | nereid |

| | |
|---|---|
| nerissa | nerissa |
| nero | nero |
| neroes | nero |
| ners | ner |
| nerve | nerv |
| nerves | nerv |
| nervii | nervii |
| nervy | nervi |
| nessus | nessu |
| nest | nest |
| nestor | nestor |
| nests | nest |
| net | net |
| nether | nether |
| netherlands | netherland |
| nets | net |
| nettle | nettl |
| nettled | nettl |
| nettles | nettl |
| neuter | neuter |
| neutral | neutral |
| nev | nev |
| never | never |
| nevil | nevil |
| nevils | nevil |
| new | new |
| newborn | newborn |
| newer | newer |
| newest | newest |
| newgate | newgat |
| newly | newli |
| newness | new |
| news | new |
| newsmongers | newsmong |
| newt | newt |
| newts | newt |
| next | next |
| nibbling | nibbl |
| nicanor | nicanor |
| nice | nice |
| nicely | nice |
| niceness | nice |
| nicer | nicer |
| nicety | niceti |
| nicholas | nichola |
| nick | nick |
| nickname | nicknam |
| nicks | nick |

niece
niec
nieces niec
niggard niggard
niggarding niggard
niggardly niggardli
nigh nigh
night night
nightcap nightcap
nightcaps nightcap
nighted night
nightgown nightgown
nightingale nightingal
nightingales nightingal
nightly nightli
nightmare nightmar
nights night
nightwork nightwork
nihil nihil
nile nile
nill nill
nilus nilu
nimble nimbl
nimbleness nimbl
nimbler nimbler
nimbly nimbl
nine nine
nineteen nineteen
ning ning
ningly ningli
ninny ninni
ninth ninth
ninus
ninu
niobe niob
niobes niob
nip nip
nipp nipp
nipping nip
nipple nippl
nips nip
nit nit
nly nly
nnight nnight
nnights nnight
no no
noah noah
nob nob

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|---|---|
| nobility | nobil |
| nobis | nobi |
| noble | nobl |
| nobleman | nobleman |
| noblemen | noblemen |
| nobleness | nobl |
| nobler | nobler |
| nobles | nobl |
| noblesse | nobless |
| noblest | noblest |
| nobly | nobli |
| nobody | nobodi |
| noces | noce |
| nod | nod |
| nodded | nod |
| nodding | nod |
| noddle | noddl |
| noddles | noddl |
| noddy | noddi |
| nods | nod |
| noes | noe |
| nointed | noint |
| nois | noi |
| noise | nois |
| noiseless | noiseless |
| noisemaker | noisemak |
| noises | nois |
| noisome | noisom |
| nole | nole |
| nominate | nomin |
| nominated | nomin |
| nomination | nomin |
| nominativo | nominativo |
| non | non |
| nonage | nonag |
| nonce | nonc |
| none | none |
| nonino | nonino |
| nonny | nonni |
| nonpareil | nonpareil |
| nonsuits | nonsuit |
| nony | noni |
| nook | nook |
| nooks | nook |
| noon | noon |
| noonday | noondai |
| noontide | noontid |

nor nor
norbery norberi
norfolk norfolk

norman norman
normandy normandi
normans norman
north north
northampton northampton
northamptonshire northamptonshir
northerly northerli
northern northern
northgate northgat
northumberland northumberland
northumberlands northumberland
northward northward
norway norwai
norways norwai
norwegian norwegian
norweyan norweyan
nos no
nose nose
nosegays nosegai
noseless noseless
noses nose
noster noster
nostra nostra
nostril nostril
nostrils nostril
not not
notable notabl
notably notabl
notary notari
notch notch

note note
notebook notebook
noted note
notedly notedli
notes note
notest notest
noteworthy noteworthi
nothing noth
nothings noth
notice notic
notify notifi
noting note
notion notion

notorious notori
notoriously notori
notre notr
notwithstanding notwithstand
nought nought
noun noun
nouns noun
nourish nourish
nourished nourish
nourisher nourish
nourishes nourish
nourisheth nourisheth
nourishing nourish
nourishment nourish
nous nou
novel novel
novelties novelti
novelty novelti
noverbs
noverb
novi novi
novice novic
novices novic
novum novum
now now
nowhere nowher
noyance noyanc
ns ns
nt nt
nubibus nubibu
numa numa
numb numb
number number
numbered number
numbering number
numberless numberless
numbers number
numbness numb
nun nun
nuncio nuncio
nuncle nuncl
nunnery nunneri
nuns nun
nuntius nuntiu
nuptial nuptial
nurs nur
nurse nurs
nursed nurs

| | |
|---|---|
| nurser | nurser |
| nursery | nurseri |
| nurses | nurs |
| nurseth | nurseth |
| nursh | nursh |
| nursing | nurs |
| nurtur | nurtur |
| nurture | nurtur |
| nut | nut |
| nuthook | nuthook |
| nutmeg | nutmeg |
| nutmegs | nutmeg |
| nutriment | nutriment |
| nuts | nut |
| nutshell | nutshel |
| ny | ny |
| nym | nym |
| nymph | nymph |
| nymphs | nymph |
| o | o |
| oak | oak |
| oaken | oaken |
| oaks | oak |
| oared | oar |
| oars | oar |
| oatcake | oatcak |
| oaten | oaten |
| oath | oath |
| oathable | oathabl |
| oaths | oath |
| oats | oat |
| ob | ob |
| obduracy | obduraci |
| obdurate | obdur |
| obedience | obedi |
| obedient | obedi |
| obeisance | obeis |
| oberon | oberon |
| obey | obei |
| obeyed | obei |
| obeying | obei |
| obeys | obei |
| obidicut | obidicut |
| object | object |
| objected | object |
| objections | object |

objects object
oblation oblat
oblations oblat
obligation oblig
obligations oblig
obliged oblig
oblique obliqu
oblivion oblivion
oblivious oblivi
obloquy obloqui
obscene obscen
obscenely obscen
obscur obscur
obscure obscur
obscured obscur
obscurely obscur
obscures obscur
obscuring obscur
obscurity obscur
obsequies obsequi
obsequious obsequi
obsequiously obsequi
observ observ
observance observ
observances observ
observancy observ
observant observ
observants observ
observation observ
observe observ
observed observ
observer observ
observers observ
observing observ
observingly observingli
obsque obsqu
obstacle obstacl
obstacles obstacl
obstinacy obstinaci
obstinate obstin
obstinately obstin
obstruct obstruct
obstruction obstruct
obstructions obstruct
obtain obtain
obtained obtain
obtaining obtain

occasion occas
occasions occas
occident occid
occidental occident
occulted occult
occupat
occupat
occupation occup
occupations occup
occupied occupi
occupies occupi
occupy occupi
occurrence occurr
occurrences occurr
occurrents occurr
ocean ocean
oceans ocean
octavia octavia
octavius octaviu
ocular ocular
od od
odd odd
oddest oddest
oddly oddli
odds odd
ode od
odes od
odious odiou
odoriferous odorifer
odorous odor
odour odour
odours odour
ods od
oeillades oeillad
oes oe
oeuvres oeuvr
of of
ofephesus ofephesu
off
off
offal offal
offence offenc
offenceful offenc
offences offenc
offend offend
offended offend
offendendo offendendo
offender offend

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|---|---|
| offenders | offend |
| offendeth | offendeth |
| offending | offend |
| offendress | offendress |
| offends | offend |
| offense | offens |
| offenseless | offenseless |
| offenses | offens |
| offensive | offens |
| offer | offer |
| offered | offer |
| offering | offer |
| offerings | offer |
| offers | offer |
| offert | offert |
| offic | offic |
| office | offic |
| officed | offic |
| officer | offic |
| officers | offic |
| offices | offic |
| official | offici |
| officious | offici |
| offspring | offspr |
| oft | oft |
| often | often |
| oftener | often |
| oftentimes | oftentim |
| oh | oh |
| oil | oil |
| oils | oil |
| oily | oili |
| old | old |
| oldcastle | oldcastl |
| olden | olden |
| older | older |
| oldest | oldest |
| oldness | old |
| olive | oliv |
| oliver | oliv |
| olivers | oliv |
| olives | oliv |
| olivia | olivia |
| olympian | olympian |
| olympus | olympu |
| oman | oman |
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ominous omin
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ophelia ophelia
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orisons orison
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orphan orphan
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ort ort
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ossa ossa
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ostentare ostentar
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ostler ostler
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ostrich ostrich
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|---|---|
| oswald | oswald |
| othello | othello |
| other | other |
| othergates | otherg |
| others | other |
| otherwhere | otherwher |
| otherwhiles | otherwhil |
| otherwise | otherwis |
| otter | otter |
| ottoman | ottoman |
| ottomites | ottomit |
| oublie | oubli |
| ouches | ouch |
| ought | ought |
| oui | oui |
| ounce | ounc |
| ounces | ounc |
| ouphes | ouph |
| our | our |
| ours | our |
| ourself | ourself |
| ourselves | ourselv |
| ousel | ousel |
| out | out |
| outbids | outbid |
| outbrave | outbrav |
| outbraves | outbrav |
| outbreak | outbreak |
| outcast | outcast |
| outcries | outcri |
| outcry | outcri |
| outdar | outdar |
| outdare | outdar |
| outdares | outdar |
| outdone | outdon |
| outfac | outfac |
| outface | outfac |
| outfaced | outfac |
| outfacing | outfac |
| outfly | outfli |
| outfrown | outfrown |
| outgo | outgo |
| outgoes | outgo |
| outgrown | outgrown |
| outjest | outjest |
| outlaw | outlaw |
| outlawry | outlawri |
| outlaws | outlaw |

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| outliv | outliv |
| outlive | outliv |
| outlives | outliv |
| outliving | outliv |
| outlook | outlook |
| outlustres | outlustr |
| outpriz | outpriz |
| outrage | outrag |
| outrageous | outrag |
| outrages | outrag |
| outran | outran |
| outright | outright |
| outroar | outroar |
| outrun | outrun |
| outrunning | outrun |
| outruns | outrun |
| outscold | outscold |
| outscorn | outscorn |
| outsell | outsel |
| outsells | outsel |
| outside | outsid |
| outsides | outsid |
| outspeaks | outspeak |
| outsport | outsport |
| outstare | outstar |
| outstay | outstai |
| outstood | outstood |
| outstretch | outstretch |
| outstretched | outstretch |
| outstrike | outstrik |
| outstrip | outstrip |
| outstripped | outstrip |
| outswear | outswear |
| outvenoms | outvenom |
| outward | outward |
| outwardly | outwardli |
| outwards | outward |
| outwear | outwear |
| outweighs | outweigh |
| outwent | outwent |
| outworn | outworn |
| outworths | outworth |
| oven | oven |
| over | over |
| overawe | overaw |
| overbear | overbear |
| overblown | overblown |
| overboard | overboard |

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| overbold | overbold |
| overborne | overborn |
| overbulk | overbulk |
| overbuys | overbui |
| overcame | overcam |
| overcast | overcast |
| overcharg | overcharg |
| overcharged | overcharg |
| overcome | overcom |
| overcomes | overcom |
| overdone | overdon |
| overearnest | overearnest |
| overfar | overfar |
| overflow | overflow |
| overflown | overflown |
| overglance | overgl |
| overgo | overgo |
| overgone | overgon |
| overgorg | overgorg |
| overgrown | overgrown |
| overhead | overhead |
| overhear | overhear |
| overheard | overheard |
| overhold | overhold |
| overjoyed | overjoi |
| overkind | overkind |
| overland | overland |
| overleather | overleath |
| overlive | overl |
| overlook | overlook |
| overlooking | overlook |
| overlooks | overlook |
| overmaster | overmast |
| overmounting | overmount |
| overmuch | overmuch |
| overpass | overpass |
| overpeer | overp |
| overpeering | overp |
| overplus | overplu |
| overrul | overrul |
| overrun | overrun |
| overscutch | overscutch |
| overset | overset |
| overshades | overshad |
| overshine | overshin |
| overshines | overshin |
| overshot | overshot |

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| oversights | oversight |
| overspread | overspread |
| overstain | overstain |
| overswear | overswear |
| overt | |
| | overt |
| overta | overta |
| overtake | overtak |
| overtaketh | overtaketh |
| overthrow | overthrow |
| overthrown | overthrown |
| overthrows | overthrow |
| overtook | overtook |
| overtopp | overtopp |
| overture | overtur |
| overturn | overturn |
| overwatch | overwatch |
| overween | overween |
| overweening | overween |
| overweigh | overweigh |
| overwhelm | overwhelm |
| overwhelming | overwhelm |
| overworn | overworn |
| ovid | ovid |
| ovidius | ovidiu |
| ow | ow |
| owe | ow |
| owed | ow |
| owedst | owedst |
| owen | owen |
| owes | ow |
| owest | owest |
| oweth | oweth |
| owing | ow |
| owl | owl |
| owls | owl |
| own | |
| | own |
| owner | owner |
| owners | owner |
| owning | own |
| owns | own |
| owy | owi |
| ox | ox |
| oxen | oxen |
| oxford | oxford |
| oxfordshire | oxfordshir |
| oxlips | oxlip |

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| oyes | oy |
| oyster | oyster |
| p | p |
| pabble | pabbl |
| pabylon | pabylon |
| pac | pac |
| pace | pace |
| paced | pace |
| paces | pace |
| pacified | pacifi |
| pacify | pacifi |
| pacing | pace |
| pack | pack |
| packet | packet |
| packets | packet |
| packhorses | packhors |
| packing | pack |
| packings | pack |
| packs | pack |
| packthread | packthread |
| pacorus | pacoru |
| paction | paction |
| pad | pad |
| paddle | paddl |
| paddling | paddl |
| paddock | paddock |
| padua | padua |
| pagan | pagan |
| pagans | pagan |
| page | page |
| pageant | pageant |
| pageants | pageant |
| pages | page |
| pah | pah |
| paid | paid |
| pail | pail |
| pailfuls | pail |
| pails | pail |
| pain | pain |
| pained | pain |
| painful | pain |
| painfully | painfulli |
| pains | pain |
| paint | paint |
| painted | paint |
| painter | painter |
| painting | paint |

paintings paint
paints paint
pair pair
paired pair
pairs pair
pajock pajock
pal pal

palabras palabra
palace palac
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palamedes palamed
palate palat
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palatine palatin
palating palat
pale pale
paled pale
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palfrey palfrei
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pallets pallet
palm palm
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| pancake | pancak |
| pancakes | pancak |
| pandar | pandar |
| pandars | pandar |
| pandarus | pandaru |
| pander | pander |
| panderly | panderli |
| panders | pander |
| pandulph | pandulph |
| panel | panel |
| pang | pang |
| panging | pang |
| pangs | pang |
| pannier | pannier |
| pannonians | pannonian |
| pansa | pansa |
| pansies | pansi |
| pant | pant |
| pantaloon | pantaloon |
| panted | pant |
| pantheon | pantheon |
| panther | panther |
| panthino | panthino |
| panting | pant |
| pantingly | pantingli |
| pantler | pantler |
| pantry | pantri |
| pants | pant |
| pap | pap |
| papal | papal |
| paper | paper |
| papers | paper |
| paphlagonia | paphlagonia |
| paphos | papho |
| papist | papist |
| paps | pap |
| par | par |
| parable | parabl |
| paracelsus | paracelsu |
| paradise | paradis |
| paradox | paradox |
| paradoxes | paradox |
| paragon | paragon |
| paragons | paragon |
| parallel | parallel |
| parallels | parallel |
| paramour | paramour |

paramours paramour
parapets parapet
paraquito paraquito
parasite parasit
parasites parasit
parca parca
parcel parcel
parcell parcel
parcels parcel
parch parch
parched parch
parching parch
parchment parchment
pard pard
pardon pardon
pardona pardona
pardoned pardon
pardoner pardon
pardoning pardon
pardonne pardonn
pardonner pardonn
pardonnez pardonnez
pardons pardon
pare pare
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parent parent
parentage parentag
parents parent
parfect parfect
paring pare
parings pare
paris pari
parish parish
parishioners parishion
parisians parisian
paritors paritor
park park
parks park
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parler parler
parles parl
parley parlei
parlez parlez
parliament parliament
parlors parlor
parlour parlour

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| parlous | parlou |
| parmacity | parmac |
| parolles | parol |
| parricide | parricid |
| parricides | parricid |
| parrot | parrot |
| parrots | parrot |
| parsley | parslei |
| parson | parson |
| part | part |
| partake | partak |
| partaken | partaken |
| partaker | partak |
| partakers | partak |
| parted | part |
| parthia | parthia |
| parthian | parthian |
| parthians | parthian |
| parti | parti |
| partial | partial |
| partialize | partial |
| partially | partial |
| participate | particip |
| participation | particip |
| particle | particl |
| particular | particular |
| particularities | particular |
| particularize | particular |
| particularly | particularli |
| particulars | particular |
| parties | parti |
| parting | part |
| partisan | partisan |
| partisans | partisan |
| partition | partit |
| partizan | partizan |
| partlet | partlet |
| partly | partli |
| partner | partner |
| partners | partner |
| partridge | partridg |
| parts | part |
| party | parti |
| pas | pa |
| pash | pash |
| pashed | pash |
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| pass | pass |
| passable | passabl |
| passado | passado |
| passage | passag |
| passages | passag |
| passant | passant |
| passed | pass |
| passenger | passeng |
| passengers | passeng |
| passes | pass |
| passeth | passeth |
| passing | pass |
| passio | passio |
| passion | passion |
| passionate | passion |
| passioning | passion |
| passions | passion |
| passive | passiv |
| passport | passport |
| passy | passi |
| past | past |
| paste | past |
| pasterns | pastern |
| pasties | pasti |
| pastime | pastim |
| pastimes | pastim |
| pastoral | pastor |
| pastorals | pastor |
| pastors | pastor |
| pastry | pastri |
| pasture | pastur |
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| pasty | pasti |
| pat | pat |
| patay | patai |
| patch | patch |
| patchery | patcheri |
| patches | patch |
| pate | pate |
| pated | pate |
| patent | patent |
| patents | patent |
| paternal | patern |
| pates | pate |
| path | path |
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| paths | path |
| pathway | pathwai |
| pathways | pathwai |
| patience | patienc |
| patient | patient |
| patiently | patient |
| patients | patient |
| patines | patin |
| patrician | patrician |
| patricians | patrician |
| patrick | patrick |
| patrimony | patrimoni |
| patroclus | patroclu |
| patron | patron |
| patronage | patronag |
| patroness | patro |
| patrons | patron |
| patrum | patrum |
| patter | patter |
| pattern | pattern |
| patterns | pattern |
| pattle | pattl |
| pauca | pauca |
| paucas | pauca |
| paul | paul |
| paulina | paulina |
| paunch | paunch |
| paunches | paunch |
| pause | paus |
| pauser | pauser |
| pauses | paus |
| pausingly | pausingli |
| pauvres | pauvr |
| pav | pav |
| paved | pave |
| pavement | pavement |
| pavilion | pavilion |
| pavilions | pavilion |
| pavin | pavin |
| paw | paw |
| pawn | pawn |
| pawns | pawn |
| paws | paw |
| pax | pax |
| pay | pai |
| payest | payest |
| paying | pai |

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pear pear
peard peard
pearl pearl
pearls pearl
pears pear
peas pea
peasant peasant
peasantry peasantri
peasants peasant
peascod peascod
pease peas
peaseblossom peaseblossom
peat peat
peaten peaten
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pebble pebbl
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| pedestal | pedest |
| pedigree | pedigre |
| pedlar | pedlar |
| pedlars | pedlar |
| pedro | pedro |
| peds | ped |
| peel | peel |
| peep | peep |
| peeped | peep |
| peeping | peep |
| peeps | peep |
| peer | peer |
| peereth | peereth |
| peering | peer |
| peerless | peerless |
| peers | peer |
| peesel | peesel |
| peevish | peevish |
| peevishly | peevishli |
| peflur | peflur |
| peg | peg |
| pegasus | pegasu |
| pegs | peg |
| peise | peis |
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| pelf | pelf |
| pelican | pelican |
| pelion | pelion |
| pell | pell |
| pella | pella |
| pelleted | pellet |
| peloponnesus | peloponnesu |
| pelt | pelt |
| pelting | pelt |
| pembroke | pembrok |
| pen | pen |
| penalties | penalti |
| penalty | penalti |
| penance | penanc |
| pence | penc |
| pencil | pencil |
| pencill | pencil |
| pencils | pencil |
| pendant | pendant |
| pendent | pendent |
| pendragon | pendragon |

pendulous pendul
penelope penelop
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pennyworth pennyworth
pennyworths pennyworth
pens pen
pense pens
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pensive pensiv
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pent pent
pentecost pentecost
penthesilea penthesilea
penthouse penthous
penurious penuri
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people peopl
peopled peopl
peoples peopl
pepin pepin
pepper pepper
peppercorn peppercorn
peppered pepper
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perceiv perceiv
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perceiveth perceiveth
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percies perci
percussion percuss
percy perci
perdie perdi
perdita perdita
perdition perdit
perdonato perdonato
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perdurable perdur
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perdy perdi
pere pere
peregrinate peregrin
peremptorily peremptorili
peremptory peremptori
perfect perfect
perfected perfect
perfecter perfect
perfectest perfectest
perfection perfect
perfections perfect
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perfectness perfect
perfidious perfidi
perfidiously perfidi
perforce perforc
perform perform
performance perform
performances perform
performed perform
performer perform
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performing perform
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perge perg
perhaps perhap
periapts periapt
perigort perigort

perigouna perigouna
peril peril
perilous peril
perils peril
period period
periods period
perish perish
perished perish
perishest perishest
perisheth perisheth
perishing perish
periwig periwig
perjur perjur
perjure perjur
perjured perjur
perjuries perjuri
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perk perk
perkes perk
permafoy permafoi
permanent perman
permission permiss
permissive permiss
permit permit
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pernicious pernici
perniciously pernici
peroration peror
perpend perpend
perpendicular perpendicular
perpendicularly perpendicularli
perpetual perpetu
perpetually perpetu
perpetuity perpetu
perplex perplex
perplexed perplex
perplexity perplex
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persecutor persecutor
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persevers persev
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| persian | persian |
| persist | persist |
| persisted | persist |
| persistency | persist |
| persistive | persist |
| persists | persist |
| person | person |
| personae | persona |
| personage | personag |
| personages | personag |
| personal | person |
| personally | person |
| personate | person |
| personated | person |
| personates | person |
| personating | person |
| persons | person |
| perspective | perspect |
| perspectively | perspect |
| perspectives | perspect |
| perspicuous | perspicu |
| persuade | persuad |
| persuaded | persuad |
| persuades | persuad |
| persuading | persuad |
| persuasion | persuas |
| persuasions | persuas |
| pert | pert |
| pertain | pertain |
| pertaining | pertain |
| pertains | pertain |
| pertaunt | pertaunt |
| pertinent | pertin |
| pertly | pertli |
| perturb | perturb |
| perturbation | perturb |
| perturbations | perturb |
| perturbed | perturb |
| perus | peru |
| perusal | perus |
| peruse | perus |
| perused | perus |
| perusing | perus |
| perverse | pervers |
| perversely | pervers |
| perverseness | pervers |
| pervert | pervert |
| perverted | pervert |

peseech peseech
pest pest
pester pester
pestiferous pestifer
pestilence pestil
pestilent pestil
pet pet
petar petar
peter peter
petit petit
petition petit
petitionary petitionari
petitioner petition
petitioners petition
petitions petit
peto peto
petrarch petrarch
petruchio petruchio
petter petter
petticoat petticoat
petticoats petticoat
pettiness petti
pettish pettish
pettitoes pettito
petty petti
peu peu
pew pew
pewter pewter
pewterer pewter
phaethon phaethon
phaeton phaeton
phantasime phantasim
phantasimes phantasim
phantasma phantasma
pharamond pharamond
pharaoh pharaoh
pharsalia pharsalia
pheasant pheasant
pheazar pheazar
phebe phebe
phebes phebe
pheebus pheebu
pheeze pheez
phibbus phibbu
philadelphos philadelpho
philario philario
philarmonus philarmonu

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|---|---|
| philemon | philemon |
| philip | philip |
| philippan | philippan |
| philippe | philipp |
| philippi | philippi |
| phillida | phillida |
| philo | philo |
| philomel | philomel |
| philomela | philomela |
| philosopher | philosoph |
| philosophers | philosoph |
| philosophical | philosoph |
| philosophy | philosophi |
| philostrate | philostr |
| philotus | philotu |
| phlegmatic | phlegmat |
| phoebe | phoeb |
| phoebus | phoebu |
| phoenicia | phoenicia |
| phoenicians | phoenician |
| phoenix | phoenix |
| phorbus | phorbu |
| photinus | photinu |
| phrase | phrase |
| phraseless | phraseless |
| phrases | phrase |
| phrygia | phrygia |
| phrygian | phrygian |
| phrynia | phrynia |
| physic | physic |
| physical | physic |
| physician | physician |
| physicians | physician |
| physics | physic |
| pia | pia |
| pibble | pibbl |
| pible | pibl |
| picardy | picardi |
| pick | pick |
| pickaxe | pickax |
| pickaxes | pickax |
| pickbone | pickbon |
| picked | pick |
| pickers | picker |
| picking | pick |
| pickle | pickl |
| picklock | picklock |

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|---|---|
| pickpurse | pickpurs |
| picks | pick |
| pickt | pickt |
| pickthanks | pickthank |
| pictur | pictur |
| picture | pictur |
| pictured | pictur |
| pictures | pictur |
| pid | pid |
| pie | pie |
| piec | piec |
| piece | piec |
| pieces | piec |
| piecing | piec |
| pied | pi |
| piedness | pied |
| pier | pier |
| pierc | pierc |
| pierce | pierc |
| pierced | pierc |
| pierces | pierc |
| pierceth | pierceth |
| piercing | pierc |
| piercy | pierci |
| piers | pier |
| pies | pi |
| piety | pieti |
| pig | pig |
| pigeon | pigeon |
| pigeons | pigeon |
| pight | pight |
| pigmy | pigmi |
| pigrogromitus | pigrogromitu |
| pike | pike |
| pikes | pike |
| pil | pil |
| pilate | pilat |
| pilates | pilat |
| pilchers | pilcher |
| pile | pile |
| piles | pile |
| pilf | pilf |
| pilfering | pilfer |
| pilgrim | pilgrim |
| pilgrimage | pilgrimag |
| pilgrims | pilgrim |

pill pill
pillage pillag
pillagers pillag
pillar pillar
pillars pillar
pillicock pillicock
pillory pillori
pillow pillow
pillows pillow
pills pill
pilot pilot
pilots pilot
pimpernell pimpernel
pin pin
pinch pinch
pinched pinch
pinches pinch
pinching pinch
pindarus pindaru
pine pine
pined pine
pines pine
pinfold pinfold
pining pine
pinion pinion
pink pink
pinn pinn
pinnace pinnac
pins pin
pinse pins
pint pint
pintpot pintpot
pioned pion
pioneers pioneer
pioner pioner
pioners pioner
pious piou
pip pip
pipe pipe
piper piper
pipers piper
pipes pipe
piping pipe
pippin pippin
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pirate pirat
pirates pirat

pisa pisa
pisanio pisanio
pish pish
pismires pismir
piss piss
pissing piss
pistol pistol
pistols
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pit pit
pitch pitch
pitched pitch
pitcher pitcher
pitchers pitcher
pitchy pitchi
piteous piteou
piteously piteous
pitfall pitfal
pith pith
pithless pithless
pithy pithi
pitie piti
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pitiful piti
pitifully pitifulli
pitiless pitiless
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pittikins pittikin
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plainer plainer
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plainly plainli
plainness plain
plains plain
plainsong plainsong
plaintful plaint
plaintiff plaintiff
plaintiffs plaintiff
plaints plaint
planched planch
planet planet
planetary planetari
planets planet
planks plank
plant plant
plantage plantag
plantagenet plantagenet
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plantain plantain
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planteth planteth
plants plant
plash plash
plashy plashi
plast plast
plaster plaster
plasterer plaster
plat plat
plate plate
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plates plate
platform platform
platforms platform
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plausible plausibl
plausive plausiv
plautus plautu

play plai
played plai
player player
players player
playeth playeth
playfellow playfellow
playfellows playfellow
playhouse playhous
playing plai
plays plai
plea plea
pleach pleach
pleached pleach
plead plead
pleaded plead
pleader pleader
pleaders pleader
pleading plead
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pleas plea
pleasance pleasanc
pleasant pleasant
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pleaser pleaser
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pleasing pleas
pleasure pleasur
pleasures pleasur
plebeians plebeian
plebeii plebeii
plebs pleb
pledge pledg
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plenitude plenitud
plenteous plenteou
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plenties plenti
plentiful plenti
plentifully plentifulli
plenty plenti
pless pless

plessed pless
plessing pless
pliant pliant
plied pli
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plight plight
plighted plight
plighter plighter
plod plod
plodded plod
plodders plodder
plodding plod
plods plod
plood plood
ploody ploodi
plot plot
plots plot
plotted plot
plotter plotter
plough plough
ploughed plough
ploughman ploughman
ploughmen ploughmen
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plows plow
pluck pluck
plucked pluck
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plucking pluck
plucks pluck
plue plue
plum plum
plume plume
plumed plume
plumes plume
plummet plummet
plump plump
plumpy plumpi
plums plum
plung plung
plunge plung
plunged plung
plural plural
plurisy plurisi
plus plu
pluto pluto
plutus plutu

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|---|---|
| ply | ply |
| po | po |
| pocket | pocket |
| pocketing | pocket |
| pockets | pocket |
| pocky | pocki |
| pody | podi |
| poem | poem |
| poesy | poesi |
| poet | poet |
| poetical | poetic |
| poetry | poetri |
| poets | poet |
| poictiers | poictier |
| poinards | poinard |
| poins | poin |
| point | point |
| pointblank | pointblank |
| pointed | point |
| pointing | point |
| points | point |
| pois | poi |
| poise | pois |
| poising | pois |
| poison | poison |
| poisoned | poison |
| poisoner | poison |
| poisoning | poison |
| poisonous | poison |
| poisons | poison |
| poke | poke |
| poking | poke |
| pol | pol |
| polack | polack |
| polacks | polack |
| poland | poland |
| pold | pold |
| pole | pole |
| poleaxe | poleax |
| polecat | polecat |
| polecats | polecat |
| polemon | polemon |
| poles | pole |
| poli | poli |
| policies | polici |
| policy | polici |
| polish | polish |
| polished | polish |

politic politic
politician politician
politicians politician
politicly politicli
polixenes polixen
poll poll
polluted pollut
pollution pollut
polonius poloniu
poltroons poltroon
polusion polus
polydamus polydamu
polydore polydor
polyxena polyxena
pomander pomand
pomegranate pomegran
pomewater pomewat
pomfret pomfret
pomgarnet pomgarnet
pommel pommel
pomp pomp
pompeius pompeiu
pompey pompei
pompion
pompion
pompous pompou
pomps pomp
pond pond
ponder ponder
ponderous ponder
ponds pond
poniard poniard
poniards poniard
pont pont
pontic pontic
pontifical pontif
ponton ponton
pooh pooh
pool pool
poole pool
poop poop
poor poor
poorer poorer
poorest poorest
poorly poorli
pop pop
pope pope
popedom popedom

popilius popiliu
popingay popingai
popish popish
popp popp
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pops pop
popular popular
popularity popular
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porch porch
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pore pore
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pork pork
porn porn
porpentine porpentin
porridge porridg
porringer porring
port port
portable portabl
portage portag
portal portal
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portentous portent
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porter porter
porters porter
portia portia
portion portion
portly portli
portotartarossa portotartarossa
portrait portrait
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ports port
portugal portug
pose pose
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position posit
positive posit
positively posit
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possessed possess
possesses possess
possesseth possesseth
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possessions possess
possessor possessor
posset posset
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possibilities possibl
possibility possibl
possible possibl
possibly possibl
possitable possit
post post
poste post
posted post
posterior posterior
posteriors posterior
posterity poster
postern postern
posterns postern
posters poster
posthorse posthors
posthorses posthors
posthumus posthumu
posting post
postmaster postmast
posts post
postscript postscript
posture postur
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pot pot
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potations potat
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pother pother
potion potion

potions potion
potpan potpan
pots pot
potter potter
potting pot
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poulter poulter
poultice poultic
poultney poultnei
pouncet pouncet
pound pound
pounds pound
pour pour
pourest pourest
pouring pour
pourquoi pourquoi
pours pour
pout pout
poverty poverti
pow pow
powd powd
powder powder
power power
powerful power
powerfully powerfulli
powerless powerless
powers power
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prabbles prabbl
practic practic
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praeclarissimus praeclarissimu

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|---|---|
| praemunire | praemunir |
| praetor | praetor |
| praetors | praetor |
| pragging | prag |
| prague | pragu |
| prain | prain |
| prains | prain |
| prais | prai |
| praise | prais |
| praised | prais |
| praises | prais |
| praisest | praisest |
| praiseworthy | praiseworthi |
| praising | prais |
| prancing | pranc |
| prank | prank |
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| prating | prate |
| prattle | prattl |
| prattler | prattler |
| prattling | prattl |
| prave | prave |
| prawls | prawl |
| prawns | prawn |
| pray | prai |
| prayer | prayer |
| prayers | prayer |
| praying | prai |
| prays | prai |
| pre | pre |
| preach | preach |
| preached | preach |
| preachers | preacher |
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| preaching | preach |
| preachment | preachment |
| pread | pread |
| preambulate | preambul |
| precedence | preced |
| precedent | preced |
| preceding | preced |
| precept | precept |
| preceptial | precepti |

precepts precept
precinct precinct
precious preciou
preciously precious
precipice precipic
precipitating precipit
precipitation precipit
precise precis
precisely precis
preciseness precis
precisian precisian
precor precor
precurse precurs
precursors precursor
predeceased predeceas
predecessor predecessor
predecessors predecessor
predestinate predestin
predicament predica
predict predict
prediction predict
predictions predict
predominance predomin
predominant predomin
predominate predomin
preeches preech
preeminence preemin
preface prefac
prefer prefer
preferment prefer
preferments prefer
preferr preferr
preferreth preferreth
preferring prefer
prefers prefer
prefiguring prefigur
prefix prefix
prefixed prefix
preformed preform
pregnancy pregnanc
pregnant pregnant
pregnantly pregnantli
prejudicates prejud
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prejudicial prejudici
prelate prelat

premeditated premedit
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prenominate prenomin
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preordinance preordin
prepar prepar
preparation prepar
preparations prepar
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prepares prepar
preparing prepar
prepost prepost
preposterous preposter
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prerogative prerog
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president presid
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prest prest
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presuppos presuppo
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pretend pretend
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pretense pretens
pretext pretext
pretia pretia
prettier prettier
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pretty pretti
prevail prevail
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prevention prevent

preventions prevent
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priesthood priesthood
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prig prig
primal primal
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primest primest
primitive primit
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primogenity primogen
primrose primros
primroses primros
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printing print
printless printless
prints print
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priories priori
priority prioriti
priory priori
priscian priscian
prison prison
prisoner prison
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prisonment prison
prisonnier prisonni
prisons prison
pristine pristin
prithe prith
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privacy privaci
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probable probabl
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proceed proce
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proceeders proceed
proceeding proceed
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proceeds proce
process process
procession process
proclaim proclaim
proclaimed proclaim
proclaimeth proclaimeth
proclaims proclaim
proclamation proclam
proclamations proclam
proconsul proconsul
procrastinate procrastin
procreant procreant
procreants procreant
procreation procreat
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proculeius proculeiu
procur procur
procurator procur
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profanation profan
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proficient profici
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profitable profit
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profitless profitless
profits profit
profound profound
profoundest profoundest
profoundly profoundli
progenitors progenitor
progeny progeni
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prognosticate prognost
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progress progress
progression progress
prohibit prohibit
prohibition prohibit
project
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projection project
projects project
prolixious prolixi
prolixity prolix
prologue prologu
prologues prologu
prolong prolong
prolongs prolong
promethean promethean
prometheus prometheu
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promise promis
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promiseth promiseth
promising promis
promontory promontori
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prompt prompt
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promptement promptement
prompter prompter
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prompts prompt
prompture promptur
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pronoun pronoun
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pronounced pronounc
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proof proof
proofs proof
prop prop
propagate propag
propagation propag
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propension propens
proper proper
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properties properti
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prophetess prophetess
prophetic prophet
prophetically prophet
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proportion proport
proportionable proportion
proportions proport
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propose propos
proposed propos
proposer propos
proposes propos
proposing propos
proposition proposit
propositions proposit
propounded propound
propp propp
propre propr
propriety proprieti
props prop
propugnation propugn
prorogue prorogu
prorogued prorogu
proscription proscript
proscriptions proscript
prose prose
prosecute prosecut
prosecution prosecut
proselytes proselyt
proserpina proserpina
prosp prosp
prospect prospect
prosper prosper
prosperity prosper
prospero prospero
prosperous prosper
prosperously prosper
prospers prosper
prostitute prostitut
prostrate prostrat
protect protect
protected protect
protection protect
protector protector
protectors protector
protectorship protectorship
protectress protectress
protects protect
protest protest

protestation protest
protestations protest
protested protest
protester protest
protesting protest
protests protest
proteus proteu
protheus protheu
protract protract
protractive protract
proud proud
prouder prouder
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proudlier proudlier
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prouds proud
prov prov
provand provand
prove prove
proved prove
provender provend
proverb proverb
proverbs proverb
proves prove
proveth proveth
provide provid
provided provid
providence provid
provident provid
providently provid
provider provid
provides provid
province provinc
provinces provinc
provincial provinci
proving prove
provision provis
proviso proviso
provocation provoc
provok provok
provoke provok
provoked provok
provoker provok
provokes
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provoketh provoketh
provoking provok

provost provost
prowess prowess
prudence prudenc
prudent prudent
prun prun
prune prune
prunes prune
pruning prune
pry pry
prying pry
psalm psalm
psalmist psalmist
psalms psalm
psalteries psalteri
ptolemies ptolemi
ptolemy ptolemi
public public
publican publican
publication public
publicly publicli
publicola publicola
publish publish
published publish
publisher publish
publishing publish
publius publiu
pucelle pucel
puck puck
pudder
pudder
pudding pud
puddings pud
puddle puddl
puddled puddl
pudency pudenc
pueritia pueritia
puff puff
puffing puf
puffs puff
pugging pug
puis pui
puissance puissanc
puissant puissant
puke puke
puking puke
pulcher pulcher
puling pule
pull pull

puller puller
pullet pullet
pulling pull
pulls pull
pulpit pulpit
pulpiter pulpit
pulpits pulpit
pulse puls
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pump pump
pumpion pumpion
pumps pump
pun pun
punched punch
punish punish
punished punish
punishes punish
punishment punish
punishments punish
punk punk
punto punto
puny puni
pupil pupil
pupils pupil
puppet puppet
puppets puppet
puppies puppi
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pur pur
purblind purblind
purchas purcha
purchase purchas
purchased purchas
purchases purchas
purchaseth purchaseth
purchasing purchas
pure pure
purely pure
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|---|---|
| purging | purg |
| purifies | purifi |
| purifying | purifi |
| puritan | puritan |
| purity | puriti |
| purlieus | purlieu |
| purple | purpl |
| purpled | purpl |
| purples | purpl |
| purport | purport |
| purpos | purpo |
| purpose | purpos |
| purposed | purpos |
| purposely | purpos |
| purposes | purpos |
| purposeth | purposeth |
| purposing | purpos |
| purr | purr |
| purs | pur |
| purse | purs |
| pursents | pursent |
| purses | purs |
| pursu | pursu |
| pursue | pursu |
| pursued | pursu |
| pursuers | pursuer |
| pursues | pursu |
| pursuest | pursuest |
| pursueth | pursueth |
| pursuing | pursu |
| pursuit | pursuit |
| pursuivant | pursuiv |
| pursuivants | pursuiv |
| pursy | pursi |
| purus | puru |
| purveyor | purveyor |
| push | push |
| pushes | push |
| pusillanimity | pusillanim |
| put | put |
| putrefy | putrefi |
| putrified | putrifi |
| puts | put |
| putter | putter |
| putting | put |
| puttock | puttock |
| puzzel | puzzel |
| puzzle | puzzl |

puzzled puzzl
puzzles puzzl
py py
pygmalion pygmalion
pygmies pygmi
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pyramid pyramid
pyramides pyramid
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pyramus pyramu
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quadrangle quadrangl
quae quae
quaff quaff
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quail quail
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quaint quaint
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qualification qualif
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qualities qualiti
quality qualiti
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quam quam
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quando quando
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quare
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quarrel quarrel

quarrell quarrel
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quarrelous quarrel
quarrels quarrel
quarrelsome quarrelsom
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quartering quarter
quarters quarter
quarts quart
quasi quasi
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quatch quatch
quay quai
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quean quean
queas quea
queasiness queasi
queasy queasi
queen queen
queens queen
quell quell
queller queller
quench quench
quenched quench
quenching quench
quenchless quenchless
quern quern
quest quest
questant questant
question question
questionable question
questioned question
questioning question
questionless questionless
questions question
questrists questrist
quests quest
queubus queubu
qui qui
quick quick
quicken quicken
quickens quicken
quicker quicker

quicklier quicklier
quickly quickli
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| rainold | rainold |
| rains | rain |
| rainy | raini |
| rais | rai |
| raise | rais |
| raised | rais |
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| raising | rais |
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| rak | rak |
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| ral | ral |
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| ralph | |
| ralph | |
| ram | ram |
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| rampallian | rampallian |
| rampant | rampant |
| ramping | ramp |
| rampir | rampir |
| ramps | ramp |
| rams | ram |
| ramsey | ramsei |
| ramston | ramston |
| ran | ran |
| rance | ranc |
| rancorous | rancor |
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| random | random |
| rang | rang |
| range | rang |
| ranged | rang |
| rangers | ranger |
| ranges | rang |
| ranging | rang |
| rank | rank |
| ranker | ranker |
| rankest | rankest |
| ranking | rank |
| rankle | rankl |
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| ranks | rank |

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| reacheth | reacheth |
| reaching | reach |
| read | read |
| reader | reader |
| readiest | readiest |
| readily | readili |
| readiness | readi |
| reading | read |
| readins | readin |
| reads | read |
| ready | readi |
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| realm | realm |
| realms | realm |
| reap | reap |
| reapers | reaper |
| reaping | reap |
| reaps | reap |
| rear | rear |
| rears | rear |
| rearward | rearward |
| reason | reason |
| reasonable | reason |
| reasonably | reason |
| reasoned | reason |
| reasoning | reason |
| reasonless | reasonless |
| reasons | reason |
| reave | reav |
| rebate | rebat |
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| rebel | rebel |
| rebell | rebel |
| rebelling | rebel |
| rebellion | rebellion |
| rebellious | rebelli |
| rebels | rebel |
| rebound | rebound |
| rebuk | rebuk |
| rebuke | rebuk |
| rebukeable | rebuk |
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| rebukes | rebuk |
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| recall | recal |

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| reconciliation | reconcili |
| record | record |
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| recorded | record |
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| records | record |
| recount | recount |
| recounted | recount |
| recounting | recount |
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| recourse | recours |
| recov | recov |
| recover | recov |
| recoverable | recover |
| recovered | recov |
| recoveries | recoveri |
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| recovery | recoveri |
| recreant | recreant |
| recreants | recreant |
| recreate | recreat |
| recreation | recreat |
| rectify | rectifi |
| rector | rector |
| rectorship | rectorship |
| recure | recur |
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| red | red |
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| redeem | redeem |
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| redeemer | redeem |
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| reporting | report |
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| reposing | repos |
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| reprehend | reprehend |
| reprehended | reprehend |
| reprehending | reprehend |
| represent | repres |
| representing | repres |
| reprieve | repriev |
| reprieves | repriev |
| reprisal | repris |
| reproach | reproach |
| reproaches | reproach |
| reproachful | reproach |
| reproachfully | reproachfulli |
| reprobate | reprob |
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| reproveable | reprov |
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| repugnancy | repugn |
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| repulse | repuls |
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| repurchas | repurcha |
| repured | repur |
| reputation | reput |
| repute | reput |
| reputed | reput |
| reputeless | reputeless |
| reputes | reput |
| reputing | reput |
| request | request |
| requested | request |
| requesting | request |
| requests | request |
| requiem | requiem |
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| rex | rex |
| rey | rei |
| reynaldo | reynaldo |
| rford | rford |
| rful | rful |
| rfull | rfull |
| rhapsody | rhapsodi |
| rheims | rheim |
| rhenish | rhenish |
| rhesus | rhesu |
| rhetoric | rhetor |
| rheum | rheum |
| rheumatic | rheumat |
| rheums | rheum |
| rheumy | rheumi |
| rhinoceros | rhinocero |
| rhodes | rhode |
| rhodope | rhodop |
| rhubarb | rhubarb |
| rhym | rhym |
| rhyme | rhyme |
| rhymers | rhymer |
| rhymes | rhyme |
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| rialto | rialto |
| rib | rib |
| ribald | ribald |
| riband | riband |
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| ribaudred | ribaudr |
| ribb | ribb |
| ribbed | rib |
| ribbon | ribbon |
| ribbons | ribbon |
| ribs | rib |
| rice | rice |
| rich | rich |
| richard | richard |
| richer | richer |
| riches | rich |
| richest | richest |
| richly | richli |
| richmond | richmond |
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| rid | rid |
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| ridden | ridden |
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| rider | rider |
| riders | rider |
| rides | ride |
| ridest | ridest |
| rideth | rideth |
| ridge | ridg |
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| ridiculous | ridicul |
| riding | ride |
| rids | rid |
| rien | rien |
| ries | ri |
| rifle | rifl |
| rift | rift |
| rifted | rift |
| rig | rig |
| rigg | rigg |
| riggish | riggish |
| right | right |
| righteous | righteou |
| righteously | righteous |
| rightful | right |
| rightfully | rightfulli |
| rightly | rightli |
| rights | right |
| rigol | rigol |
| rigorous | rigor |
| rigorously | rigor |
| rigour | rigour |
| ril | ril |
| rim | rim |
| rin | rin |
| rinaldo | rinaldo |
| rind | rind |
| ring | ring |
| ringing | ring |
| ringleader | ringlead |
| ringlets | ringlet |
| rings | ring |
| ringwood | ringwood |
| riot | riot |
| rioter | rioter |
| rioting | riot |

riotous riotou
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| sackcloth | sackcloth |
| sacked | sack |
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| sacks | sack |
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| sacrific | sacrif |
| sacrifice | sacrific |
| sacrificers | sacrific |
| sacrifices | sacrific |
| sacrificial | sacrifici |
| sacrificing | sacrif |
| sacrilegious | sacrilegi |
| sacring | sacr |
| sad | sad |
| sadder | sadder |
| saddest | saddest |
| saddle | saddl |
| saddler | saddler |
| saddles | saddl |
| sadly | sadli |
| sadness | sad |
| saf | saf |
| safe | safe |
| safeguard | safeguard |
| safely | safe |
| safer | safer |
| safest | safest |
| safeties | safeti |
| safety | safeti |
| saffron | saffron |
| sag | sag |
| sage | sage |
| sagittary | sagittari |
| said | said |
| saidst | saidst |
| sail | sail |
| sailing | sail |
| sailmaker | sailmak |
| sailor | sailor |

sailors sailor
sails sail
sain sain
saint saint
sainted saint
saintlike saintlik
saints saint
saith saith
sake sake
sakes
sake
sala sala
salad salad
salamander salamand
salary salari
sale sale
salerio salerio
salicam salicam
salique saliqu
salisbury salisburi
sall sall
sallet sallet
sallets sallet
sallies salli
sallow sallow
sally salli
salmon salmon
salmons salmon
salt salt
salter salter
saltiers saltier
saltness salt
saltpetre saltpetr
salutation salut
salutations salut
salute salut
saluted salut
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saluteth saluteth
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salvation salvat
salve salv
salving
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same same
samingo samingo
samp samp
sampire sampir

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|---|---|
| sample | sampl |
| sampler | sampler |
| sampson | sampson |
| samson | samson |
| samsons | samson |
| sancta | sancta |
| sanctified | sanctifi |
| sanctifies | sanctifi |
| sanctify | sanctifi |
| sanctimonies | sanctimoni |
| sanctimonious | sanctimoni |
| sanctimony | sanctimoni |
| sanctities | sanctiti |
| sanctity | sanctiti |
| sanctuarize | sanctuar |
| sanctuary | sanctuari |
| sand | sand |
| sandal | sandal |
| sandbag | sandbag |
| sanded | sand |
| sands | sand |
| sandy | sandi |
| sandys | sandi |
| sang | sang |
| sanguine | sanguin |
| sanguis | sangui |
| sanity | saniti |
| sans | san |
| santrailles | santrail |
| sap | sap |
| sapient | sapient |
| sapit | sapit |
| sapless | sapless |
| sapling | sapl |
| sapphire | sapphir |
| sapphires | sapphir |
| saracens | saracen |
| sarcenet | sarcenet |
| sard | sard |
| sardians | sardian |
| sardinia | sardinia |
| sardis | sardi |
| sarum | sarum |
| sat | sat |
| satan | satan |
| satchel | satchel |
| sate | sate |
| sated | sate |

satiate satiat
satiety satieti
satin satin
satire satir
satirical satir
satis sati
satisfaction satisfact
satisfied satisfi
satisfies satisfi
satisfy satisfi
satisfying satisfi
saturday saturdai
saturdays saturdai
saturn saturn
saturnine saturnin
saturninus saturninu
satyr satyr
satyrs satyr
sauc sauc
sauce sauc
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saucers saucer
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saucily saucili
sauciness sauci
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sauf sauf
saunder saunder
sav sav
savage savag
savagely savag
savageness savag
savagery savageri
savages savag
save save
saved save
saves save
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saviour saviour
savory savori
savour savour
savouring savour
savours savour
savoury savouri
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saw saw

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|---|---|
| sawed | saw |
| sawest | sawest |
| sawn | sawn |
| sawpit | sawpit |
| saws | saw |
| sawyer | sawyer |
| saxons | saxon |
| saxony | saxoni |
| saxton | saxton |
| say | sai |
| sayest | sayest |
| saying | sai |
| sayings | sai |
| says | sai |
| sayst | sayst |
| sblood | sblood |
| sc | sc |
| scab | scab |
| scabbard | scabbard |
| scabs | scab |
| scaffold | scaffold |
| scaffoldage | scaffoldag |
| scal | scal |
| scald | scald |
| scalded | scald |
| scalding | scald |
| scale | scale |
| scaled | scale |
| scales | scale |
| scaling | scale |
| scall | scall |
| scalp | scalp |
| scalps | scalp |
| scaly | scali |
| scamble | scambl |
| scambling | scambl |
| scamels | scamel |
| scan | scan |
| scandal | scandal |
| scandaliz | scandaliz |
| scandalous | scandal |
| scandy | scandi |
| scann | scann |
| scant | scant |
| scanted | scant |
| scanter | scanter |
| scanting | scant |

scantling scantl
scants scant
scap scap
scape scape
scaped scape
scapes scape
scapeth scapeth
scar scar
scarce scarc
scarcely scarc
scarcity scarciti
scare scare
scarecrow scarecrow
scarecrows scarecrow
scarf scarf
scarfed scarf
scarfs scarf
scaring scare
scarlet scarlet
scarr scarr
scarre scarr
scars scar
scarus scaru
scath scath
scathe scath
scathful scath
scatt scatt
scatter scatter
scattered scatter
scattering scatter
scatters scatter
scelera scelera
scelerisque scelerisqu
scene scene
scenes scene
scent scent
scented scent
scept scept
scepter scepter
sceptre sceptr
sceptred sceptr
sceptres sceptr
schedule schedul
schedules schedul
scholar scholar
scholarly scholarli
scholars scholar

school school
schoolboy schoolboi
schoolboys schoolboi
schoolfellows schoolfellow
schooling school
schoolmaster schoolmast
schoolmasters schoolmast
schools school
sciatica sciatica
sciaticas sciatica
science scienc
sciences scienc
scimitar scimitar
scion scion
scions scion
scissors scissor
scoff scoff
scoffer scoffer
scoffing scof
scoffs scoff
scoggin scoggin
scold scold
scolding scold
scolds scold
sconce sconc
scone scone
scope
scope
scopes scope
scorch scorch
scorched scorch
score score
scored score
scores score
scoring score
scorn scorn
scorned scorn
scornful scorn
scornfully scornfulli
scorning scorn
scorns scorn
scorpion scorpion
scorpions scorpion
scot scot
scotch scotch
scotches scotch
scotland scotland
scots scot

scottish scottish
scoundrels scoundrel
scour scour
scoured scour
scourg scourg
scourge scourg
scouring scour
scout scout
scouts scout
scowl scowl
scrap scrap
scrape scrape
scraping scrape
scraps scrap
scratch scratch
scratches scratch
scratching scratch
scream scream
screams scream
screech screech
screeching screech
screen screen
screens screen
screw screw
screws screw
scribbl scribbl
scribbled scribbl
scribe scribe
scribes scribe
scrimers scrimer
scrip scrip
scrippage scrippag
scripture scriptur
scriptures scriptur
scrivener scriven
scroll scroll
scrolls scroll
scroop scroop
scrowl scrowl
scroyles scroyl
scrubbed scrub
scruple scrupl
scruples scrupl
scrupulous scrupul
scuffles scuffl
scuffling scuffl

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|---|---|
| scullion | scullion |
| sculls | scull |
| scum | scum |
| scurril | scurril |
| scurrility | scurril |
| scurrilous | scurril |
| scurvy | scurvi |
| scuse | scuse |
| scut | scut |
| scutcheon | scutcheon |
| scutcheons | scutcheon |
| scylla | scylla |
| scythe | scyth |
| scythed | scyth |
| scythia | scythia |
| scythian | scythian |
| sdeath | sdeath |
| se | se |
| sea | sea |
| seacoal | seacoal |
| seafaring | seafar |
| seal | seal |
| sealed | seal |
| sealing | seal |
| seals | seal |
| seam | seam |
| seamen | seamen |
| seamy | |
| seami | |
| seaport | seaport |
| sear | sear |
| searce | searc |
| search | search |
| searchers | searcher |
| searches | search |
| searcheth | searcheth |
| searching | search |
| seared | sear |
| seas | sea |
| seasick | seasick |
| seaside | seasid |
| season | season |
| seasoned | season |
| seasons | season |
| seat | seat |
| seated | seat |
| seats | seat |
| sebastian | sebastian |

second second
secondarily secondarili
secondary secondari
seconded second
seconds second
secrecy secreci
secret secret
secretaries secretari
secretary secretari
secretly secretli
secrets secret
sect
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sectary sectari
sects sect
secundo secundo
secure secur
securely secur
securing secur
security secur
sedg sedg
sedge sedg
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see see
seed seed
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seein seein
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seel seel
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|---|---|
| seemers | seemer |
| seemest | seemest |
| seemeth | seemeth |
| seeming | seem |
| seemingly | seemingli |
| seemly | seemli |
| seems | seem |
| seen | seen |
| seer | seer |
| sees | see |
| seese | sees |
| seest | seest |
| seethe | seeth |
| seethes | seeth |
| seething | seeth |
| seeting | seet |
| segregation | segreg |
| seigneur | seigneur |
| seigneurs | seigneur |
| seiz | seiz |
| seize | seiz |
| seized | seiz |
| seizes | seiz |
| seizeth | seizeth |
| seizing | seiz |
| seizure | seizur |
| seld | seld |
| seldom | seldom |
| select | select |
| seleucus | seleucu |
| self | self |
| selfsame | selfsam |
| sell | sell |
| seller | seller |
| selling | sell |
| sells | sell |
| selves | selv |
| semblable | semblabl |
| semblably | semblabl |
| semblance | semblanc |
| semblances | semblanc |
| semblative | sembl |
| semi | semi |
| semicircle | semicircl |
| semiramis | semirami |
| semper | semper |
| sempronius | semproniu |

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|---|---|
| senate | senat |
| senator | senat |
| senators | senat |
| send | send |
| sender | sender |
| sendeth | sendeth |
| sending | send |
| sends | send |
| seneca | seneca |
| senior | senior |
| seniory | seniori |
| senis | seni |
| sennet | sennet |
| senoys | senoi |
| sense | sens |
| senseless | senseless |
| senses | sens |
| sensible | sensibl |
| sensibly | sensibl |
| sensual | sensual |
| sensuality | sensual |
| sent | sent |
| sentenc | sentenc |
| sentence | sentenc |
| sentences | sentenc |
| sententious | sententi |
| sentinel | sentinel |
| sentinels | sentinel |
| separable | separ |
| separate | separ |
| separated | separ |
| separates | separ |
| separation | separ |
| septentrion | septentrion |
| sepulchre | sepulchr |
| sepulchres | sepulchr |
| sepulchring | sepulchr |
| sequel | sequel |
| sequence | sequenc |
| sequent | sequent |
| sequest | sequest |
| sequester | sequest |
| sequestration | sequestr |
| sere | sere |
| serenis | sereni |
| serge | |

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|---|---|
| | serg |
| sergeant | sergeant |
| serious | seriou |
| seriously | serious |
| sermon | sermon |
| sermons | sermon |
| serpent | serpent |
| serpentine | serpentin |
| serpents | serpent |
| serpigo | serpigo |
| serv | serv |
| servant | servant |
| servanted | servant |
| servants | servant |
| serve | serv |
| served | serv |
| server | server |
| serves | serv |
| serveth | serveth |
| service | servic |
| serviceable | servic |
| services | servic |
| servile | servil |
| servility | servil |
| servilius | serviliu |
| serving | serv |
| servingman | servingman |
| servingmen | servingmen |
| serviteur | serviteur |
| servitor | servitor |
| servitors | servitor |
| servitude | servitud |
| sessa | sessa |
| session | session |
| sessions | session |
| sestos | sesto |
| set | set |
| setebos | setebo |
| sets | set |
| setter | setter |
| setting | set |
| settle | settl |
| settled | settl |
| settlest | settlest |
| settling | settl |
| sev | sev |
| seven | seven |
| sevenfold | sevenfold |

sevennight sevennight
seventeen seventeen
seventh seventh
seventy seventi
sever sever
several sever
severally sever
severals sever
severe sever
severed sever
severely sever
severest severest
severing sever
severity sever
severn
severn
severs sever
sew sew
seward seward
sewer sewer
sewing sew
sex sex
sexes sex
sexton sexton
sextus sextu
seymour seymour
seyton seyton
sfoot sfoot
sh sh
shackle shackl
shackles shackl
shade shade
shades shade
shadow shadow
shadowed shadow
shadowing shadow
shadows shadow
shadowy shadowi
shady shadi
shafalus shafalu
shaft shaft
shafts shaft
shag shag
shak shak
shake shake
shaked shake
shaken shaken
shakes

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|---|---|
| shake | |
| shaking | shake |
| shales | shale |
| shall | shall |
| shallenge | shalleng |
| shallow | shallow |
| shallowest | shallowest |
| shallowly | shallowli |
| shallows | shallow |
| shalt | shalt |
| sham | sham |
| shambles | shambl |
| shame | shame |
| shamed | shame |
| shameful | shame |
| shamefully | shamefulli |
| shameless | shameless |
| shames | shame |
| shamest | shamest |
| shaming | shame |
| shank | shank |
| shanks | shank |
| shap | shap |
| shape | shape |
| shaped | shape |
| shapeless | shapeless |
| shapen | shapen |
| shapes | shape |
| shaping | shape |
| shar | shar |
| shard | shard |
| sharded | shard |
| shards | shard |
| share | share |
| shared | share |
| sharers | sharer |
| shares | share |
| sharing | share |
| shark | shark |
| sharp | sharp |
| sharpen | sharpen |
| sharpened | sharpen |
| sharpens | sharpen |
| sharper | sharper |
| sharpest | sharpest |
| sharply | sharpli |
| sharpness | sharp |
| sharps | sharp |

shatter shatter
shav shav
shave shave
shaven shaven
shaw shaw
she she
sheaf sheaf
sheal sheal
shear shear
shearers shearer
shearing shear
shearman shearman
shears shear
sheath sheath
sheathe sheath
sheathed sheath
sheathes sheath
sheathing sheath
sheaved sheav
sheaves sheav
shed shed
shedding shed
sheds shed
sheen sheen
sheep sheep
sheepcote sheepcot
sheepcotes sheepcot
sheeps sheep
sheepskins sheepskin
sheer sheer
sheet sheet
sheeted sheet
sheets sheet
sheffield sheffield
shelf shelf
shell shell
shells shell
shelt shelt
shelter shelter
shelters shelter
shelves shelv
shelving shelv
shelvy shelvi
shent shent
shepherd shepherd
shepherdes shepherd
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shepherdesses shepherdess
shepherds shepherd
sher sher
sheriff sheriff
sherris sherri
shes she
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shield shield
shielded shield
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shift shift
shifted shift
shifting shift
shifts shift
shilling shill
shillings shill
shin shin
shine shine
shines shine
shineth shineth
shining shine
shins shin
shiny shini
ship ship
shipboard shipboard
shipman shipman
shipmaster shipmast
shipmen shipmen
shipp shipp
shipped ship
shipping ship
ships
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shipt shipt
shipwreck shipwreck
shipwrecking shipwreck
shipwright shipwright
shipwrights shipwright
shire shire
shirley shirlei
shirt shirt
shirts shirt
shive shive
shiver shiver
shivering shiver
shivers shiver
shoal shoal
shoals shoal

shock shock
shocks shock
shod shod
shoe shoe
shoeing shoe
shoemaker shoemak
shoes shoe
shog shog
shone shone
shook shook
shoon shoon
shoot shoot
shooter shooter
shootie shooti
shooting shoot
shoots
shoot
shop shop
shops shop
shore shore
shores shore
shorn shorn
short short
shortcake shortcak
shorten shorten
shortened shorten
shortens shorten
shorter shorter
shortly shortli
shortness short
shot shot
shotten shotten
shoughs shough
should should
shoulder shoulder
shouldering shoulder
shoulders shoulder
shouldst shouldst
shout shout
shouted shout
shouting shout
shouts shout
shov shov
shove shove
shovel shovel
shovels shovel
show show
showed show

shower
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showers shower
showest showest
showing show
shown shown
shows show
shreds shred
shrew shrew
shrewd shrewd
shrewdly shrewdli
shrewdness shrewd
shrewish shrewish
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shrewsbury shrewsburi
shriek shriek
shrieking shriek
shrieks shriek
shrieve shriev
shrift shrift
shrill shrill
shriller shriller
shrills shrill
shrilly shrilli
shrimp shrimp
shrine shrine
shrink shrink
shrinking shrink
shrinks shrink
shriv shriv
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shriver shriver
shrives shrive
shriving shrive
shroud shroud
shrouded shroud
shrouding shroud
shrouds shroud
shrove shrove
shrow shrow
shrows shrow
shrub shrub
shrubs shrub
shrug shrug
shrugs shrug

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| shrunk | shrunk |
| shudd | shudd |
| shudders | shudder |
| shuffl | shuffl |
| shuffle | shuffl |
| shuffled | shuffl |
| shuffling | shuffl |
| shun | shun |
| shunless | shunless |
| shunn | shunn |
| shunned | shun |
| shunning | shun |
| shuns | shun |
| shut | shut |
| shuts | shut |
| shuttle | shuttl |
| shy | shy |
| shylock | shylock |
| si | si |
| sibyl | sibyl |
| sibylla | sibylla |
| sibyls | sibyl |
| sicil | sicil |
| sicilia | sicilia |
| sicilian | sicilian |
| sicilius | siciliu |
| sicils | sicil |
| sicily | sicili |
| sicinius | siciniu |
| sick | sick |
| sicken | sicken |
| sickens | sicken |
| sicker | sicker |
| sickle | sickl |
| sicklemen | sicklemen |
| sicklied | sickli |
| sickliness | sickli |
| sickly | sickli |
| sickness | sick |
| sicles | sicl |
| sicyon | sicyon |
| side | side |
| sided | side |
| sides | side |
| siege | sieg |
| sieges | sieg |
| sienna | sienna |

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|---|---|
| sies | si |
| sieve | siev |
| sift | sift |
| sifted | sift |
| sigeia | sigeia |
| sigh | sigh |
| sighed | sigh |
| sighing | sigh |
| sighs | sigh |
| sight | sight |
| sighted | sight |
| sightless | sightless |
| sightly | sightli |
| sights | sight |
| sign | sign |
| signal | signal |
| signet | signet |
| signieur | signieur |
| significant | signific |
| significants | signific |
| signified | signifi |
| signifies | signifi |
| signify | signifi |
| signifying | signifi |
| signior | signior |
| signiories | signiori |
| signiors | signior |
| signiory | signiori |
| signor | signor |
| signories | signori |
| signs | sign |
| signum | signum |
| silenc | silenc |
| silence | silenc |
| silenced | silenc |
| silencing | silenc |
| silent | silent |
| silently | silent |
| silius | siliu |
| silk | silk |
| silken | silken |
| silkman | silkman |
| silks | silk |
| silliest | silliest |
| silliness | silli |
| silling | sill |
| silly | silli |

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|---|---|
| silva | silva |
| silver | silver |
| silvered | silver |
| silverly | silverli |
| silvia | silvia |
| silvius | silviu |
| sima | sima |
| simile | simil |
| similes | simil |
| simois | simoi |
| simon | simon |
| simony | simoni |
| simp | simp |
| simpcox | simpcox |
| simple | simpl |
| simpleness | simpl |
| simpler | simpler |
| simples | simpl |
| simplicity | simplic |
| simply | simpli |
| simular | simular |
| simulation | simul |
| sin | sin |
| since | sinc |
| sincere | sincer |
| sincerely | sincer |
| sincerity | sincer |
| sinel | sinel |
| sinew | sinew |
| sinewed | sinew |
| sinews | sinew |
| sinewy | sinewi |
| sinful | sin |
| sinfully | sinfulli |
| sing | sing |
| singe | sing |
| singeing | sing |
| singer | singer |
| singes | sing |
| singeth | singeth |
| singing | sing |
| single | singl |
| singled | singl |
| singleness | singl |
| singly | singli |
| sings | sing |
| singular | singular |
| singulariter | singularit |

singularities singular
singularity
singular
singuled singul
sinister sinist
sink sink
sinking sink
sinks sink
sinn sinn
sinner sinner
sinners sinner
sinning sin
sinon sinon
sins sin
sip sip
sipping sip
sir sir
sire sire
siren siren
sirrah sirrah
sirs sir
sist sist
sister sister
sisterhood sisterhood
sisterly sisterli
sisters sister
sit sit
sith sith
sithence sithenc
sits sit
sitting sit
situate situat
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situations situat
siward siward
six six
sixpence sixpenc
sixpences sixpenc
sixpenny sixpenni
sixteen sixteen
sixth sixth
sixty sixti
siz siz
size size
sizes size
sizzle sizzl
skains skain
skamble skambl

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|---|---|
| skein | skein |
| skelter | skelter |
| skies | ski |
| skilful | skil |
| skilfully | skilfulli |
| skill | skill |
| skilless | skilless |
| skillet | skillet |
| skillful | skill |
| skills | skill |
| skim | skim |
| skimble | skimbl |
| skin | skin |
| skinker | skinker |
| skinny | skinni |
| skins | skin |
| skip | skip |
| skipp | skipp |
| skipper | |
| skipper | |
| skipping | skip |
| skirmish | skirmish |
| skirmishes | skirmish |
| skirr | skirr |
| skirted | skirt |
| skirts | skirt |
| skittish | skittish |
| skulking | skulk |
| skull | skull |
| skulls | skull |
| sky | sky |
| skyey | skyei |
| skyish | skyish |
| slab | slab |
| slack | slack |
| slackly | slackli |
| slackness | slack |
| slain | slain |
| slake | slake |
| sland | sland |
| slander | slander |
| slandered | slander |
| slanderer | slander |
| slanderers | slander |
| slandering | slander |
| slanderous | slander |
| slanders | slander |
| slash | slash |

| | |
|---|---|
| slaught | slaught |
| slaughter | slaughter |
| slaughtered | slaughter |
| slaughterer | slaughter |
| slaughterman | slaughterman |
| slaughtermen | slaughtermen |
| slaughterous | slaughter |
| slaughters | slaughter |
| slave | slave |
| slaver | slaver |
| slavery | slaveri |
| slaves | slave |
| slavish | slavish |
| slay | slai |
| slayeth | slayeth |
| slaying | slai |
| slays | slai |
| sleave | sleav |
| sledded | sled |
| sleek | sleek |
| sleekly | sleekli |
| sleep | sleep |
| sleeper | sleeper |
| sleepers | sleeper |
| sleepest | sleepest |
| sleeping | sleep |
| sleeps | sleep |
| sleepy | sleepi |
| sleeve | sleev |
| sleeves | sleev |
| sleid | sleid |
| sleided | sleid |
| sleight | sleight |
| sleights | sleight |
| slender | slender |
| slenderer | slender |
| slenderly | slenderli |
| slept | slept |
| slew | slew |
| slewest | slewest |
| slice | slice |
| slid | slid |
| slide | slide |
| slides | slide |
| sliding | slide |
| slight | slight |
| slighted | slight |
| slightest | slightest |

slightly slightli
slightness slight
slights slight
slily slili
slime slime
slimy slimi
slings sling
slink slink
slip slip
slipp slipp
slipper slipper
slippers slipper
slippery slipperi
slips slip
slish slish
slit slit
sliver sliver
slobb
slobb
slomber slomber
slop slop
slope slope
slops slop
sloth sloth
slothful sloth
slough slough
slovenly slovenli
slovenry slovenri
slow slow
slower slower
slowly slowli
slowness slow
slubber slubber
slug slug
sluggard sluggard
sluggardiz sluggardiz
sluggish sluggish
sluic sluic
slumb slumb
slumber slumber
slumbers slumber
slumbery slumberi
slunk slunk
slut slut
sluts slut
sluttery slutteri
sluttish sluttish
sluttishness sluttish

sly sly
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smack smack
smacking smack
smacks smack
small small
smaller smaller
smallest smallest
smallness small
smalus smalu
smart smart
smarting smart
smartly smartli
smatch smatch
smatter smatter
smear smear
smell smell
smelling smell
smells smell
smelt smelt
smil smil
smile smile
smiled smile
smiles smile
smilest smilest
smilets smilet
smiling smile
smilingly smilingli
smirch smirch
smirched smirch
smit smit
smite smite
smites smite
smith
smith
smithfield smithfield
smock smock
smocks smock
smok smok
smoke smoke
smoked smoke
smokes smoke
smoking smoke
smoky smoki
smooth smooth
smoothed smooth
smoothing smooth

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|---|---|
| smoothly | smoothli |
| smoothness | smooth |
| smooths | smooth |
| smote | smote |
| smoth | smoth |
| smother | smother |
| smothered | smother |
| smothering | smother |
| smug | smug |
| smulkin | smulkin |
| smutch | smutch |
| snaffle | snaffl |
| snail | snail |
| snails | snail |
| snake | snake |
| snakes | snake |
| snaky | snaki |
| snap | snap |
| snapp | snapp |
| snapper | snapper |
| snar | snar |
| snare | snare |
| snares | snare |
| snarl | snarl |
| snarleth | snarleth |
| snarling | snarl |
| snatch | snatch |
| snatchers | snatcher |
| snatches | snatch |
| snatching | snatch |
| sneak | sneak |
| sneaking | sneak |
| sneap | sneap |
| sneaping | sneap |
| sneck | sneck |
| snip | snip |
| snipe | snipe |
| snipt | snipt |
| snore | snore |
| snores | snore |
| snoring | snore |
| snorting | snort |
| snout | snout |
| snow | snow |
| snowballs | snowbal |
| snowed | snow |
| snowy | snowi |
| snuff | snuff |

snuffs snuff
snug snug
so so
soak soak
soaking soak
soaks soak
soar soar
soaring soar
soars soar
sob sob
sobbing sob
sober sober
soberly soberli
sobriety sobrieti
sobs sob
sociable sociabl
societies societi
society societi
socks sock
socrates socrat
sod sod
sodden sodden
soe soe
soever soever
soft soft
soften soften
softens soften
softer softer
softest softest
softly softli
softness soft
soil soil
soiled soil
soilure soilur
soit soit
sojourn
sojourn
sol sol
sola sola
solace solac
solanio solanio
sold sold
soldat soldat
solder solder
soldest soldest
soldier soldier
soldiers soldier
soldiership soldiership

sole sole
solely sole
solem solem
solemn solemn
solemness solem
solemnities solemn
solemnity solemn
solemniz solemniz
solemnize solemn
solemnized solemn
solemnly solemnli
soles sole
solicit solicit
solicitation solicit
solicited solicit
soliciting solicit
solicitings solicit
solicitor solicitor
solicits solicit
solid
solid
solidares solidar
solidity solid
solinus solinu
solitary solitari
solomon solomon
solon solon
solum solum
solus solu
solyman solyman
some some
somebody somebodi
someone someon
somerset somerset
somerville somervil
something someth
sometime sometim
sometimes sometim
somever somev
somewhat somewhat
somewhere somewher
somewhither somewhith
somme somm
son son
sonance sonanc
song song
songs song
sonnet sonnet

sonneting sonnet
sonnets sonnet
sons son
sont
sont
sonties sonti
soon soon
sooner sooner
soonest soonest
sooth sooth
soothe sooth
soothers soother
soothing sooth
soothsay soothsai
soothsayer soothsay
sooty sooti
sop sop
sophister sophist
sophisticated sophist
sophy sophi
sops sop
sorcerer sorcer
sorcerers sorcer
sorceress sorceress
sorceries sorceri
sorcery sorceri
sore sore
sorel sorel
sorely sore
sorer sorer
sores sore
sorrier sorrier
sorriest sorriest
sorrow sorrow
sorrowed sorrow
sorrowest sorrowest
sorrowful sorrow
sorrowing sorrow
sorrows sorrow
sorry sorri
sort sort
sortance sortanc
sorted sort
sorting sort
sorts sort
sossius sossiu
sot sot
soto soto

sots sot
sottish sottish
soud soud
sought sought
soul soul
sould sould
soulless soulless
souls soul
sound sound
sounded sound
sounder sounder
soundest soundest
sounding sound
soundless soundless
soundly soundli
soundness sound
soundpost soundpost
sounds sound
sour sour
source
sourc
sources sourc
sourest sourest
sourly sourli
sours sour
sous sou
souse sous
south south
southam southam
southampton southampton
southerly southerli
southern southern
southward southward
southwark southwark
southwell southwel
souviendrai souviendrai
sov sov
sovereign sovereign
sovereignest sovereignest
sovereignly sovereignli
sovereignty sovereignti
sovereignvours sovereignvour
sow sow
sowing sow
sowl sowl
sowter sowter
space space
spaces space

spacious spaciou
spade spade
spades spade
spain
spain
spak spak
spake spake
spakest spakest
span span
spangle spangl
spangled spangl
spaniard spaniard
spaniel spaniel
spaniels spaniel
spanish spanish
spann spann
spans span
spar spar
spare spare
spares spare
sparing spare
sparingly sparingli
spark spark
sparkle sparkl
sparkles sparkl
sparkling sparkl
sparks spark
sparrow sparrow
sparrows sparrow
sparta sparta
spartan spartan
spavin spavin
spavins spavin
spawn spawn
speak speak
speaker
speaker
speakers speaker
speakest speakest
speaketh speaketh
speaking speak
speaks speak
spear spear
speargrass speargrass
spears spear
special special
specialities special
specially special

specialties specialti
specialty specialti
specify specifi
speciously specious
spectacle spectacl
spectacled spectacl
spectacles spectacl
spectators spectat
spectatorship spectatorship
speculation specul
speculations specul
speculative specul
sped sped
speech speech
speeches speech
speechless speechless
speed speed
speeded speed
speedier speedier
speediest speediest
speedily speedili
speediness speedi
speeding speed
speeds speed
speedy speedi
speens speen
spell spell
spelling spell
spells spell
spelt spelt
spencer spencer
spend spend
spendest spendest
spending spend
spends spend
spendthrift spendthrift
spent spent
sperato sperato
sperm sperm
spero spero
sperr sperr
spher spher
sphere sphere
sphered sphere
spheres sphere
spherical spheric
sphery spheri
sphinx sphinx

| | |
|---|---|
| spice | spice |
| spiced | spice |
| spicery | spiceri |
| spices | spice |
| spider | spider |
| spiders | spider |
| spied | spi |
| spies | spi |
| spieth | spieth |
| spightfully | spightfulli |
| spigot | spigot |
| spill | spill |
| spilling | spill |
| spills | spill |
| spilt | spilt |
| spilth | spilth |
| spin | spin |
| spinii | spinii |
| spinners | spinner |
| spinster | spinster |
| spinsters | spinster |
| spire | spire |
| spirit | spirit |
| spirited | spirit |
| spiritless | spiritless |
| spirits | spirit |
| spiritual | spiritu |
| spiritualty | spiritualti |
| spirt | spirt |
| spit | spit |
| spital | spital |
| spite | spite |
| spited | spite |
| spiteful | spite |
| spites | spite |
| spits | spit |
| spitted | spit |
| spitting | spit |
| splay | splai |
| spleen | spleen |
| spleenful | spleen |
| spleens | spleen |
| spleeny | spleeni |
| splendour | splendour |
| splenitive | splenit |
| splinter | splinter |

splinters splinter
split split
splits split
splitted split
splitting split
spoil spoil
spoils spoil
spok spok
spoke spoke
spoken spoken
spokes spoke
spokesman spokesman
sponge spong
spongy spongi
spoon spoon
spoons spoon
sport sport
sportful sport
sporting sport
sportive sportiv
sports sport
spot spot
spotless spotless
spots spot
spotted spot
spousal spousal
spouse spous
spout spout
spouting spout
spouts spout
sprag sprag
sprang sprang
sprat sprat
sprawl sprawl
spray sprai
sprays sprai
spread spread
spreading spread
spreads spread
sprighted spright
sprightful spright
sprightly sprightli
sprigs sprig
spring spring
springe spring
springes spring
springeth springeth
springhalt springhalt

springing spring
springs spring
springtime
springtim
sprinkle sprinkl
sprinkles sprinkl
sprite sprite
sprited sprite
spritely sprite
sprites sprite
spriting sprite
sprout sprout
spruce spruce
sprung sprung
spun spun
spur spur
spurio spurio
spurn spurn
spurns spurn
spurr spurr
spurrer spurrer
spurring spur
spurs spur
spy spy
spying spy
squabble squabbl
squadron squadron
squadrons squadron
squand squand
squar squar
square squar
squarer squarer
squares squar
squash squash
squeak
squeak
squeaking squeak
squeal squeal
squealing squeal
squeezes squeez
squeezing squeez
squele squel
squier squier
squints squint
squiny squini
squire squir
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squirrel squirrel

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stab stab
stabb stabb
stabbed stab
stabbing stab
stable stabl
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stablish stablish
stablishment stablish
stabs stab
stacks stack
staff staff
stafford stafford
staffords stafford
staffordshire staffordshir
stag stag
stage stage
stages stage
stagger stagger
staggering stagger
staggers stagger
stags stag
staid staid
staider staider
stain stain
stained stain
staines stain
staineth staineth
staining stain
stainless stainless
stains stain
stair stair
stairs stair
stake stake
stakes stake
stale stale
staled stale
stalk stalk
stalking stalk
stalks stalk
stall stall
stalling stall
stalls stall
stamford stamford
stammer stammer
stamp stamp

stamped stamp
stamps stamp
stanch stanch
stanchless stanchless
stand stand
standard standard
standards standard
stander stander
standers stander
standest standest
standeth standeth
standing stand
stands stand
staniel staniel
stanley stanlei
stanze stanz
stanzo stanzo
stanzos stanzo
staple stapl
staples stapl
star star
stare stare
stared stare
stares stare
staring stare
starings stare
stark stark
starkly starkli
starlight starlight
starling starl
starr starr
starry starri
stars star
start start
started start

starting start
startingly startingli
startle startl
startles startl
starts start
starv starv
starve starv
starved starv
starvelackey starvelackei
starveling starvel
starveth starveth
starving starv

state state
statelier stateli
stately state
states state
statesman statesman
statesmen statesmen
statilius statiliu
station station
statist statist
statists statist
statue statu
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stature statur
statures statur
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stay stai
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steadier steadier
steads stead
steal steal
stealer stealer
stealers stealer
stealing steal
steals steal
stealth stealth
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steel steel
steeled steel
steely steeli
steep steep
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steeps steep
steepy steepi
steer steer
steerage steerag

steering steer
steers steer
stelled
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stem stem
stemming stem
stench stench
step step
stepdame stepdam
stephano stephano
stephen stephen
stepmothers stepmoth
stepp stepp
stepping step
steps step
sterile steril
sterility steril
sterling sterl
stern stern
sternage sternag
sterner sterner
sternest sternest
sternness stern
steterat steterat
stew stew
steward steward
stewards steward
stewardship stewardship
stewed stew
stews stew
stick stick
sticking stick
stickler stickler
sticks stick
stiff stiff
stiffen stiffen
stiffly stiffli
stifle stifl
stifled stifl
stifles stifl
stigmatic stigmat
stigmatical stigmat
stile stile
still still
stiller stiller
stillest stillest
stillness still
stilly stilli

sting sting
stinging sting
stingless stingless
stings sting
stink stink
stinking stink
stinkingly stinkingli
stinks stink
stint stint
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stir stir
stirr stirr
stirred stir
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stirrers stirrer
stirreth stirreth
stirring stir
stirrup
stirrup
stirrups stirrup
stirs stir
stitchery stitcheri
stitches stitch
stithied stithi
stithy stithi
stoccadoes stoccado
stoccata stoccata
stock stock
stockfish stockfish
stocking stock
stockings stock
stockish stockish
stocks stock
stog stog
stogs stog
stoics stoic
stokesly stokesli
stol stol
stole stole
stolen stolen
stolest stolest
stomach stomach
stomachers stomach
stomaching stomach
stomachs stomach
ston ston
stone stone

stonecutter stonecutt
stones stone
stonish stonish
stony stoni
stood stood
stool stool
stools stool
stoop stoop
stooping stoop
stoops stoop
stop stop
stope stope
stopp stopp
stopped stop
stopping stop
stops stop
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storehouse storehous
storehouses storehous
stores store
stories stori
storm storm
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storming storm
storms storm
stormy stormi
story stori
stoup stoup
stoups stoup
stout stout
stouter stouter
stoutly stoutli
stoutness stout
stover stover
stow stow
stowage stowag
stowed stow
strachy strachi
stragglers straggler
straggling straggl
straight straight
straightest straightest
straightway straightwai
strain strain
strained strain

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|---|---|
| straining | strain |
| strains | strain |
| strait | strait |
| straited | strait |
| straiter | straiter |
| straitly | straitli |
| straitness | strait |
| straits | strait |
| strand | strand |
| strange | strang |
| strangely | strang |
| strangeness | strang |
| stranger | stranger |
| strangers | stranger |
| strangest | strangest |
| strangle | strangl |
| strangled | strangl |
| strangler | strangler |
| strangles | strangl |
| strangling | strangl |
| strappado | strappado |
| straps | strap |
| stratagem | stratagem |
| stratagems | stratagem |
| stratford | stratford |
| strato | strato |
| straw | straw |
| strawberries | strawberri |
| strawberry | strawberri |
| straws | straw |
| strawy | strawi |
| stray | strai |
| straying | strai |
| strays | strai |
| streak | streak |
| streaks | streak |
| stream | stream |
| streamers | streamer |
| streaming | stream |
| streams | stream |
| streching | strech |
| street | street |
| streets | street |
| strength | strength |
| strengthen | strengthen |
| strengthened | strengthen |
| strengthless | strengthless |

strengths strength
stretch stretch
stretched stretch
stretches stretch
stretching stretch
strew strew
strewing strew
strewings strew
strewments strewment
stricken stricken
strict strict
stricter stricter
strictest strictest
strictly strictli
stricture strictur
stride stride
strides stride
striding stride
strife strife
strifes strife
strik strik
strike strike
strikers striker
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strikest strikest
striking strike
string string
stringless stringless
strings string
strip strip
stripes stripe
stripling stripl
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striving strive
strok strok
stroke stroke
strokes stroke
strond strond
stronds strond
strong strong
stronger stronger
strongest strongest

strongly strongli
strooke strook
strossers strosser
strove strove
strown strown
stroy stroi
struck struck
strucken strucken
struggle struggl
struggles struggl
struggling struggl
strumpet strumpet
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strung strung
strut strut
struts strut
strutted strut
strutting strut
stubble stubbl
stubborn stubborn
stubbornest stubbornest
stubbornly stubbornli
stubbornness stubborn
stuck stuck
studded stud
student student
students student
studied studi
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studious studiou
studiously studious
studs stud
study studi
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stuff stuff
stuffing stuf
stuffs stuff
stumble stumbl
stumbled stumbl
stumblest stumblest
stumbling stumbl
stump stump
stumps stump
stung stung
stupefy stupefi
stupid stupid

stupified
stupifi
stuprum stuprum
sturdy sturdi
sty sty
styga styga
stygian stygian
styl styl
style style
styx styx
su su
sub sub
subcontracted subcontract
subdu subdu
subdue subdu
subdued subdu
subduements subduement
subdues subdu
subduing subdu
subject subject
subjected subject
subjection subject
subjects subject
submerg submerg
submission submiss
submissive submiss
submit submit
submits submit
submitting submit
suborn suborn
subornation suborn
suborned suborn
subscrib
subscrib
subscribe subscrib
subscribed subscrib
subscribes subscrib
subscription subscript
subsequent subsequ
subsidies subsidi
subsidy subsidi
subsist subsist
subsisting subsist
substance substanc
substances substanc
substantial substanti
substitute substitut
substituted substitut

substitutes substitut
substitution substitut
subtile subtil
subtilly subtilli
subtle subtl
subtleties subtleti
subtlety subtleti
subtly subtli
subtractors subtractor
suburbs suburb
subversion subvers
subverts subvert
succedant succed
succeed succe
succeeded succeed
succeeders
succeed
succeeding succeed
succeeds succe
success success
successantly successantli
successes success
successful success
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succession success
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successively success
successor successor
successors successor
succour succour
succours succour
such such
suck suck
sucker sucker
suckers sucker
sucking suck
suckle suckl
sucks suck
sudden sudden
suddenly suddenli
sue sue
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suerly suerli
sues sue
sueth sueth
suff suff
suffer suffer
sufferance

suffer
sufferances suffer
suffered suffer
suffering suffer
suffers suffer
suffic suffic
suffice suffic
sufficed suffic
suffices suffic
sufficeth sufficeth
sufficiency suffici
sufficient suffici
sufficiently suffici
sufficing suffic
sufficit sufficit
suffigance suffig
suffocate suffoc
suffocating suffoc
suffocation suffoc
suffolk suffolk
suffrage suffrag
suffrages suffrag
sug sug
sugar sugar
sugarsop sugarsop
suggest suggest
suggested suggest
suggesting suggest
suggestion suggest
suggestions suggest
suggests suggest
suis
sui
suit suit
suitable suitabl
suited suit
suiting suit
suitor suitor
suitors suitor
suits suit
suivez suivez
sullen sullen
sullens sullen
sullied sulli
sullies sulli
sully sulli
sulph sulph
sulpherous sulpher

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|---|---|
| sulphur | sulphur |
| sulphurous | sulphur |
| sultan | sultan |
| sultry | sultri |
| sum | sum |
| sumless | sumless |
| summ | summ |
| summa | summa |
| summary | summari |
| summer | summer |
| summers | summer |
| summit | summit |
| summon | summon |
| summoners | summon |
| summons | summon |
| sumpter | sumpter |
| sumptuous | sumptuou |
| sumptuously | sumptuous |
| sums | sum |
| sun | sun |
| sunbeams | sunbeam |
| sunburning | sunburn |
| sunburnt | sunburnt |
| sund | sund |
| sunday | sundai |
| sundays | sundai |
| sunder | sunder |
| sunders | sunder |
| sundry | sundri |
| sung | sung |
| sunk | sunk |
| sunken | sunken |
| sunny | sunni |
| sunrising | sunris |
| suns | sun |
| sunset | sunset |
| sunshine | sunshin |
| sup | sup |
| super | super |
| superficial | superfici |
| superficially | superfici |
| superfluity | superflu |
| superfluous | superflu |
| superfluously | superflu |
| superflux | superflux |
| superior | superior |
| supernal | supern |

supernatural supernatur
superpraise superprais
superscript superscript
superscription superscript
superserviceable superservic
superstition superstit
superstitious superstiti
superstitiously superstiti
supersubtle supersubtl
supervise supervis
supervisor supervisor
supp supp
supper supper
suppers supper
suppertime suppertim
supping sup
supplant supplant
supple suppl
suppler suppler
suppliance supplianc
suppliant suppliant
suppliants suppliant
supplicant supplic
supplication supplic
supplications supplic
supplie suppli
supplied suppli
supplies suppli
suppliest suppliest
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supplyant supplyant
supplying suppli
supplyment supplyment
support support
supportable support
supportance support
supported support
supporter support
supporters support
supporting support
supportor supportor
suppos suppo
supposal suppos
suppose suppos
supposed suppos
supposes suppos
supposest supposest

supposing suppos
supposition supposit
suppress suppress
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swaddling swaddl
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|---|---|
| sward | sward |
| sware | sware |
| swarm | swarm |
| swarming | swarm |
| swart | swart |
| swarth | swarth |
| swarths | swarth |
| swarthy | swarthi |
| swashers | swasher |
| swashing | swash |
| swath | swath |
| swathing | swath |
| swathling | swathl |
| sway | swai |
| swaying | swai |
| sways | swai |
| swear | swear |
| swearer | swearer |
| swearers | swearer |
| swearest | swearest |
| swearing | swear |
| swearings | swear |
| swears | swear |
| sweat | sweat |
| sweaten | sweaten |
| sweating | sweat |
| sweats | sweat |
| sweaty | sweati |
| sweep | sweep |
| sweepers | sweeper |
| sweeps | sweep |
| sweet | sweet |
| sweeten | sweeten |
| sweetens | sweeten |
| sweeter | sweeter |
| sweetest | sweetest |
| sweetheart | sweetheart |
| sweeting | sweet |
| sweetly | sweetli |
| sweetmeats | sweetmeat |
| sweetness | sweet |
| sweets | sweet |
| swell | swell |
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swelter swelter
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swinstead swinstead
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syllogism syllog
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tailor tailor

tailors tailor
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tamworth tamworth
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target target
targets target
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tarquin tarquin
tarquins tarquin
tarr tarr
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tart tart
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tartars tartar
tartly tartli

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|---|---|
| tartness | tart |
| task | task |
| tasker | tasker |
| tasking | task |
| tasks | task |
| tassel | tassel |
| taste | tast |
| tasted | tast |
| tastes | tast |
| tasting | tast |
| tatt | tatt |
| tatter | tatter |
| tattered | tatter |
| tatters | tatter |
| tattle | tattl |
| tattling | tattl |
| tattlings | tattl |
| taught | taught |
| taunt | taunt |
| taunted | taunt |
| taunting | taunt |
| tauntingly | tauntingli |
| taunts | taunt |
| taurus | tauru |
| tavern | tavern |
| taverns | tavern |
| tavy | tavi |
| tawdry | tawdri |
| tawny | tawni |
| tax | tax |
| taxation | taxat |
| taxations | taxat |
| taxes | tax |
| taxing | tax |
| tc | tc |
| te | te |
| teach | teach |
| teacher | teacher |
| teachers | teacher |
| teaches | teach |
| teachest | teachest |
| teacheth | teacheth |
| teaching | teach |
| team | team |
| tear | tear |
| tearful | tear |
| tearing | tear |
| tears | tear |

tearsheet tearsheet
teat teat
tedious tediou
tediously tedious
tediousness tedious
teem teem
teeming teem
teems teem
teen teen
teeth teeth
teipsum teipsum
telamon telamon
telamonius telamoniu
tell tell
teller teller
telling tell
tells tell
tellus tellu
temp temp
temper temper
temperality temper
temperance temper
temperate temper
temperately temper
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|---|---|
| tenant | tenant |
| tenantius | tenantiu |
| tenantless | tenantless |
| tenants | tenant |
| tench | tench |
| tend | tend |
| tendance | tendanc |
| tended | tend |
| tender | tender |
| tendered | tender |
| tenderly | tenderli |
| tenderness | tender |
| tenders | tender |
| tending | tend |
| tends | tend |
| tenedos | tenedo |
| tenement | tenement |
| tenements | tenement |
| tenfold | tenfold |
| tennis | tenni |
| tenour | tenour |
| tenours | tenour |
| tens | ten |
| tent | tent |
| tented | tent |
| tenth | tenth |
| tenths | tenth |
| tents | tent |
| tenure | tenur |
| tenures | tenur |
| tercel | tercel |
| tereus | tereu |
| term | term |
| termagant | termag |
| termed | term |
| terminations | termin |
| termless | termless |
| terms | term |
| terra | terra |
| terrace | terrac |
| terram | terram |
| terras | terra |
| terre | terr |
| terrene | terren |
| terrestrial | terrestri |
| terrible | terribl |
| terribly | terribl |
| territories | territori |

territory territori
terror terror
terrors terror
tertian tertian
tertio tertio
test test
testament testament
tested test
tester tester
testern testern
testify testifi
testimonied testimoni
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tgv tgv
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thank thank
thanked thank
thankful thank
thankfully thankfulli
thankfulness thank
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thanksgiving thanksgiv
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|---|---|
| theatre | theatr |
| theban | theban |
| thebes | thebe |
| thee | thee |
| theft | theft |
| thefts | theft |
| thein | thein |
| their | their |
| theirs | their |
| theise | theis |
| them | them |
| theme | theme |
| themes | theme |
| themselves | themselv |
| then | then |
| thence | thenc |
| thenceforth | thenceforth |
| theoric | theoric |
| there | there |
| thereabout | thereabout |
| thereabouts | thereabout |
| thereafter | thereaft |
| thereat | thereat |
| thereby | therebi |
| therefore | therefor |
| therein | therein |
| thereof | thereof |
| thereon | thereon |
| thereto | |
| thereto | |
| thereunto | thereunto |
| thereupon | thereupon |
| therewith | therewith |
| therewithal | therewith |
| thersites | thersit |
| these | these |
| theseus | theseu |
| thessalian | thessalian |
| thessaly | thessali |
| thetis | theti |
| thews | thew |
| they | thei |
| thick | thick |
| thicken | thicken |
| thickens | thicken |
| thicker | thicker |
| thickest | thickest |
| thicket | thicket |

thickskin thickskin
thief thief
thievery thieveri
thieves thiev
thievish thievish
thigh thigh
thighs thigh
thimble thimbl
thimbles thimbl
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thine thine
thing thing
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thinking think
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thinly thinli
third third
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thirds third
thirst thirst
thirsting thirst
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thirteen thirteen
thirties thirti
thirtieth thirtieth
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thistle thistl
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thitherward thitherward
thoas thoa
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thorn thorn
thorns thorn
thorny thorni
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those those

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|---|---|
| thou | thou |
| though | though |
| thought | thought |
| thoughtful | thought |
| thoughts | thought |
| thousand | thousand |
| thousands | thousand |
| thracian | thracian |
| thraldom | thraldom |
| thrall | thrall |
| thralled | thrall |
| thralls | thrall |
| thrash | thrash |
| thrasonical | thrason |
| thread | thread |
| threadbare | threadbar |
| threaden | threaden |
| threading | thread |
| threat | threat |
| threaten | threaten |
| threatening | threaten |
| threatens | threaten |
| threatest | threatest |
| threats | threat |
| three | three |
| threefold | threefold |
| threepence | threepenc |
| threepile | threepil |
| threes | three |
| threescore | threescor |
| thresher | thresher |
| threshold | threshold |
| threw | threw |
| thrice | thrice |
| thrift | thrift |
| thriftless | thriftless |
| thrifts | thrift |
| thrifty | thrifti |
| thrill | thrill |
| thrilling | thrill |
| thrills | thrill |
| thrive | thrive |
| thrived | thrive |
| thrivers | thriver |
| thrives | thrive |
| thriving | thrive |
| throat | throat |
| throats | throat |

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|---|---|
| throbbing | throb |
| throbs | throb |
| throca | throca |
| throe | throe |
| throes | throe |
| thromuldo | thromuldo |
| thron | thron |
| throne | throne |
| throned | throne |
| thrones | throne |
| throng | |
| throng | |
| thronging | throng |
| throngs | throng |
| throstle | throstl |
| throttle | throttl |
| through | through |
| throughfare | throughfar |
| throughfares | throughfar |
| throughly | throughli |
| throughout | throughout |
| throw | throw |
| thrower | thrower |
| throwest | throwest |
| throwing | throw |
| thrown | thrown |
| throws | throw |
| thrum | thrum |
| thrumm | thrumm |
| thrush | thrush |
| thrust | thrust |
| thrusteth | thrusteth |
| thrusting | thrust |
| thrusts | thrust |
| thumb | thumb |
| thumbs | thumb |
| thump | thump |
| thund | thund |
| thunder | thunder |
| thunderbolt | thunderbolt |
| thunderbolts | thunderbolt |
| thunderer | thunder |
| thunders | thunder |
| thunderstone | thunderston |
| thunderstroke | thunderstrok |
| thurio | thurio |
| thursday | thursdai |

thus thu
thwack thwack
thwart thwart
thwarted thwart
thwarting thwart
thwartings thwart
thy thy
thyme thyme
thymus thymu
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thyself thyself
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ticed tice
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| tomboys | tomboi |
| tombs | tomb |
| tomorrow | tomorrow |
| tomyris | tomyri |
| ton | ton |
| tongs | tong |
| tongu | tongu |
| tongue | tongu |
| tongued | tongu |
| tongueless | tongueless |
| tongues | tongu |
| tonight | tonight |
| too | too |
| took | took |
| tool | tool |
| tools | tool |
| tooth | |
| tooth | |
| toothache | toothach |
| toothpick | toothpick |
| toothpicker | toothpick |
| top | top |
| topas | topa |
| topful | top |
| topgallant | topgal |
| topless | topless |
| topmast | topmast |
| topp | topp |
| topping | top |
| topple | toppl |
| topples | toppl |
| tops | top |
| topsail | topsail |
| topsy | topsi |
| torch | torch |
| torchbearer | torchbear |
| torchbearers | torchbear |
| torcher | torcher |
| torches | torch |
| torchlight | torchlight |
| tore | tore |
| torment | torment |
| tormenta | tormenta |
| tormente | torment |
| tormented | torment |
| tormenting | torment |
| tormentors | tormentor |
| torments | torment |

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tortoise tortois
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| trammel | trammel |
| trample | |
| trampl | |
| trampled | trampl |
| trampling | trampl |
| tranc | tranc |
| trance | tranc |
| tranio | tranio |
| tranquil | tranquil |
| tranquillity | tranquil |
| transcendence | transcend |
| transcends | transcend |
| transferred | transfer |
| transfigur | transfigur |
| transfix | transfix |
| transform | transform |
| transformation | transform |
| transformations | transform |
| transformed | transform |
| transgress | transgress |
| transgresses | transgress |
| transgressing | transgress |
| transgression | transgress |
| translate | translat |
| translated | translat |
| translates | translat |
| translation | translat |
| transmigrates | transmigr |
| transmutation | transmut |
| transparent | transpar |
| transport | transport |
| transportance | transport |
| transported | transport |
| transporting | transport |
| transports | transport |
| transpose | transpos |
| transshape | transshap |
| trap | trap |
| trapp | trapp |
| trappings | trap |
| traps | trap |
| trash | trash |
| travail | travail |
| travails | travail |
| travel | travel |
| traveler | travel |
| traveling | travel |
| travell | travel |

travelled travel
traveller travel
travellers travel
travellest travellest
travelling travel
travels travel
travers traver
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trebonius treboniu
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trencherman trencherman
trenchers trencher
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trent trent
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trespass trespass
trespasses trespass
tressel tressel
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trial trial
trials trial
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tribes tribe
tribulation tribul
tribunal tribun
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tricking trick
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tricksy tricksi
trident trident
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trifles trifl
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trigon trigon
trill trill
trim trim
trimly trimli
trimm trimm

trimmed trim
trimming trim
trims trim
trinculo trinculo
trinculos trinculo
trinkets trinket
trip trip
tripartite tripartit
tripe tripe
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triplex triplex
tripoli tripoli
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trippingly trippingli
trips trip
tristful trist
triton triton
triumph triumph
triumphant triumphant
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triumpher triumpher
triumphers triumpher
triumphing triumph
triumphs triumph
triumvir triumvir
triumvirate triumvir
triumvirs triumvir
triumviry triumviri
trivial trivial
troat troat
trod trod
trodden trodden
troiant troiant
troien troien
troilus troilu
troiluses troilus
trojan trojan
trojans trojan
troll troll
tromperies tromperi
trompet trompet
troop troop
trooping troop
troops troop
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trophies trophi
trophy trophi
tropically tropic
trot trot
troth troth
trothed troth
troths troth
trots trot
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| vice | vice |
| vicegerent | viceger |
| vicentio | vicentio |
| viceroy | viceroi |
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| vices | vice |
| vici | vici |
| vicious | viciou |
| viciousness | vicious |
| vict | vict |
| victims | victim |
| victor | victor |
| victoress | victoress |
| victories | victori |
| victorious | victori |
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| victory | victori |
| victual | victual |
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| videlicet | videlicet |
| video | video |
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| vidi | vidi |
| vie | vie |
| vied | vi |
| vienna | vienna |
| view | view |
| viewest | viewest |
| vieweth | vieweth |
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| viewless | viewless |
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| vigil | vigil |
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| vigilant | vigil |
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| violate | violat |
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| weak | weak |
| weaken | weaken |
| weakens | weaken |
| weaker | weaker |
| weakest | weakest |
| weakling | weakl |
| weakly | weakli |
| weakness | weak |
| weal | weal |
| wealsmen | wealsmen |
| wealth | wealth |
| wealthiest | wealthiest |
| wealthily | wealthili |
| wealthy | wealthi |
| wealtlly | wealtlli |
| wean | wean |
| weapon | weapon |
| weapons | weapon |
| wear | wear |
| wearer | wearer |
| wearers | wearer |
| wearied | weari |
| wearies | weari |
| weariest | weariest |
| wearily | wearili |
| weariness | weari |
| wearing | wear |
| wearisome | wearisom |
| wears | wear |
| weary | weari |
| weasel | weasel |
| weather | weather |
| weathercock | weathercock |
| weathers | weather |
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| weaver | weaver |
| weavers | weaver |
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| weaving | weav |
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| wed | wed |
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| wilfulnes | wilfuln |
| wilfulness | wil |
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| willed | will |
| willers | willer |
| willeth | willeth |
| william | william |
| williams | william |
| willing | will |
| willingly | willingli |
| willingness | willing |
| willoughby | willoughbi |
| willow | willow |
| wills | will |
| wilt | wilt |
| wiltshire | wiltshir |
| wimpled | wimpl |
| win | win |
| wince | winc |
| winch | winch |
| winchester | winchest |
| wincot | wincot |
| wind | wind |
| winded | wind |
| windgalls | windgal |
| winding | wind |
| windlasses | windlass |
| windmill | windmil |
| window | window |
| windows | window |
| windpipe | windpip |
| winds | wind |
| windsor | windsor |
| windy | windi |
| wine | wine |
| wing | wing |
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| wingfield | wingfield |
| wingham | wingham |
| wings | wing |
| wink | wink |
| winking | wink |
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| winner | winner |
| winners | winner |
| winning | win |
| winnow | winnow |
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| winnows | winnow |
| wins | win |
| winter | winter |
| winterly | winterli |
| winters | winter |
| wip | wip |
| wipe | wipe |
| wiped | wipe |
| wipes | wipe |
| wiping | wipe |
| wire | wire |
| wires | wire |
| wiry | wiri |
| wisdom | wisdom |
| wisdoms | wisdom |
| wise | wise |
| wiselier | wiseli |
| wisely | wise |
| wiser | wiser |
| wisest | wisest |
| wish | wish |
| wished | wish |
| wisher | wisher |
| wishers | wisher |
| wishes | wish |
| wishest | wishest |
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| wishful | wish |
| wishing | wish |
| wishtly | wishtli |
| wisp | wisp |
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| wit | wit |
| witb | witb |
| witch | witch |
| witchcraft | witchcraft |
| witches | witch |
| witching | witch |
| with | with |
| withal | withal |
| withdraw | withdraw |
| withdrawing | withdraw |
| withdrawn | withdrawn |
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| wither | wither |
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withers wither
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|---|---|
| yesterdays | yesterdai |
| yesternight | yesternight |
| yesty | yesti |
| yet | yet |
| yew | yew |
| yicld | yicld |
| yield | yield |
| yielded | yield |
| yielder | yielder |
| yielders | yielder |
| yielding | yield |
| yields | yield |
| yok | yok |
| yoke | yoke |
| yoked | yoke |
| yokefellow | yokefellow |
| yokes | yoke |
| yoketh | yoketh |
| yon | yon |
| yond | yond |
| yonder | yonder |
| yongrey | yongrei |
| yore | yore |
| yorick | yorick |
| york | york |
| yorkists | yorkist |
| yorks | york |
| yorkshire | yorkshir |
| you | you |
| young | young |
| younger | younger |
| youngest | youngest |
| youngling | youngl |
| younglings | youngl |
| youngly | youngli |
| younker | younker |
| your | your |
| yours | your |
| yourself | yourself |
| yourselves | yourselv |
| youth | youth |
| youthful | youth |
| youths | youth |
| youtli | youtli |
| zanies | zani |
| zany | zani |
| zeal | zeal |

```
  zealous             zealou
  zeals               zeal
  zed                 zed
  zenelophon          zenelophon
  zenith              zenith
  zephyrs             zephyr
  zir                 zir
  zo                  zo
  zodiac              zodiac
  zodiacs             zodiac
  zone                zone
  zounds              zound
  zwagger             zwagger
}


# Create a full-text index to use for testing the stemmer.
#
db close
sqlite3 db :memory:
db eval {
 CREATE VIRTUAL TABLE t1 USING fts1(word, tokenize Porter);
}

foreach {pfrom pto} $porter_test_data {
 do_test fts1porter-$pfrom {
   execsql {
     DELETE FROM t1_term;
     DELETE FROM t1_content;
     INSERT INTO t1(word) VALUES($pfrom);
     SELECT term FROM t1_term;
   }
 } $pto
}

finish_test
```

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/test/fts1porter.test
No license file was found, but licenses were detected in source scan.

```
# 2006 September 14
#
# The author disclaims copyright to this source code.  In place of
# a legal notice, here is a blessing:
#
#    May you do good and not evil.
#    May you find forgiveness for yourself and forgive others.
```

```
#    May you share freely, never taking more than you give.
#
#***********************************************************************
# This file implements regression tests for SQLite library.  The
# focus of this script is testing the FTS1 module.
#
# $Id: fts1c.test,v 1.11 2006/10/04 17:35:28 drh Exp $
#

set testdir [file dirname $argv0]
source $testdir/tester.tcl

# If SQLITE_ENABLE_FTS1 is defined, omit this file.
ifcapable !fts1 {
 finish_test
 return
}

# Create a table of sample email data.   The data comes from email
# archives of Enron executives that was published as part of the
# litigation against that company.
#
do_test fts1c-1.1 {
 db eval {
   CREATE VIRTUAL TABLE email
 USING fts1([from],[to],subject,body);
   BEGIN TRANSACTION;
INSERT INTO email([from],[to],subject,body) VALUES('savita.puthigai@enron.com', 'traders.eol@enron.com,
traders.eol@enron.com', 'EnronOnline- Change to Autohedge', 'Effective Monday, October 22, 2001 the following
changes will be made to the Autohedge functionality on EnronOnline.

The volume on the hedge will now respect the minimum volume and volume increment settings on the parent
product. See rules below:

? If the transaction volume on the child is less than half of the parent''s minimum volume no hedge will occur.
? If the transaction volume on the child is more than half the parent''s minimum volume but less than half the volume
increment on the parent, the hedge will volume will be the parent''s minimum volume.
? For all other volumes, the same rounding rules will apply based on the volume increment on the parent product.

Please see example below:

Parent''s Settings:
Minimum:  5000
Increment:  1000

Volume on Autohedge
 transaction   Volume Hedged
1      - 2499       0
```

2500 - 5499 5000
5500 - 6499 6000');
INSERT INTO email([from],[to],subject,body) VALUES('dana.davis@enron.com', 'laynie.east@enron.com, lisa.king@enron.com, lisa.best@enron.com,', 'Leaving Early', 'FYI:
If it''s ok with everyone''s needs, I would like to leave @4pm. If you think
you will need my assistance past the 4 o''clock hour just let me know; I''ll
be more than willing to stay.');
INSERT INTO email([from],[to],subject,body) VALUES('enron_update@concureworkplace.com', 'louise.kitchen@enron.com', '<<Concur Expense Document>> - CC02.06.02', 'The following expense report is ready for approval:

Employee Name: Christopher F. Calger
Status last changed by: Mollie E. Gustafson Ms
Expense Report Name: CC02.06.02
Report Total: $3,972.93
Amount Due Employee: $3,972.93

To approve this expense report, click on the following link for Concur Expense.
http://expensexms.enron.com');
INSERT INTO email([from],[to],subject,body)
VALUES('jeff.duff@enron.com', 'julie.johnson@enron.com', 'Work request', 'Julie,

Could you print off the current work request report by 1:30 today?

Gentlemen,

I''d like to review this today at 1:30 in our office. Also, could you provide
me with your activity reports so I can have Julie enter this information.

JD');
INSERT INTO email([from],[to],subject,body) VALUES('v.weldon@enron.com', 'gary.l.carrier@usa.dupont.com, scott.joyce@bankofamerica.com', 'Enron News', 'This could turn into something big....
http://biz.yahoo.com/rf/010129/n29305829.html');
INSERT INTO email([from],[to],subject,body) VALUES('mark.haedicke@enron.com', 'paul.simons@enron.com', 'Re: First Polish Deal!', 'Congrats! Things seem to be building rapidly now on the Continent. Mark');
INSERT INTO email([from],[to],subject,body) VALUES('e..carter@enron.com', 't..robinson@enron.com', 'FW: Producers Newsletter 9-24-2001', '
The producer lumber pricing sheet.
-----Original Message-----
From: Johnson, Jay
Sent: Tuesday,
October 16, 2001 3:42 PM
To: Carter, Karen E.
Subject: FW: Producers Newsletter 9-24-2001

-----Original Message-----
From: Daigre, Sergai
Sent: Friday, September 21, 2001 8:33 PM
Subject: Producers Newsletter 9-24-2001

');
INSERT INTO email([from],[to],subject,body) VALUES('david.delainey@enron.com', 'kenneth.lay@enron.com', 'Greater Houston Partnership', 'Ken, in response to the letter from Mr Miguel San Juan, my suggestion would be to offer up the Falcon for their use; however, given the tight time frame and your recent visit with Mr. Fox that it would be difficult for either you or me to participate.

I spoke to Max and he agrees with this approach.

I hope this meets with your approval.

Regards
Delainey');
INSERT INTO email([from],[to],subject,body) VALUES('lachandra.fenceroy@enron.com', 'lindy.donoho@enron.com', 'FW: Bus Applications Meeting Follow Up', 'Lindy,

Here is the original memo we discussed earlier. Please provide any information that you may have.

Your cooperation is greatly appreciated.

Thanks,

lachandra.fenceroy@enron.com
713.853.3884
877.498.3401 Pager

-----Original Message-----
From: Bisbee, Joanne
Sent: Wednesday, September 26, 2001 7:50 AM
To: Fenceroy, LaChandra
Subject: FW: Bus Applications Meeting Follow Up

Lachandra, Please get with David Duff today and see what this is about. Who are our TW accounting business users?

-----Original Message-----
From: Koh, Wendy
Sent: Tuesday, September 25, 2001 2:41 PM
To: Bisbee, Joanne
Subject: Bus Applications Meeting Follow Up

Lisa brought up a TW change effective Nov 1. It involves eliminating a turnback surcharge. I have no other

information, but you might check with the business folks for any system changes required.

Wendy');
INSERT INTO email([from],[to],subject,body) VALUES('danny.mccarty@enron.com', 'fran.fagan@enron.com', 'RE: worksheets', 'Fran,
If Julie"s merit needs to be lump sum, just move it over to that column. Also, send me Eric Gadd"s sheets as well. Thanks.
Dan

-----Original Message-----
From: Fagan, Fran
Sent: Thursday, December 20, 2001 11:10 AM
To: McCarty, Danny
Subject: worksheets

As discussed, attached are your sheets for bonus and merit.

Thanks,

Fran Fagan
Sr. HR Rep
713.853.5219

<< File: McCartyMerit.xls >> << File: mccartyBonusCommercial_UnP.xls >>

');
INSERT INTO email([from],[to],subject,body) VALUES('bert.meyers@enron.com', 'shift.dl-portland@enron.com', 'OCTOBER SCHEDULE', 'TEAM,

PLEASE SEND ME ANY REQUESTS THAT YOU HAVE FOR OCTOBER. SO FAR I HAVE THEM FOR LEAF. I WOULD LIKE TO HAVE IT DONE BY THE 15TH OF THE MONTH. ANY QUESTIONS PLEASE GIVE ME A CALL.

BERT');
INSERT INTO email([from],[to],subject,body) VALUES('errol.mclaughlin@enron.com', 'john.arnold@enron.com, bilal.bajwa@enron.com, john.griffith@enron.com,', 'TRV Notification: (NG - PROPT P/L - 09/27/2001)', 'The report named: NG - PROPT P/L <http://trv.corp.enron.com/linkFromExcel.asp?report_cd=11&report_name=NG+-+PROPT+P/L&category_cd=5&category_name=FINANCIAL&toc_hide=1&sTV1=5&TV1Exp=Y&current_efct_date=09/27/2001>,
published as of 09/27/2001 is now available for viewing on the website.');
INSERT INTO email([from],[to],subject,body) VALUES('patrice.mims@enron.com', 'calvin.eakins@enron.com', 'Re: Small business supply assistance', 'Hi Calvin

I spoke with Rickey (boy, is he long-winded!!). Gave him the name of our credit guy, Russell Diamond.

Thank for your help!');
INSERT INTO email([from],[to],subject,body) VALUES('legal <.hall@enron.com>', 'stephanie.panus@enron.com', 'Termination update', 'City of Vernon and Salt River Project terminated their contracts. I will fax these notices to you.');
INSERT INTO email([from],[to],subject,body) VALUES('d..steffes@enron.com', 'richard.shapiro@enron.com', 'EES / ENA Government Affairs Staffing & Outside Services', 'Rick --

Here is the information on staffing and outside services. Call if you need anything else.

Jim

');
INSERT INTO email([from],[to],subject,body)
VALUES('gelliott@industrialinfo.com', 'pcopello@industrialinfo.com', 'ECAAR (Gavin), WSCC (Diablo Canyon), & NPCC (Seabrook)', 'Dear Power Outage Database Customer,
Attached you will find an excel document. The outages contained within are forced or rescheduled outages. Your daily delivery will still contain these outages.
In addition to the two excel documents, there is a dbf file that is formatted like your daily deliveries you receive nightly. This will enable you to load the data into your regular database. Any questions please let me know. Thanks.
Greg Elliott
IIR, Inc.
713-783-5147 x 3481
outages@industrialinfo.com
THE INFORMATION CONTAINED IN THIS E-MAIL IS LEGALLY PRIVILEGED AND CONFIDENTIAL INFORMATION INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY NAMED ABOVE. YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION, OR COPY OF THIS E-MAIL TO UNAUTHORIZED ENTITIES IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS E-MAIL IN ERROR, PLEASE DELETE IT.
- OUTAGE.dbf
- 111201R.xls
- 111201.xls ');
INSERT INTO email([from],[to],subject,body) VALUES('enron.announcements@enron.com', 'all_ena_egm_eim@enron.com', 'EWS Brown Bag', 'MARK YOUR LUNCH CALENDARS NOW !

You are invited to attend the EWS Brown Bag Lunch Series

Featuring: RAY BOWEN, COO

Topic: Enron Industrial Markets

Thursday, March 15, 2001
11:30 am - 12:30 pm
EB 5 C2

You bring your lunch, Limited Seating
We provide drinks and dessert. RSVP x 3-9610');
INSERT INTO email([from],[to],subject,body) VALUES('chris.germany@enron.com',

'ingrid.immer@williams.com', 'Re: About St Pauls', 'Sounds good to me.  I bet this is next to the Warick?? Hotel.

"Immer, Ingrid" <Ingrid.Immer@Williams.com> on 12/21/2000 11:48:47 AM
To: ""chris.germany@enron.com"" <chris.germany@enron.com>
cc:
Subject: About St Pauls

<<About St Pauls.url>>
?
?http://www.stpaulshouston.org/about.html

Chris,

I like the looks of this place.? What do you think about going
here Christmas
eve?? They have an 11:00 a.m. service and a candlelight service at 5:00 p.m.,
among others.

Let me know.?? ii

- About St Pauls.url

');
INSERT INTO email([from],[to],subject,body) VALUES('nas@cpuc.ca.gov', 'skatz@sempratrading.com, kmccrea@sablaw.com, thompson@wrightlaw.com,', 'Reply Brief filed July 31, 2000', ' - CPUC01-#76371-v1-Revised_Reply_Brief__Due_today_7_31_.doc');
INSERT INTO email([from],[to],subject,body) VALUES('gascontrol@aglresources.com', 'dscott4@enron.com, lcampbel@enron.com', 'Alert Posted 10:00 AM November 20,2000: E-GAS Request Reminder', 'Alert Posted 10:00 AM November 20,2000: E-GAS Request Reminder
As discussed in the Winter Operations Meeting on Sept.29,2000,
E-Gas(Emergency Gas) will not be offered this winter as a service from AGLC.
Marketers and Poolers can receive gas via Peaking and IBSS nominations(daisy
chain) from other marketers up to the 6 p.m. Same Day 2 nomination cycle.
');
INSERT INTO email([from],[to],subject,body) VALUES('dutch.quigley@enron.com',
'rwolkwitz@powermerchants.com', '', '

Here is a goody for you');
INSERT INTO email([from],[to],subject,body) VALUES('ryan.o''rourke@enron.com', 'k..allen@enron.com, randy.bhatia@enron.com, frank.ermis@enron.com,', 'TRV Notification:  (West VaR - 11/07/2001)', 'The report named: West VaR
<http://trv.corp.enron.com/linkFromExcel.asp?report_cd=36&report_name=West+VaR&category_cd=2&category_

name=WEST&toc_hide=1&sTV1=2&TV1Exp=Y&current_efct_date=11/07/2001>, published as of 11/07/2001 is now available for viewing on the website.');
INSERT INTO email([from],[to],subject,body) VALUES('mjones7@txu.com', 'cstone1@txu.com, ggreen2@txu.com, timpowell@txu.com,', 'Enron / HPL Actuals for July 10, 2000', 'Teco Tap 10.000 / Enron ; 110.000 / HPL IFERC

LS HPL LSK IC 30.000 / Enron
');
INSERT INTO email([from],[to],subject,body) VALUES('susan.pereira@enron.com', 'kkw816@aol.com', 'soccer practice', 'Kathy-

Is it safe to assume that practice is cancelled for
tonight??

Susan Pereira');
INSERT INTO email([from],[to],subject,body) VALUES('mark.whitt@enron.com', 'barry.tycholiz@enron.com', 'Huber Internal Memo', 'Please look at this. I didn"t know how deep to go with the desk. Do you think this works.

');
INSERT INTO email([from],[to],subject,body) VALUES('m..forney@enron.com', 'george.phillips@enron.com', '', 'George,
Give me a call and we will further discuss opportunities on the 13st floor.

Thanks,
JMForney
3-7160');
INSERT INTO email([from],[to],subject,body) VALUES('brad.mckay@enron.com', 'angusmcka@aol.com', 'Re: (no subject)', 'not yet');
INSERT INTO email([from],[to],subject,body) VALUES('adam.bayer@enron.com', 'jonathan.mckay@enron.com', 'FW: Curve Fetch File', 'Here is the curve fetch file sent to me. It has plenty of points in it. If you give me a list of which ones you need we may be able to construct a secondary worksheet to vlookup the values.

adam
35227

-----Original Message-----
From: Royed, Jeff
Sent: Tuesday,
September 25, 2001 11:37 AM
To: Bayer, Adam
Subject: Curve Fetch File

Let me know if it works. It may be required to have a certain version of Oracle for it to work properly.

Jeff Royed

Enron
Energy Operations
Phone: 713-853-5295');
INSERT INTO email([from],[to],subject,body) VALUES('matt.smith@enron.com', 'yan.wang@enron.com', 'Report Formats', 'Yan,

The merged reports look great. I believe the only orientation changes are to
"unmerge" the following six reports:

31 Keystone Receipts
15 Questar Pipeline
40 Rockies Production
22 West_2
23 West_3
25 CIG_WIC

The orientation of the individual reports should be correct. Thanks.

Mat

PS. Just a reminder to add the "*" by the title of calculated points.');
INSERT INTO email([from],[to],subject,body) VALUES('michelle.lokay@enron.com', 'jimboman@bigfoot.com', 'Egyptian Festival', '---------- Forwarded by Michelle Lokay/ET&S/Enron on 09/07/2000
10:08 AM ----------

"Karkour, Randa" <Randa.Karkour@COMPAQ.com>
on 09/07/2000 09:01:04 AM
To: ""Agheb (E-mail)" <Agheb@aol.com>, "Leila Mankarious (E-mail)"
<Leila_Mankarious@mhhs.org>, ""Marymankarious (E-mail)"
<marymankarious@aol.com>, "Michelle lokay (E-mail)" <mlokay@enron.com>, "Ramy
Mankarious (E-mail)" <Mankarious@aol.com>
cc:

Subject: Egyptian Festival

<<Egyptian Festival.url>>

http://www.egyptianfestival.com/

- Egyptian Festival.url
');
INSERT INTO email([from],[to],subject,body) VALUES('errol.mclaughlin@enron.com', 'sherry.dawson@enron.com', 'Urgent!!! --- New EAST books', 'This has to be done.....

Thanks
---------- Forwarded by Errol McLaughlin/Corp/Enron on 12/20/2000

08:39 AM ----------

From: William Kelly @ ECT 12/20/2000 08:31 AM

To: Kam Keiser/HOU/ECT@ECT, Darron C Giron/HOU/ECT@ECT, David Baumbach/HOU/ECT@ECT, Errol McLaughlin/Corp/Enron@ENRON
cc: Kimat Singla/HOU/ECT@ECT, Kulvinder Fowler/NA/Enron@ENRON, Kyle R
Lilly/HOU/ECT@ECT, Jeff Royed/Corp/Enron@ENRON, Alejandra Chavez/NA/Enron@ENRON, Crystal Hyde/HOU/ECT@ECT

Subject: New EAST books

We have new book names in TAGG for our intramonth portfolios and it is extremely important that any deal booked to the East is communicated quickly to someone on my team. I know it will take some time for the new names to sink in and I do not want us to miss any positions or P&L.

Thanks for your help on this.

New:
Scott Neal : East Northeast
Dick Jenkins: East Marketeast

WK
');
INSERT INTO email([from],[to],subject,body) VALUES('david.forster@enron.com', 'eol.wide@enron.com', 'Change to Stack Manager', 'Effective immediately, there is a change to the Stack Manager which will affect any Inactive Child.

An inactive Child with links to Parent products will not have their calculated prices updated until the Child product is Activated.

When the Child Product is activated, the price will be recalculated and updated BEFORE it
is displayed on the web.

This means that if you are inputting a basis price on a Child product, you will not see the final, calculated price until you Activate the product, at which time the customer will also see it.

If you have any questions, please contact the Help Desk on:

Americas: 713 853 4357
Europe: + 44 (0) 20 7783 7783

Asia/Australia: +61 2 9229 2300

Dave');
INSERT INTO email([from],[to],subject,body) VALUES('vince.kaminski@enron.com', 'jhh1@email.msn.com', 'Re: Light reading - see pieces beginning on page 7', 'John,

I saw it. Very interesting.

Vince

"John H Herbert" <jhh1@email.msn.com> on 07/28/2000 08:38:08 AM
To: "Vince J Kaminski" <Vince_J_Kaminski@enron.com>
cc:
Subject: Light reading - see pieces beginning on page 7

Cheers and have a nice weekend,

JHHerbert

- gd000728.pdf

');
INSERT INTO email([from],[to],subject,body) VALUES('matthew.lenhart@enron.com', 'mmmarcantel@equiva.com', 'RE:', 'i will try to line up a pig for you ');
INSERT INTO email([from],[to],subject,body)
VALUES('jae.black@enron.com', 'claudette.harvey@enron.com, chaun.roberts@enron.com, judy.martinez@enron.com,', 'Disaster Recovery Equipment', 'As a reminder...there are several pieces of equipment that are set up on the 30th Floor, as well as on our floor, for the Disaster Recovery Team. PLEASE DO NOT TAKE, BORROW OR USE this equipment. Should you need to use another computer system, other than yours, or make conference calls please work with your Assistant to help find or set up equipment for you to use.

Thanks for your understanding in this matter.

T.Jae Black
East Power Trading
Assistant to Kevin Presto
off. 713-853-5800

fax 713-646-8272
cell 713-539-4760');
INSERT INTO email([from],[to],subject,body) VALUES('eric.bass@enron.com', 'dale.neuner@enron.com', '5 X 24', 'Dale,

Have you heard anything more on the 5 X 24s? We would like to get this
product out ASAP.

Thanks,

Eric');
INSERT INTO email([from],[to],subject,body) VALUES('messenger@smartreminders.com',
'm..tholt@enron.com', '10% Coupon - PrintPal Printer Cartridges - 100% Guaranteed', '[IMAGE]
[IMAGE][IMAGE][IMAGE]
Dear SmartReminders Member,
[IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE]

We respect your privacy and are a Certified Participant of the BBBOnLine
Privacy Program. To be removed from future offers,click here.
SmartReminders.com is a permission based service. To unsubscribe click here . ');
INSERT INTO email([from],[to],subject,body) VALUES('benjamin.rogers@enron.com',
'mark.bernstein@enron.com', '', 'The guy you are talking about left CIN under a "cloud of suspicion" sort of
speak. He was the one who got into several bad deals and PPA"s in California
for CIN, thus he left on a bad note. Let me know if you need more detail
than that, I felt this was the type of info you were looking for. Thanks!
Ben');
INSERT INTO email([from],[to],subject,body)

VALUES('enron_update@concureworkplace.com', 'michelle.cash@enron.com', 'Expense Report Receipts Not Received', 'Employee Name: Michelle Cash
Report Name: Houston Cellular 8-11-01
Report Date: 12/13/01
Report ID: 594D37C9ED2111D5B452
Submitted On: 12/13/01

You are only allowed 2 reports with receipts outstanding. Your expense reports will not be paid until you meet this requirement.');
INSERT INTO email([from],[to],subject,body) VALUES('susan.mara@enron.com', 'ray.alvarez@enron.com, mark.palmer@enron.com, karen.denne@enron.com,', 'CAISO Emergency Motion -- to discontinue market-based rates for', 'FYI. the latest broadside against the generators.

Sue Mara
Enron Corp.
Tel: (415) 782-7802
Fax:(415) 782-7854
----- Forwarded by Susan J Mara/NA/Enron on 06/08/2001 12:24 PM -----

"Milner, Marcie" <MMilner@coral-energy.com> 06/08/2001 11:13 AM To: ""smara@enron.com"" <smara@enron.com> cc: Subject: CAISO Emergency Motion

Sue, did you see this emergency motion
the CAISO filed today? Apparently
they are requesting that FERC discontinue market-based rates immediately and
grant refunds plus interest on the difference between cost-based rates and
market revenues received back to May 2000. They are requesting the
commission act within 14 days. Have you heard anything about what they are
doing?

Marcie

http://www.caiso.com/docs/2001/06/08/200106081005526469.pdf
');
INSERT INTO email([from],[to],subject,body) VALUES('fletcher.sturm@enron.com', 'eloy.escobar@enron.com', 'Re: General Brinks Position Meeting', 'Eloy,

Who is General Brinks?

Fletch');
INSERT INTO email([from],[to],subject,body) VALUES('nailia.dindarova@enron.com', 'richard.shapiro@enron.com', 'Documents for Mark Frevert (on EU developments and lessons from', 'Rick,

Here are the documents that Peter has prepared for Mark Frevert.

Nailia

---------- Forwarded by Nailia Dindarova/LON/ECT on 25/06/2001
16:36 ----------

Nailia Dindarova
25/06/2001 15:36
To:
Michael Brown/Enron@EUEnronXGate
cc: Ross Sankey/Enron@EUEnronXGate, Eric Shaw/ENRON@EUEnronXGate, Peter
Styles/LON/ECT@ECT

Subject: Documents for Mark Frevert (on EU developments and lessons from
California)

Michael,

These are the documents that Peter promised to give to you for Mark Frevert.
He has now handed them to him in person but asked me to transmit them
electronically to you, as well as Eric and Ross.

Nailia

');
INSERT INTO email([from],[to],subject,body) VALUES('peggy.a.kostial@accenture.com',
'dave.samuels@enron.com', 'EOL-Accenture Deal Sheet', 'Dave -

Attached are our comments and suggested changes. Please call to review.

On the time line for completion, we have four critical steps to complete:
Finalize market analysis to refine business case, specifically
projected revenue stream
Complete counterparty surveying, including targeting 3 CPs for letters
of intent
Review Enron asset base for potential reuse/ licensing
Contract
negotiations

Joe will come back to us with an updated time line, but it is my
expectation that we are still on the same schedule (we just begun week
three) with possibly a week or so slippage.....contract negotiations will
probably be the critical path.

We will send our cut at the actual time line here shortly. Thanks,

Peggy

(See attached file: accenture-dealpoints v2.doc)
- accenture-dealpoints v2.doc ');
INSERT INTO email([from],[to],subject,body) VALUES('thomas.martin@enron.com', 'thomas.martin@enron.com',
'Re: Guadalupe Power Partners LP', '---------------------- Forwarded by Thomas A Martin/HOU/ECT on 03/20/2001
03:49 PM ----------------------------

Thomas A Martin
10/11/2000 03:55 PM
To: Patrick Wade/HOU/ECT@ECT
cc:
Subject: Re: Guadalupe Power Partners LP

The deal is physically served at Oasis Waha or Oasis Katy and is priced at
either HSC, Waha or Katytailgate GD at buyers option three days prior to
NYMEX  close.

');
INSERT INTO email([from],[to],subject,body)
 VALUES('judy.townsend@enron.com', 'dan.junek@enron.com, chris.germany@enron.com', 'Columbia
Distribution''s Capacity Available for Release - Sum', '---------------------- Forwarded by Judy Townsend/HOU/ECT
on 03/09/2001 11:04
AM ----------------------------

agoddard@nisource.com on 03/08/2001 09:16:57 AM
To: "  -  *Koch, Kent" <kkoch@nisource.com>, "  -
*Millar, Debra" <dmillar@nisource.com>, "  -  *Burke, Lynn"
<lburke@nisource.com>
cc: "  -  *Heckathorn, Tom" <theckathorn@nisource.com>
Subject: Columbia Distribution''s Capacity Available for Release - Sum

Attached is Columbia Distribution''s notice of capacity available for release
for
the summer of 2001 (Apr. 2001 through Oct. 2001).

Please note that the deadline for bids is 3:00pm EST on March 20, 2001.

If you have any questions, feel free to contact any of the representatives
listed
at the bottom of the attachment.

Aaron Goddard

- 2001Summer.doc
');
INSERT INTO
email([from],[to],subject,body) VALUES('rhonda.denton@enron.com', 'tim.belden@enron.com,
dana.davis@enron.com, genia.fitzgerald@enron.com,', 'Split Rock Energy LLC', 'We have received the executed
EEI contract from this CP dated 12/12/2000.
Copies will be distributed to Legal and Credit.');
INSERT INTO email([from],[to],subject,body) VALUES('kerrymcelroy@dwt.com', 'jack.speer@alcoa.com,
crow@millernash.com, michaelearly@earthlink.net,', 'Oral Argument Request', ' - Oral Argument Request.doc');
INSERT INTO email([from],[to],subject,body) VALUES('mike.carson@enron.com', 'rlmichaelis@hormel.com', '',
'Did you come in town this wk end..... My new number at our house is :
713-668-3712..... my cell # is 281-381-7332

the kid');
INSERT INTO email([from],[to],subject,body) VALUES('cooper.richey@enron.com', 'trycooper@hotmail.com',
'FW: Contact Info', '

-----Original Message-----
From: Punja, Karim
Sent: Thursday, December 13, 2001 2:35 PM
To: Richey, Cooper
Subject: Contact Info

Cooper,

Its
been a real pleasure working with you (even though it was for only a small amount of time)
I hope we can stay in touch.

Home# 234-0249
email: kpunja@hotmail.com

Take Care,

Karim.
');
INSERT INTO email([from],[to],subject,body) VALUES('bjm30@earthlink.net', 'mcguinn.k@enron.com,
mcguinn.ian@enron.com, mcguinn.stephen@enron.com,', 'email address change', 'Hello all.

I haven''t talked to many of you via email recently but I do want to give you
my new address for your email file:

bjm30@earthlink.net

I hope all is well.

Brian McGuinn');
INSERT INTO email([from],[to],subject,body) VALUES('shelley.corman@enron.com', 'steve.hotte@enron.com', 'Flat Panels', 'Can you please advise what is going on with the flat panels that we had planned to distribute to our gas logistics team. It was in the budget and we had the okay, but now I"m hearing there is some hold-up & the units are stored on 44.

Shelley');
INSERT INTO email([from],[to],subject,body) VALUES('sara.davidson@enron.com', 'john.schwartzenburg@enron.com, scott.dieball@enron.com, recipients@enron.com,', '2001 Enron Law Conference (Distribution List 2)', ' Enron Law Conference

San Antonio, Texas May 2-4, 2001 Westin Riverwalk

See attached memo for more details!!

? Registration for the law conference this year will be handled through an Online RSVP Form on the Enron Law Conference Website at http://lawconference.corp.enron.com. The website is still under construction and will not be available until Thursday, March 15, 2001.

? We will send you another e-mail to confirm when the Law Conference Website is operational.

? Please complete the Online RSVP Form as soon as it is available and submit it no later than Friday, March 30th.

');
INSERT INTO email([from],[to],subject,body) VALUES('tori.kuykendall@enron.com', 'heath.b.taylor@accenture.com', 'Re:', 'hey - thats funny about john - he definitely remembers him - i"ll call pat and let him know - we are coming
on saturday - i just havent had a chance to
call you guys back -- looking forward to it -- i probably need the
directions again though');
INSERT INTO email([from],[to],subject,body) VALUES('darron.giron@enron.com', 'bryce.baxter@enron.com', 'Re: Feedback for Audrey Cook', 'Bryce,

I"ll get it done today.

DG 3-9573

From: Bryce Baxter 06/12/2000 07:15 PM

To: Darron C Giron/HOU/ECT@ECT
cc:
Subject: Feedback for Audrey Cook

You were identified as a reviewer for Audrey Cook. If possible, could you complete her feedback by end of business Wednesday? It will really help me in the PRC process to have your input. Thanks.

');
INSERT INTO email([from],[to],subject,body) VALUES('casey.evans@enron.com', 'stephanie.sever@enron.com', 'Gas EOL ID', 'Stephanie,

In conjunction with the recent movement of several power traders, they are changing the names of their gas books as well. The names of the new gas books and traders are as follows:

PWR-NG-LT-SPP:
Mike Carson
PWR-NG-LT-SERC: Jeff King

If you need to know their power desk to map their ID to their gas books, those desks are as follows:

EPMI-LT-SPP: Mike Carson
EPMI-LT-SERC: Jeff King

I will be in training this afternoon, but will be back when class is over. Let me know if you have any questions.

Thanks for your help!
Casey');
INSERT INTO email([from],[to],subject,body) VALUES('darrell.schoolcraft@enron.com', 'david.roensch@enron.com, kimberly.watson@enron.com, michelle.lokay@enron.com,', 'Postings', 'Please see the attached.

ds

');
INSERT INTO email([from],[to],subject,body) VALUES('mcominsky@aol.com', 'cpatman@bracepatt.com, james_derrick@enron.com', 'Jurisprudence Luncheon', 'Carrin & Jim --

It was an honor and a pleasure to meet both of you yesterday. I know we will

have fun working together on this very special event.

Jeff left the jurisprudence luncheon lists for me before he left on vacation.
I wasn"t sure whether he transmitted them
to you as well. Would you please
advise me if you would like them sent to you? I can email the MS Excel files
or I can fax the hard copies to you. Please advise what is most convenient.

I plan to be in town through the holidays and can be reached by phone, email,
or cell phone at any time. My cell phone number is 713/705-4829.

Thanks again for your interest in the ADL"s work. Martin.

Martin B. Cominsky
Director, Southwest Region
Anti-Defamation League
713/627-3490, ext. 122
713/627-2011 (fax)
MCominsky@aol.com');
INSERT INTO email([from],[to],subject,body) VALUES('phillip.love@enron.com', 'todagost@utmb.edu, gbsonnta@utmb.edu', 'New President', 'I had a little bird put a word in my ear. Is there any possibility for Ben Raimer to be Bush"s secretary of HHS? Just curious about that infamous UTMB
rumor mill. Hope things are well, happy holidays.
PL');
INSERT INTO email([from],[to],subject,body) VALUES('marie.heard@enron.com', 'ehamilton@fna.com', 'ISDA Master Agreement',
'Erin:

Pursuant to your request, attached are the Schedule to the ISDA Master Agreement, together with Paragraph 13 to the ISDA Credit Support Annex. Please let me know if you need anything else. We look forward to hearing your comments.

Marie

Marie Heard
Senior Legal Specialist
Enron North America Corp.
Phone: (713) 853-3907
Fax: (713) 646-3490
marie.heard@enron.com

');
INSERT INTO email([from],[to],subject,body) VALUES('andrea.ring@enron.com', 'beverly.beaty@enron.com', 'Re: Tennessee Buy - Louis Dreyfus', 'Beverly - once again thanks so much for your help on this.

');

INSERT INTO email([from],[to],subject,body) VALUES('karolyn.criado@enron.com', 'j..bonin@enron.com, felicia.case@enron.com, b..clapp@enron.com,', 'Price List week of Oct. 8-9, 2001', '
Please contact me if you have any questions regarding last weeks prices.

Thank you,
Karolyn Criado
3-9441

');
INSERT INTO email([from],[to],subject,body)
VALUES('kevin.presto@enron.com', 'edward.baughman@enron.com, billy.braddock@enron.com', 'Associated', 'Please begin working on filling our Associated short position in 02. I would like to take this risk off the books.

In addition, please find out what a buy-out of VEPCO would cost us. With Rogers transitioning to run our retail risk management, I would like to clean up our customer positions.

We also need to continue to explore a JEA buy-out.

Thanks.');
INSERT INTO email([from],[to],subject,body) VALUES('stacy.dickson@enron.com', 'gregg.penman@enron.com', 'RE: Constellation TC 5-7-01', 'Gregg,

I am at home with a sick baby. (Lots of fun!) I will call you about this
tomorrow.

Stacy');
INSERT INTO email([from],[to],subject,body) VALUES('joe.quenet@enron.com', 'dfincher@utilicorp.com', '', 'hey big guy.....check this out.....

w ww.gorelieberman-2000.com/');
INSERT INTO email([from],[to],subject,body) VALUES('k..allen@enron.com', 'jacqestc@aol.com', '',
'Jacques,

I sent you a fax of Kevin Kolb''s comments on the release. The payoff on the note would be $36,248 ($36090(principal) + $158 (accrued interest)).
This is assuming we wrap this up on Tuesday.

Please email to confirm that their changes are ok so I can set up a meeting on Tuesday to reach closure.

Phillip');
INSERT INTO email([from],[to],subject,body) VALUES('kourtney.nelson@enron.com', 'mike.swerzbin@enron.com', 'Adjusted L/R Balance', 'Mike,

I placed the adjusted L/R Balance on the Enronwest site. It is under the "Staff/Kourtney Nelson". There are two links:

1) "Adj L_R" is the same data/format from the weekly strategy meeting.
2) "New Gen 2001_2002" link has all of the supply side info that is used to calculate the L/R balance
-Please note the Data Flag column, a value of "3" indicates the project was cancelled, on hold, etc and is not included in the calc.

Both of these sheets are interactive Excel spreadsheets and thus you can play around with the data as you please. Also, James Bruce is working to get his gen report on the web. That will help with your access to information on new gen.

Please let me know if you have any questions or feedback,

Kourtney

Kourtney Nelson
Fundamental Analysis
Enron North America
(503) 464-8280
kourtney.nelson@enron.com');
INSERT INTO email([from],[to],subject,body) VALUES('d..thomas@enron.com', 'naveed.ahmed@enron.com', 'FW: Current Enron TCC Portfolio', '

-----Original Message-----
From: Grace, Rebecca M.
Sent: Monday, December 17, 2001 9:44 AM
To: Thomas, Paul D.
Cc: Cashion, Jim; Allen, Thresa A.; May, Tom
Subject: RE: Current Enron TCC Portfolio

Paul,

I reviewed NY"s list. I agree with all of their contracts numbers and mw amounts.

Call if you have any more questions.

Rebecca

-----Original Message-----
From: Thomas, Paul D.
Sent: Monday, December 17, 2001 9:08 AM
To: Grace, Rebecca M.
Subject: FW: Current Enron TCC Portfolio

<< File: enrontccs.xls >>
Rebecca,
Let me know if you
see any differences.

Paul
X 3-0403
-----Original Message-----
From: Thomas, Paul D.
Sent: Monday, December 17, 2001 9:04 AM
To: Ahmed, Naveed
Subject: FW: Current Enron TCC Portfolio

-----Original Message-----
From: Thomas, Paul D.
Sent: Thursday, December 13, 2001 10:01 AM
To: Baughman, Edward D.
Subject: Current Enron TCC Portfolio

');
INSERT INTO email([from],[to],subject,body) VALUES('stephanie.panus@enron.com',
'william.bradford@enron.com, debbie.brackett@enron.com,', 'Coastal Merchant Energy/El Paso Merchant Energy',
'Coastal Merchant Energy, L.P. merged with and into El Paso Merchant Energy,
L.P., effective February 1, 2001, with the surviving entity being El Paso
Merchant Energy, L.P.  We currently have ISDA Master Agreements with both
counterparties.  Please see the attached memo regarding the existing Masters
and let us know which agreement should be terminated.

Thanks,
Stephanie
');
INSERT INTO email([from],[to],subject,body) VALUES('kam.keiser@enron.com', 'c..kenne@enron.com',
 'RE: What about this too???', '

-----Original Message-----
From:  Kenne, Dawn C.
Sent: Wednesday, February 06, 2002 11:50 AM
To: Keiser, Kam
Subject: What about this too???

<< File: Netco Trader Matrix.xls >>
');
INSERT INTO email([from],[to],subject,body) VALUES('chris.meyer@enron.com', 'joe.parks@enron.com',

'Centana', 'Talked to Chip.  We do need Cash Committe approval given the netting feature of your deal, which means Batch Funding Request.  Please update per my previous e-mail and forward.

Thanks

chris
x31666');
INSERT INTO email([from],[to],subject,body) VALUES('debra.perlingiere@enron.com', 'jworman@academyofhealth.com', '', 'Have a great weekend!  Happy Fathers Day!

Debra Perlingiere
Enron North America Corp.
1400 Smith Street, EB 3885
Houston, Texas 77002
dperlin@enron.com
Phone 713-853-7658
Fax  713-646-3490');
INSERT INTO email([from],[to],subject,body) VALUES('outlook.team@enron.com', '', 'Demo by Martha Janousek of Dashboard & Pipeline
 Profile / Julia  &', 'CALENDAR ENTRY: APPOINTMENT

Description:
 Demo by Martha Janousek of Dashboard & Pipeline Profile / Julia  & Dir Rpts. - 4102

Date:  1/5/2001
Time:  9:00 AM - 10:00 AM (Central Standard Time)

Chairperson: Outlook Migration Team

Detailed Description:');
INSERT INTO email([from],[to],subject,body) VALUES('diana.seifert@enron.com', 'mark.taylor@enron.com', 'Guest access Chile', 'Hello Mark,

Justin Boyd told me that your can help me with questions regarding Chile.
We got a request for guest access through MG.
The company is called Escondida and is a subsidiary of BHP Australia.

Please advise if I can set up a guest account or not.
F.Y.I.: MG is planning to put a "in w/h Chile" contract for Copper on-line as
soon as Enron has done the due diligence for this country.
Thanks !

Best regards

Diana Seifert
EOL PCG');

INSERT INTO email([from],[to],subject,body) VALUES('enron_update@concureworkplace.com',
'mark.whitt@enron.com', '<<Concur Expense Document>> - 121001',
'The Approval status has changed on the following report:

Status last changed by: Barry L. Tycholiz
Expense Report Name: 121001
Report Total: $198.98
Amount Due Employee: $198.98
Amount Approved: $198.98
Amount Paid: $0.00
Approval Status: Approved
Payment Status: Pending

To review this expense report, click on the following link for Concur Expense.
http://expensexms.enron.com');
INSERT INTO email([from],[to],subject,body) VALUES('kevin.hyatt@enron.com', '', 'Technical Support', 'Outside the U.S., please refer to the list below:

Australia:
1800 678-515
support@palm-au.com

Canada:
1905 305-6530
support@palm.com

New Zealand:
0800 446-398
support@palm-nz.com

U.K.:
0171 867 0108
eurosupport@palm.3com.com

Please refer to the Worldwide Customer Support card for a complete technical support contact list.');
INSERT INTO email([from],[to],subject,body) VALUES('geoff.storey@enron.com', 'dutch.quigley@enron.com',
'RE:', 'duke contact?

-----Original Message-----
From: Quigley, Dutch

Sent: Wednesday, October 31, 2001 10:14 AM
To: Storey, Geoff
Subject: RE:

bp corp Albert LaMore 281-366-4962

running the reports now

-----Original Message-----
From: Storey, Geoff
Sent: Wednesday, October 31, 2001 10:10 AM
To: Quigley, Dutch
Subject: RE:

give me a contact over there too
BP

-----Original Message-----
From: Quigley, Dutch
Sent: Wednesday, October 31, 2001 9:42 AM
To: Storey, Geoff
Subject:

Coral Jeff Whitnah 713-767-5374
Relaint Steve McGinn 713-207-4000');
INSERT INTO email([from],[to],subject,body) VALUES('pete.davis@enron.com', 'pete.davis@enron.com', 'Start Date: 4/22/01; HourAhead hour: 3; <CODESITE>', 'Start Date: 4/22/01; HourAhead hour: 3; No ancillary schedules awarded.
Variances detected.
Variances detected in Load schedule.

LOG MESSAGES:

PARSING FILE -->> O:\Portland\WestDesk\California Scheduling\ISO Final Schedules\2001042203.txt

---- Load Schedule ----
$$$ Variance found in table tblLoads.
Details: (Hour: 3 / Preferred:
1.92 / Final: 1.89)
TRANS_TYPE: FINAL
LOAD_ID: PGE4
MKT_TYPE: 2
TRANS_DATE: 4/22/01
SC_ID: EPMI

');
INSERT INTO email([from],[to],subject,body) VALUES('john.postlethwaite@enron.com', 'john.zufferli@enron.com', 'Reference', 'John, hope things are going well up there for you. The big day is almost here for you and Jessica. I was wondering if I could use your name as a job reference if need be. I am just trying to get everything in order just in case something happens.

```
John');
INSERT INTO email([from],[to],subject,body) VALUES('jeffrey.shankman@enron.com',
'lschiffm@jonesday.com', 'Re:', 'I saw you called on the cell this a.m.  Sorry I missed you.  (I was in the
shower).  I have had a shitty week--I suspect my silence (not only to you,
but others) after our phone call is a result of the week.  I''m seeing Glen at
11:15....talk to you');
INSERT INTO email([from],[to],subject,body) VALUES('litebytz@enron.com', '', 'Lite Bytz RSVP', '
This week''s Lite Bytz presentation
 will feature the following TOOLZ speaker:

Richard McDougall
Solaris 8
Thursday, June 7, 2001

If you have not already signed up, please RSVP via email to litebytz@enron.com by the end of the day Tuesday,
June 5, 2001.

*Remember: this is now a Brown Bag Event--so bring your lunch and we will provide cookies and drinks.

Click below for more details.

http://home.enron.com:84/messaging/litebytztoolzprint.jpg');
  COMMIT;
 }
} {}

################################################################################
# Everything above just builds an interesting test database.  The actual
# tests come after this comment.
################################################################################

do_test fts1c-1.2 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark'
 }
} {6 17 25 38 40 42 73 74}
do_test fts1c-1.3 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'susan'
 }
} {24 40}
do_test fts1c-1.4 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark
 susan'
 }
} {40}
do_test fts1c-1.5 {
```

```
 execsql {
   SELECT rowid FROM email WHERE email MATCH 'susan mark'
 }
} {40}
do_test fts1c-1.6 {
 execsql {
   SELECT rowid FROM email WHERE email MATCH '"mark susan"'
 }
} {}
do_test fts1c-1.7 {
 execsql {
   SELECT rowid FROM email WHERE email MATCH 'mark -susan'
 }
} {6 17 25 38 42 73 74}
do_test fts1c-1.8 {
 execsql {
   SELECT rowid FROM email WHERE email MATCH '-mark susan'
 }
} {24}
do_test fts1c-1.9 {
 execsql {
   SELECT rowid FROM email WHERE email MATCH 'mark OR susan'
 }
} {6 17 24 25 38 40 42 73 74}

# Some simple tests of the automatic "offsets(email)" column.  In the sample
# data set above, only one message, number 20, contains the words
# "gas" and "reminder" in both body and subject.
#
do_test fts1c-2.1 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE email MATCH 'gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8 3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}
do_test fts1c-2.2 {
 execsql {

  SELECT rowid, offsets(email) FROM email
    WHERE email MATCH 'subject:gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8 3 1 54 8}}
do_test fts1c-2.3 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE email MATCH 'body:gas reminder'
 }
} {20 {2 1 54 8 3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}
```

```
do_test fts1c-2.4 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE subject MATCH 'gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8}}
do_test fts1c-2.5 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE body MATCH 'gas reminder'
 }
} {20 {3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}

# Document 32 contains 5 instances of the world "child".  But only
# 3 of them are paired with "product".  Make sure only those instances
# that match the phrase appear in the offsets(email) list.
#
do_test fts1c-3.1 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE body MATCH 'child product' AND +rowid=32
 }
} {32 {3 0 94 5 3 0 114 5 3 0 207
 5 3 1 213 7 3 0 245 5 3 1 251 7 3 0 409 5 3 1 415 7 3 1 493 7}}
do_test fts1c-3.2 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE body MATCH '"child product"'
 }
} {32 {3 0 207 5 3 1 213 7 3 0 245 5 3 1 251 7 3 0 409 5 3 1 415 7}}

# Snippet generator tests
#
do_test fts1c-4.1 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'subject:gas reminder'
 }
} {{Alert Posted 10:00 AM November 20,2000: E-<b>GAS</b> Request <b>Reminder</b>}}
do_test fts1c-4.2 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'christmas candlelight'
 }
} {{<b>...</b> place.? What do you think about going here <b>Christmas</b>
eve?? They have an 11:00 a.m. service and a <b>candlelight</b> service at 5:00 p.m.,
among others. <b>...</b>}}
```

```
do_test fts1c-4.3 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'deal sheet potential reuse'
 }
} {{EOL-Accenture <b>Deal</b> <b>Sheet</b> <b>...</b> intent
    Review Enron
 asset base for <b>potential</b> <b>reuse</b>/ licensing
    Contract negotiations <b>...</b>}}
do_test fts1c-4.4 {
 execsql {
   SELECT snippet(email,'<<<','>>>',' ') FROM email
    WHERE email MATCH 'deal sheet potential reuse'
 }
} {{EOL-Accenture <<<Deal>>> <<<Sheet>>>  intent
    Review Enron asset base for <<<potential>>> <<<reuse>>>/ licensing
    Contract negotiations  }}
do_test fts1c-4.5 {
 execsql {
   SELECT snippet(email,'<<<','>>>',' ') FROM email
    WHERE email MATCH 'first things'
 }
} {{Re: <<<First>>> Polish Deal!  Congrats!  <<<Things>>> seem to be building rapidly now on the  }}
do_test fts1c-4.6 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'chris is here'
 }
} {{<b>chris</b>.germany@enron.com <b>...</b> Sounds good to me.  I bet this <b>is</b> next to the Warick??
Hotel. <b>...</b> place.? What do you think about going <b>here</b> Christmas
eve?? They have an 11:00 a.m. <b>...</b>}}
do_test fts1c-4.7 {
 execsql {
   SELECT
 snippet(email) FROM email
    WHERE email MATCH '"pursuant to"'
 }
} {{Erin:

<b>Pursuant</b> <b>to</b> your request, attached are the Schedule to <b>...</b>}}
do_test fts1c-4.8 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'ancillary load davis'
 }
} {{pete.<b>davis</b>@enron.com <b>...</b> Start Date: 4/22/01; HourAhead hour: 3;  No <b>ancillary</b>
schedules awarded.
Variances detected.
```

Variances detected in Load schedule.

  LOG MESSAGES:

PARSING ...}}

# Combinations of AND and OR operators:
#
do_test fts1c-5.1 {
 execsql {
  SELECT snippet(email) FROM email
   WHERE email MATCH 'questar enron OR com'
 }
} {{matt.smith@enron.com ... six reports:

31 Keystone Receipts
15 Questar Pipeline
40 Rockies Production
22 West_2 ...}}
do_test fts1c-5.2 {
 execsql {
  SELECT snippet(email) FROM email
   WHERE email MATCH 'enron OR com questar'
 }
} {{matt.smith@enron.com ...
 six reports:

31 Keystone Receipts
15 Questar Pipeline
40 Rockies Production
22 West_2 ...}}

finish_test

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/test/fts1c.test
No license file was found, but licenses were detected in source scan.

# 2001 September 15
#
# The author disclaims copyright to this source code.  In place of
# a legal notice, here is a blessing:
#
#    May you do good and not evil.
#    May you find forgiveness for yourself and forgive others.
#    May you share freely, never taking more than you give.
#
#***********************************************************************

```
# This file implements regression tests for SQLite library.  The
# focus of this file is testing built-in functions.
#
# $Id: func.test,v 1.60 2007/04/10 13:51:19 drh Exp $

set testdir [file dirname $argv0]
source $testdir/tester.tcl

# Create a table to work with.
#
do_test func-0.0 {
 execsql {CREATE TABLE tbl1(t1 text)}
 foreach word {this program is free software} {
   execsql "INSERT INTO tbl1 VALUES('$word')"
 }
 execsql {SELECT t1 FROM tbl1 ORDER BY t1}
} {free is program software this}
do_test func-0.1 {
 execsql {
    CREATE TABLE t2(a);
    INSERT
 INTO t2 VALUES(1);
    INSERT INTO t2 VALUES(NULL);
    INSERT INTO t2 VALUES(345);
    INSERT INTO t2 VALUES(NULL);
    INSERT INTO t2 VALUES(67890);
    SELECT * FROM t2;
 }
} {1 {} 345 {} 67890}

# Check out the length() function
#
do_test func-1.0 {
 execsql {SELECT length(t1) FROM tbl1 ORDER BY t1}
} {4 2 7 8 4}
do_test func-1.1 {
 set r [catch {execsql {SELECT length(*) FROM tbl1 ORDER BY t1}} msg]
 lappend r $msg
} {1 {wrong number of arguments to function length()}}
do_test func-1.2 {
 set r [catch {execsql {SELECT length(t1,5) FROM tbl1 ORDER BY t1}} msg]
 lappend r $msg
} {1 {wrong number of arguments to function length()}}
do_test func-1.3 {
 execsql {SELECT length(t1), count(*) FROM tbl1 GROUP BY length(t1)
         ORDER BY length(t1)}
} {2 1 4 2 7 1 8 1}
do_test func-1.4 {
```

```
 execsql {SELECT coalesce(length(a),-1) FROM t2}
} {1 -1 3 -1 5}

# Check out the substr() function
#
do_test func-2.0 {
 execsql {SELECT substr(t1,1,2) FROM tbl1 ORDER BY t1}
} {fr
 is pr so th}
do_test func-2.1 {
 execsql {SELECT substr(t1,2,1) FROM tbl1 ORDER BY t1}
} {r s r o h}
do_test func-2.2 {
 execsql {SELECT substr(t1,3,3) FROM tbl1 ORDER BY t1}
} {ee {} ogr ftw is}
do_test func-2.3 {
 execsql {SELECT substr(t1,-1,1) FROM tbl1 ORDER BY t1}
} {e s m e s}
do_test func-2.4 {
 execsql {SELECT substr(t1,-1,2) FROM tbl1 ORDER BY t1}
} {e s m e s}
do_test func-2.5 {
 execsql {SELECT substr(t1,-2,1) FROM tbl1 ORDER BY t1}
} {e i a r i}
do_test func-2.6 {
 execsql {SELECT substr(t1,-2,2) FROM tbl1 ORDER BY t1}
} {ee is am re is}
do_test func-2.7 {
 execsql {SELECT substr(t1,-4,2) FROM tbl1 ORDER BY t1}
} {fr {} gr wa th}
do_test func-2.8 {
 execsql {SELECT t1 FROM tbl1 ORDER BY substr(t1,2,20)}
} {this software free program is}
do_test func-2.9 {
 execsql {SELECT substr(a,1,1) FROM t2}
} {1 {} 3 {} 6}
do_test func-2.10 {
 execsql {SELECT substr(a,2,2) FROM t2}
} {{} {} 45 {} 78}

# Only do the following tests if TCL has UTF-8 capabilities
#
if {"\u1234"!="u1234"}
 {

# Put some UTF-8 characters in the database
#
do_test func-3.0 {
```

```
 execsql {DELETE FROM tbl1}
 foreach word "contains UTF-8 characters hi\u1234ho" {
   execsql "INSERT INTO tbl1 VALUES('$word')"
 }
 execsql {SELECT t1 FROM tbl1 ORDER BY t1}
} "UTF-8 characters contains hi\u1234ho"
do_test func-3.1 {
 execsql {SELECT length(t1) FROM tbl1 ORDER BY t1}
} {5 10 8 5}
do_test func-3.2 {
 execsql {SELECT substr(t1,1,2) FROM tbl1 ORDER BY t1}
} {UT ch co hi}
do_test func-3.3 {
 execsql {SELECT substr(t1,1,3) FROM tbl1 ORDER BY t1}
} "UTF cha con hi\u1234"
do_test func-3.4 {
 execsql {SELECT substr(t1,2,2) FROM tbl1 ORDER BY t1}
} "TF ha on i\u1234"
do_test func-3.5 {
 execsql {SELECT substr(t1,2,3) FROM tbl1 ORDER BY t1}
} "TF- har ont i\u1234h"
do_test func-3.6 {
 execsql {SELECT substr(t1,3,2) FROM tbl1 ORDER BY t1}
} "F- ar nt \u1234h"
do_test func-3.7 {
 execsql {SELECT substr(t1,4,2) FROM tbl1 ORDER BY t1}
} "-8 ra ta ho"
do_test func-3.8 {
 execsql {SELECT substr(t1,-1,1)
 FROM tbl1 ORDER BY t1}
} "8 s s o"
do_test func-3.9 {
 execsql {SELECT substr(t1,-3,2) FROM tbl1 ORDER BY t1}
} "F- er in \u1234h"
do_test func-3.10 {
 execsql {SELECT substr(t1,-4,3) FROM tbl1 ORDER BY t1}
} "TF- ter ain i\u1234h"
do_test func-3.99 {
 execsql {DELETE FROM tbl1}
 foreach word {this program is free software} {
   execsql "INSERT INTO tbl1 VALUES('$word')"
 }
 execsql {SELECT t1 FROM tbl1}
} {this program is free software}

} ;# End \u1234!=u1234

# Test the abs() and round() functions.
```

```
#
do_test func-4.1 {
 execsql {
   CREATE TABLE t1(a,b,c);
   INSERT INTO t1 VALUES(1,2,3);
   INSERT INTO t1 VALUES(2,1.2345678901234,-12345.67890);
   INSERT INTO t1 VALUES(3,-2,-5);
 }
 catchsql {SELECT abs(a,b) FROM t1}
} {1 {wrong number of arguments to function abs()}}
do_test func-4.2 {
 catchsql {SELECT abs() FROM t1}
} {1 {wrong number of arguments to function abs()}}
do_test func-4.3 {
 catchsql {SELECT abs(b) FROM t1 ORDER BY a}
} {0 {2 1.2345678901234
 2}}
do_test func-4.4 {
 catchsql {SELECT abs(c) FROM t1 ORDER BY a}
} {0 {3 12345.6789 5}}
do_test func-4.4.1 {
 execsql {SELECT abs(a) FROM t2}
} {1 {} 345 {} 67890}
do_test func-4.4.2 {
 execsql {SELECT abs(t1) FROM tbl1}
} {0.0 0.0 0.0 0.0 0.0}

do_test func-4.5 {
 catchsql {SELECT round(a,b,c) FROM t1}
} {1 {wrong number of arguments to function round()}}
do_test func-4.6 {
 catchsql {SELECT round(b,2) FROM t1 ORDER BY b}
} {0 {-2.0 1.23 2.0}}
do_test func-4.7 {
 catchsql {SELECT round(b,0) FROM t1 ORDER BY a}
} {0 {2.0 1.0 -2.0}}
do_test func-4.8 {
 catchsql {SELECT round(c) FROM t1 ORDER BY a}
} {0 {3.0 -12346.0 -5.0}}
do_test func-4.9 {
 catchsql {SELECT round(c,a) FROM t1 ORDER BY a}
} {0 {3.0 -12345.68 -5.0}}
do_test func-4.10 {
 catchsql {SELECT 'x' || round(c,a) || 'y' FROM t1 ORDER BY a}
} {0 {x3.0y x-12345.68y x-5.0y}}
do_test func-4.11 {
 catchsql {SELECT round() FROM t1 ORDER BY a}
} {1 {wrong number of arguments to function round()}}
```

```
do_test func-4.12 {
 execsql
 {SELECT coalesce(round(a,2),'nil') FROM t2}
} {1.0 nil 345.0 nil 67890.0}
do_test func-4.13 {
 execsql {SELECT round(t1,2) FROM tbl1}
} {0.0 0.0 0.0 0.0 0.0}
do_test func-4.14 {
 execsql {SELECT typeof(round(5.1,1));}
} {real}
do_test func-4.15 {
 execsql {SELECT typeof(round(5.1));}
} {real}


# Test the upper() and lower() functions
#
do_test func-5.1 {
 execsql {SELECT upper(t1) FROM tbl1}
} {THIS PROGRAM IS FREE SOFTWARE}
do_test func-5.2 {
 execsql {SELECT lower(upper(t1)) FROM tbl1}
} {this program is free software}
do_test func-5.3 {
 execsql {SELECT upper(a), lower(a) FROM t2}
} {1 1 {} {} 345 345 {} {} 67890 67890}
do_test func-5.4 {
 catchsql {SELECT upper(a,5) FROM t2}
} {1 {wrong number of arguments to function upper()}}
do_test func-5.5 {
 catchsql {SELECT upper(*) FROM t2}
} {1 {wrong number of arguments to function upper()}}

# Test the coalesce() and nullif() functions
#
do_test func-6.1 {
 execsql {SELECT coalesce(a,'xyz') FROM t2}
} {1 xyz 345 xyz 67890}
do_test
 func-6.2 {
 execsql {SELECT coalesce(upper(a),'nil') FROM t2}
} {1 nil 345 nil 67890}
do_test func-6.3 {
 execsql {SELECT coalesce(nullif(1,1),'nil')}
} {nil}
do_test func-6.4 {
 execsql {SELECT coalesce(nullif(1,2),'nil')}
} {1}
```

```
do_test func-6.5 {
 execsql {SELECT coalesce(nullif(1,NULL),'nil')}
} {1}


# Test the last_insert_rowid() function
#
do_test func-7.1 {
 execsql {SELECT last_insert_rowid()}
} [db last_insert_rowid]

# Tests for aggregate functions and how they handle NULLs.
#
do_test func-8.1 {
 ifcapable explain {
   execsql {EXPLAIN SELECT sum(a) FROM t2;}
 }
 execsql {
   SELECT sum(a), count(a), round(avg(a),2), min(a), max(a), count(*) FROM t2;
 }
} {68236 3 22745.33 1 67890 5}
do_test func-8.2 {
 execsql {
   SELECT max('z+'||a||'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP') FROM t2;
 }
} {z+67890abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP}

ifcapable tempdb {
 do_test func-8.3 {
   execsql {
     CREATE TEMP TABLE t3 AS SELECT a FROM t2 ORDER
 BY a DESC;
     SELECT min('z+'||a||'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP') FROM t3;
   }
 } {z+1abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP}
} else {
 do_test func-8.3 {
   execsql {
     CREATE TABLE t3 AS SELECT a FROM t2 ORDER BY a DESC;
     SELECT min('z+'||a||'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP') FROM t3;
   }
 } {z+1abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP}
}
do_test func-8.4 {
 execsql {
   SELECT max('z+'||a||'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP') FROM t3;
 }
} {z+67890abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOP}
```

```
# How do you test the random() function in a meaningful, deterministic way?
#
do_test func-9.1 {
 execsql {
   SELECT random() is not null;
 }
} {1}
do_test func-9.2 {
 execsql {
   SELECT typeof(random());
 }
} {integer}
do_test func-9.3 {
 execsql {
   SELECT randomblob(32) is not null;
 }
} {1}
do_test func-9.4 {
 execsql {
   SELECT typeof(randomblob(32));
 }
} {blob}
do_test func-9.5 {
 execsql {
   SELECT length(randomblob(32)),
 length(randomblob(-5)),
        length(randomblob(2000))
 }
} {32 1 2000}

# The "hex()" function was added in order to be able to render blobs
# generated by randomblob().  So this seems like a good place to test
# hex().
#
do_test func-9.10 {
 execsql {SELECT hex(x'00112233445566778899aAbBcCdDeEfF')}
} {00112233445566778899AABBCCDDEEFF}
do_test func-9.11 {
 execsql {SELECT hex(replace('abcdefg','ef','12'))}
} {61626364313267}

# Use the "sqlite_register_test_function" TCL command which is part of
# the text fixture in order to verify correct operation of some of
# the user-defined SQL function APIs that are not used by the built-in
# functions.
#
set ::DB [sqlite3_connection_pointer db]
```

```
sqlite_register_test_function $::DB testfunc
do_test func-10.1 {
 catchsql {
   SELECT testfunc(NULL,NULL);
 }
} {1 {first argument should be one of: int int64 string double null value}}
do_test func-10.2 {
 execsql {
   SELECT testfunc(
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
     'int', 1234
   );
 }
} {1234}
do_test func-10.3 {
 execsql {
   SELECT testfunc(
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'string', NULL
   );
 }
} {{}}
do_test func-10.4 {
 execsql {
   SELECT testfunc(
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'double', 1.234
   );
 }
} {1.234}
do_test func-10.5 {
 execsql {
   SELECT testfunc(
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'int', 1234,
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'string', NULL,
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'double', 1.234,
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'int', 1234,
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'string', NULL,
    'string', 'abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ',
    'double', 1.234
    );
 }
} {1.234}
```

```
# Test the built-in sqlite_version(*) SQL function.
#
do_test func-11.1 {
 execsql {
   SELECT sqlite_version(*);
 }
} [sqlite3 -version]

# Test that destructors passed to sqlite3 by calls to sqlite3_result_text()
# etc. are called. These tests use two special user-defined functions
# (implemented in func.c) only available in test builds.
#
# Function test_destructor() takes one argument and returns a copy of the
# text form of that argument. A destructor is associated with the return
# value. Function test_destructor_count() returns the number of outstanding
# destructor calls for values returned by test_destructor().
#
do_test func-12.1 {
 execsql {
   SELECT test_destructor('hello world'), test_destructor_count();
 }
} {{hello world} 1}
do_test func-12.2 {
 execsql {
   SELECT test_destructor_count();
 }
} {0}
do_test func-12.3 {
 execsql {
   SELECT test_destructor('hello')||' world', test_destructor_count();
 }
} {{hello world} 0}
do_test func-12.4
 {
 execsql {
   SELECT test_destructor_count();
 }
} {0}
do_test func-12.5 {
 execsql {
   CREATE TABLE t4(x);
   INSERT INTO t4 VALUES(test_destructor('hello'));
   INSERT INTO t4 VALUES(test_destructor('world'));
   SELECT min(test_destructor(x)), max(test_destructor(x)) FROM t4;
 }
} {hello world}
do_test func-12.6 {
```

```
 execsql {
   SELECT test_destructor_count();
 }
} {0}
do_test func-12.7 {
 execsql {
   DROP TABLE t4;
 }
} {}

# Test that the auxdata API for scalar functions works. This test uses
# a special user-defined function only available in test builds,
# test_auxdata(). Function test_auxdata() takes any number of arguments.
do_test func-13.1 {
 execsql {
   SELECT test_auxdata('hello world');
 }
} {0}

do_test func-13.2 {
 execsql {
   CREATE TABLE t4(a, b);
   INSERT INTO t4 VALUES('abc', 'def');
   INSERT INTO t4 VALUES('ghi', 'jkl');
 }
} {}
do_test func-13.3 {
 execsql {
   SELECT test_auxdata('hello world') FROM t4;
 }
} {0 1}
do_test func-13.4
 {
 execsql {
   SELECT test_auxdata('hello world', 123) FROM t4;
 }
} {{0 0} {1 1}}
do_test func-13.5 {
 execsql {
   SELECT test_auxdata('hello world', a) FROM t4;
 }
} {{0 0} {1 0}}
do_test func-13.6 {
 execsql {
   SELECT test_auxdata('hello'||'world', a) FROM t4;
 }
} {{0 0} {1 0}}
```

```
# Test that auxilary data is preserved between calls for SQL variables.
do_test func-13.7 {
 set DB [sqlite3_connection_pointer db]
 set sql "SELECT test_auxdata( ? , a ) FROM t4;"
 set STMT [sqlite3_prepare $DB $sql -1 TAIL]
 sqlite3_bind_text $STMT 1 hello -1
 set res [list]
 while { "SQLITE_ROW"==[sqlite3_step $STMT] } {
   lappend res [sqlite3_column_text $STMT 0]
 }
 lappend res [sqlite3_finalize $STMT]
} {{0 0} {1 0} SQLITE_OK}

# Make sure that a function with a very long name is rejected
do_test func-14.1 {
 catch {
   db function [string repeat X 254] {return "hello"}
 }
} {0}
do_test func-14.2 {
 catch {
   db function [string repeat X 256] {return "hello"}
 }
} {1}

do_test
 func-15.1 {
 catchsql {
   select test_error(NULL);
 }
} {1 {}}

# Test the quote function for BLOB and NULL values.
do_test func-16.1 {
 execsql {
   CREATE TABLE tbl2(a, b);
 }
 set STMT [sqlite3_prepare $::DB "INSERT INTO tbl2 VALUES(?, ?)" -1 TAIL]
 sqlite3_bind_blob $::STMT 1 abc 3
 sqlite3_step $::STMT
 sqlite3_finalize $::STMT
 execsql {
   SELECT quote(a), quote(b) FROM tbl2;
 }
} {X'616263' NULL}

# Correctly handle function error messages that include %.  Ticket #1354
#
```

```
do_test func-17.1 {
 proc testfunc1 args {error "Error %d with %s percents %p"}
 db function testfunc1 ::testfunc1
 catchsql {
   SELECT testfunc1(1,2,3);
 }
} {1 {Error %d with %s percents %p}}

# The SUM function should return integer results when all inputs are integer.
#
do_test func-18.1 {
 execsql {
   CREATE TABLE t5(x);
   INSERT INTO t5 VALUES(1);
   INSERT INTO t5 VALUES(-99);
   INSERT INTO t5 VALUES(10000);
   SELECT sum(x) FROM t5;
 }
} {9902}
do_test func-18.2
 {
 execsql {
   INSERT INTO t5 VALUES(0.0);
   SELECT sum(x) FROM t5;
 }
} {9902.0}

# The sum of nothing is NULL.  But the sum of all NULLs is NULL.
#
# The TOTAL of nothing is 0.0.
#
do_test func-18.3 {
 execsql {
   DELETE FROM t5;
   SELECT sum(x), total(x) FROM t5;
 }
} {{} 0.0}
do_test func-18.4 {
 execsql {
   INSERT INTO t5 VALUES(NULL);
   SELECT sum(x), total(x) FROM t5
 }
} {{} 0.0}
do_test func-18.5 {
 execsql {
   INSERT INTO t5 VALUES(NULL);
   SELECT sum(x), total(x) FROM t5
 }
```

```
} {{} 0.0}
do_test func-18.6 {
 execsql {
   INSERT INTO t5 VALUES(123);
   SELECT sum(x), total(x) FROM t5
 }
} {123 123.0}

# Ticket #1664, #1669, #1670, #1674: An integer overflow on SUM causes
# an error. The non-standard TOTAL() function continues to give a helpful
# result.
#
do_test func-18.10 {
 execsql {
   CREATE TABLE t6(x INTEGER);
   INSERT INTO t6 VALUES(1);
   INSERT INTO t6 VALUES(1<<62);
   SELECT sum(x) - ((1<<62)+1) from t6;
 }
} 0
do_test func-18.11 {
  execsql {
   SELECT typeof(sum(x)) FROM t6
 }
} integer
do_test func-18.12 {
 catchsql {
   INSERT INTO t6 VALUES(1<<62);
   SELECT sum(x) - ((1<<62)*2.0+1) from t6;
 }
} {1 {integer overflow}}
do_test func-18.13 {
 execsql {
   SELECT total(x) - ((1<<62)*2.0+1) FROM t6
 }
} 0.0
do_test func-18.14 {
 execsql {
   SELECT sum(-9223372036854775805);
 }
} -9223372036854775805

ifcapable compound&&subquery {

do_test func-18.15 {
 catchsql {
   SELECT sum(x) FROM
     (SELECT 9223372036854775807 AS x UNION ALL
```

```
      SELECT 10 AS x);
 }
} {1 {integer overflow}}
do_test func-18.16 {
 catchsql {
   SELECT sum(x) FROM
     (SELECT 9223372036854775807 AS x UNION ALL
      SELECT -10 AS x);
 }
} {0 9223372036854775797}
do_test func-18.17 {
 catchsql {
   SELECT sum(x) FROM
     (SELECT -9223372036854775807 AS x UNION ALL
      SELECT 10 AS x);
 }
} {0 -9223372036854775797}
do_test func-18.18 {
 catchsql {
   SELECT sum(x) FROM
     (SELECT -9223372036854775807
 AS x UNION ALL
      SELECT -10 AS x);
 }
} {1 {integer overflow}}
do_test func-18.19 {
 catchsql {
   SELECT sum(x) FROM (SELECT 9 AS x UNION ALL SELECT -10 AS x);
 }
} {0 -1}
do_test func-18.20 {
 catchsql {
   SELECT sum(x) FROM (SELECT -9 AS x UNION ALL SELECT 10 AS x);
 }
} {0 1}
do_test func-18.21 {
 catchsql {
   SELECT sum(x) FROM (SELECT -10 AS x UNION ALL SELECT 9 AS x);
 }
} {0 -1}
do_test func-18.22 {
 catchsql {
   SELECT sum(x) FROM (SELECT 10 AS x UNION ALL SELECT -9 AS x);
 }
} {0 1}

} ;# ifcapable compound&&subquery
```

```
# Integer overflow on abs()
#
do_test func-18.31 {
 catchsql {
   SELECT abs(-9223372036854775807);
 }
} {0 9223372036854775807}
do_test func-18.32 {
 catchsql {
   SELECT abs(-9223372036854775807-1);
 }
} {1 {integer overflow}}

# The MATCH function exists but is only a stub and always throws an error.
#
do_test func-19.1 {
 execsql {
   SELECT match(a,b) FROM t1 WHERE 0;
 }
} {}
do_test func-19.2 {
 catchsql {
   SELECT
 'abc' MATCH 'xyz';
 }
} {1 {unable to use function MATCH in the requested context}}
do_test func-19.3 {
 catchsql {
   SELECT 'abc' NOT MATCH 'xyz';
 }
} {1 {unable to use function MATCH in the requested context}}
do_test func-19.4 {
 catchsql {
   SELECT match(1,2,3);
 }
} {1 {wrong number of arguments to function match()}}

# Soundex tests.
#
if {![catch {db eval {SELECT soundex('hello')}}]} {
 set i 0
 foreach {name sdx} {
   euler        E460
   EULER        E460
   Euler        E460
   ellery       E460
   gauss        G200
   ghosh        G200
```

```
  hilbert      H416
  Heilbronn    H416
  knuth        K530
  kant         K530
  Lloyd        L300
  LADD         L300
  Lukasiewicz  L222
  Lissajous    L222
  A            A000
  12345        ?000
 } {
  incr i
  do_test func-20.$i {
    execsql {SELECT soundex($name)}
  } $sdx
 }
}

# Tests of the REPLACE function.
#
do_test func-21.1 {
 catchsql {
   SELECT replace(1,2);
 }
} {1 {wrong number
 of arguments to function replace()}}
do_test func-21.2 {
 catchsql {
   SELECT replace(1,2,3,4);
 }
} {1 {wrong number of arguments to function replace()}}
do_test func-21.3 {
 execsql {
   SELECT typeof(replace("This is the main test string", NULL, "ALT"));
 }
} {null}
do_test func-21.4 {
 execsql {
   SELECT typeof(replace(NULL, "main", "ALT"));
 }
} {null}
do_test func-21.5 {
 execsql {
   SELECT typeof(replace("This is the main test string", "main", NULL));
 }
} {null}
do_test func-21.6 {
 execsql {
```

```
  SELECT replace("This is the main test string", "main", "ALT");
 }
} {{This is the ALT test string}}
do_test func-21.7 {
 execsql {
  SELECT replace("This is the main test string", "main", "larger-main");
 }
} {{This is the larger-main test string}}
do_test func-21.8 {
 execsql {
  SELECT replace("aaaaaaa", "a", "0123456789");
 }
} {01234567890123456789012345678901234567890123456789012345678901234567890123456789}

# Tests for the TRIM, LTRIM and RTRIM functions.
#
do_test
 func-22.1 {
 catchsql {SELECT trim(1,2,3)}
} {1 {wrong number of arguments to function trim()}}
do_test func-22.2 {
 catchsql {SELECT ltrim(1,2,3)}
} {1 {wrong number of arguments to function ltrim()}}
do_test func-22.3 {
 catchsql {SELECT rtrim(1,2,3)}
} {1 {wrong number of arguments to function rtrim()}}
do_test func-22.4 {
 execsql {SELECT trim('  hi  ');}
} {hi}
do_test func-22.5 {
 execsql {SELECT ltrim('  hi  ');}
} {{hi  }}
do_test func-22.6 {
 execsql {SELECT rtrim('  hi  ');}
} {{  hi}}
do_test func-22.7 {
 execsql {SELECT trim('  hi  ','xyz');}
} {{  hi  }}
do_test func-22.8 {
 execsql {SELECT ltrim('  hi  ','xyz');}
} {{  hi  }}
do_test func-22.9 {
 execsql {SELECT rtrim('  hi  ','xyz');}
} {{  hi  }}
do_test func-22.10 {
 execsql {SELECT trim('xyxzy  hi  zzzy','xyz');}
} {{  hi  }}
do_test func-22.11 {
```

```
 execsql {SELECT ltrim('xyxzy  hi  zzzy','xyz');}
} {{  hi  zzzy}}
do_test func-22.12 {
 execsql {SELECT rtrim('xyxzy  hi  zzzy','xyz');}
} {{xyxzy  hi  }}
do_test
 func-22.13 {
 execsql {SELECT trim('  hi  ','');}
} {{  hi  }}
do_test func-22.20 {
 execsql {SELECT typeof(trim(NULL));}
} {null}
do_test func-22.21 {
 execsql {SELECT typeof(trim(NULL,'xyz'));}
} {null}
do_test func-22.22 {
 execsql {SELECT typeof(trim('hello',NULL));}
} {null}

finish_test
```

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/test/func.test
No license file was found, but licenses were detected in source scan.

```
# 2006 September 14
#
# The author disclaims copyright to this source code.  In place of
# a legal notice, here is a blessing:
#
#    May you do good and not evil.
#    May you find forgiveness for yourself and forgive others.
#    May you share freely, never taking more than you give.
#
#***********************************************************************
# This file implements regression tests for SQLite library.  The
# focus of this script is testing the FTS2 module.
#
# $Id: fts2c.test,v 1.1 2006/10/19 23:36:26 shess Exp $
#

set testdir [file dirname $argv0]
source $testdir/tester.tcl

# If SQLITE_ENABLE_FTS2 is defined, omit this file.
ifcapable !fts2 {
 finish_test
 return
```

}

# Create a table of sample email data.  The data comes from email
# archives of Enron executives that was published as part of the
# litigation against that company.
#
do_test fts2c-1.1 {
 db eval {
  CREATE VIRTUAL TABLE email
 USING fts2([from],[to],subject,body);
  BEGIN TRANSACTION;
INSERT INTO email([from],[to],subject,body) VALUES('savita.puthigai@enron.com', 'traders.eol@enron.com, traders.eol@enron.com', 'EnronOnline- Change to Autohedge', 'Effective Monday, October 22, 2001 the following changes will be made to the Autohedge functionality on EnronOnline.

The volume on the hedge will now respect the minimum volume and volume increment settings on the parent product. See rules below:

? If the transaction volume on the child is less than half of the parent''s minimum volume no hedge will occur.
? If the transaction volume on the child is more than half the parent''s minimum volume but less than half the volume increment on the parent, the hedge will volume will be the parent''s minimum volume.
? For all other volumes, the same rounding rules will apply based on the volume increment on the parent product.

Please see example below:

Parent''s Settings:
Minimum:  5000
Increment:  1000

Volume on Autohedge
 transaction  Volume Hedged
1  - 2499  0
2500 - 5499  5000
5500 - 6499  6000');
INSERT INTO email([from],[to],subject,body) VALUES('dana.davis@enron.com', 'laynie.east@enron.com, lisa.king@enron.com, lisa.best@enron.com,', 'Leaving Early', 'FYI:
If it''s ok with everyone''s needs, I would like to leave @4pm. If you think
you will need my assistance past the 4 o''clock hour just let me know;  I''ll
be more than willing to stay.');
INSERT INTO email([from],[to],subject,body) VALUES('enron_update@concureworkplace.com', 'louise.kitchen@enron.com', '<<Concur Expense Document>> - CC02.06.02', 'The following expense report is ready for approval:

Employee Name: Christopher F. Calger
Status last changed by: Mollie E. Gustafson Ms
Expense Report Name: CC02.06.02
Report Total: $3,972.93
Amount Due Employee: $3,972.93

To approve this expense report, click on the following link for Concur Expense.
http://expensexms.enron.com');
INSERT INTO email([from],[to],subject,body)
VALUES('jeff.duff@enron.com', 'julie.johnson@enron.com', 'Work request', 'Julie,

Could you print off the current work request report by 1:30 today?

Gentlemen,

I''d like to review this today at 1:30 in our office. Also, could you provide
me with your activity reports so I can have Julie enter this information.

JD');
INSERT INTO email([from],[to],subject,body) VALUES('v.weldon@enron.com', 'gary.l.carrier@usa.dupont.com,
scott.joyce@bankofamerica.com', 'Enron News', 'This could turn into something big....
http://biz.yahoo.com/rf/010129/n29305829.html');
INSERT INTO email([from],[to],subject,body) VALUES('mark.haedicke@enron.com', 'paul.simons@enron.com',
'Re: First Polish Deal!', 'Congrats! Things seem to be building rapidly now on the Continent. Mark');
INSERT INTO email([from],[to],subject,body) VALUES('e..carter@enron.com', 't..robinson@enron.com', 'FW:
Producers Newsletter 9-24-2001', '
The producer lumber pricing sheet.
-----Original Message-----
From: Johnson, Jay
Sent: Tuesday,
October 16, 2001 3:42 PM
To: Carter, Karen E.
Subject: FW: Producers Newsletter 9-24-2001

-----Original Message-----
From: Daigre, Sergai
Sent: Friday, September 21, 2001 8:33 PM
Subject: Producers Newsletter 9-24-2001

');
INSERT INTO email([from],[to],subject,body) VALUES('david.delainey@enron.com', 'kenneth.lay@enron.com',
'Greater Houston Partnership', 'Ken, in response to the letter from Mr Miguel San Juan, my suggestion would
be to offer up the Falcon for their use; however, given the tight time frame
and your recent visit with Mr. Fox that it would be difficult for either you
or me to participate.

I spoke to Max and he agrees with this approach.

I hope this meets with your approval.

Regards
Delainey');
INSERT INTO email([from],[to],subject,body) VALUES('lachandra.fenceroy@enron.com',
'lindy.donoho@enron.com', 'FW: Bus Applications Meeting Follow Up', 'Lindy,

Here is the original memo we discussed earlier. Please provide any information that you may
have.

Your cooperation is greatly appreciated.

Thanks,

lachandra.fenceroy@enron.com
713.853.3884
877.498.3401 Pager

-----Original Message-----
From: Bisbee, Joanne
Sent: Wednesday, September 26, 2001 7:50 AM
To: Fenceroy, LaChandra
Subject: FW: Bus Applications Meeting Follow Up

Lachandra, Please get with David Duff today and see what this is about. Who are our TW accounting business users?

-----Original Message-----
From: Koh, Wendy
Sent: Tuesday, September 25, 2001 2:41 PM
To: Bisbee, Joanne
Subject: Bus Applications Meeting Follow Up

Lisa brought up a TW change effective Nov 1. It involves eliminating a turnback surcharge. I have no other information, but you might check with the business folks for any system changes required.

Wendy');
INSERT INTO email([from],[to],subject,body) VALUES('danny.mccarty@enron.com', 'fran.fagan@enron.com',
'RE: worksheets', 'Fran,
If Julie''s merit needs to be lump sum, just move it over to that column. Also, send me Eric Gadd''s
sheets as well. Thanks.
Dan

-----Original Message-----
From: Fagan, Fran
Sent: Thursday, December 20, 2001 11:10 AM
To: McCarty, Danny
Subject: worksheets

As discussed, attached are your sheets for bonus and merit.

Thanks,

Fran Fagan
Sr. HR Rep
713.853.5219

<< File: McCartyMerit.xls >>  << File: mccartyBonusCommercial_UnP.xls >>

');
INSERT INTO email([from],[to],subject,body) VALUES('bert.meyers@enron.com', 'shift.dl-portland@enron.com', 'OCTOBER SCHEDULE', 'TEAM,

PLEASE SEND ME ANY REQUESTS THAT YOU HAVE FOR OCTOBER.  SO FAR I HAVE THEM FOR LEAF.  I WOULD LIKE TO HAVE IT DONE BY THE 15TH OF THE MONTH.  ANY QUESTIONS PLEASE GIVE ME A CALL.

BERT');
INSERT INTO email([from],[to],subject,body) VALUES('errol.mclaughlin@enron.com', 'john.arnold@enron.com, bilal.bajwa@enron.com, john.griffith@enron.com,', 'TRV Notification:  (NG - PROPT P/L - 09/27/2001)', 'The report named: NG - PROPT P/L <http://trv.corp.enron.com/linkFromExcel.asp?report_cd=11&report_name=NG+-+PROPT+P/L&category_cd=5&category_name=FINANCIAL&toc_hide=1&sTV1=5&TV1Exp=Y&current_efct_date=09/27/2001>,
 published as of 09/27/2001 is now available for viewing on the website.');
INSERT INTO email([from],[to],subject,body) VALUES('patrice.mims@enron.com', 'calvin.eakins@enron.com', 'Re: Small business supply assistance', 'Hi Calvin

I spoke with Rickey (boy, is he long-winded!!).  Gave him the name of our
credit guy, Russell Diamond.

Thank for your help!');
INSERT INTO email([from],[to],subject,body) VALUES('legal <.hall@enron.com>', 'stephanie.panus@enron.com', 'Termination update', 'City of Vernon and Salt River Project terminated their contracts.  I will fax these notices to you.');
INSERT INTO email([from],[to],subject,body) VALUES('d..steffes@enron.com', 'richard.shapiro@enron.com', 'EES / ENA Government Affairs Staffing & Outside Services', 'Rick --

Here is the information on staffing and outside services.  Call if you need anything else.

Jim

');
INSERT INTO email([from],[to],subject,body)
 VALUES('gelliott@industrialinfo.com', 'pcopello@industrialinfo.com', 'ECAAR (Gavin), WSCC (Diablo Canyon), & NPCC (Seabrook)', 'Dear Power Outage Database Customer,
Attached you will find an excel document. The outages contained within are forced or rescheduled outages. Your

daily delivery will still contain these outages.
In addition to the two excel documents, there is a dbf file that is formatted like your daily deliveries you receive nightly. This will enable you to load the data into your regular database. Any questions please let me know. Thanks.
Greg Elliott
IIR, Inc.
713-783-5147 x 3481
outages@industrialinfo.com
THE INFORMATION CONTAINED IN THIS E-MAIL IS LEGALLY PRIVILEGED AND CONFIDENTIAL INFORMATION INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY NAMED ABOVE. YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION, DISTRIBUTION, OR COPY OF THIS E-MAIL TO UNAUTHORIZED ENTITIES IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS E-MAIL IN ERROR, PLEASE DELETE IT.
- OUTAGE.dbf
- 111201R.xls
- 111201.xls ');
INSERT INTO email([from],[to],subject,body) VALUES('enron.announcements@enron.com', 'all_ena_egm_eim@enron.com', 'EWS Brown Bag', 'MARK YOUR LUNCH CALENDARS NOW !

You are invited to attend the EWS Brown Bag Lunch Series

Featuring: RAY BOWEN, COO

Topic: Enron Industrial Markets

Thursday, March 15, 2001
11:30 am - 12:30 pm
EB 5 C2

You bring your lunch, Limited Seating
We provide drinks and dessert. RSVP x 3-9610');
INSERT INTO email([from],[to],subject,body) VALUES('chris.germany@enron.com', 'ingrid.immer@williams.com', 'Re: About St Pauls', 'Sounds good to me. I bet this is next to the Warick?? Hotel.

"Immer, Ingrid" <Ingrid.Immer@Williams.com> on 12/21/2000 11:48:47 AM
To: ""chris.germany@enron.com"" <chris.germany@enron.com>
cc:
Subject: About St Pauls

<<About St Pauls.url>>
?
?http://www.stpaulshouston.org/about.html

Chris,

I like the looks of this place.? What do you think about going
here Christmas
eve?? They have an 11:00 a.m. service and a candlelight service at 5:00 p.m.,
among others.

Let me know.?? ii

- About St Pauls.url

');
INSERT INTO email([from],[to],subject,body) VALUES('nas@cpuc.ca.gov', 'skatz@sempratrading.com, kmccrea@sablaw.com, thompson@wrightlaw.com,', 'Reply Brief filed July 31, 2000', ' - CPUC01-#76371-v1-Revised_Reply_Brief__Due_today_7_31_.doc');
INSERT INTO email([from],[to],subject,body) VALUES('gascontrol@aglresources.com', 'dscott4@enron.com, lcampbel@enron.com', 'Alert Posted 10:00 AM November 20,2000: E-GAS Request Reminder', 'Alert Posted 10:00 AM November 20,2000: E-GAS Request Reminder
As discussed in the Winter Operations Meeting on Sept.29,2000,
E-Gas(Emergency Gas) will not be offered this winter as a service from AGLC.
Marketers and Poolers can receive gas via Peaking and IBSS nominations(daisy
chain) from other marketers up to the 6 p.m. Same Day 2 nomination cycle.
');
INSERT INTO email([from],[to],subject,body) VALUES('dutch.quigley@enron.com',
'rwolkwitz@powermerchants.com', '', '

Here is a goody for you');
INSERT INTO email([from],[to],subject,body) VALUES('ryan.o''rourke@enron.com', 'k..allen@enron.com, randy.bhatia@enron.com, frank.ermis@enron.com,', 'TRV Notification:  (West VaR - 11/07/2001)', 'The report named: West VaR
<http://trv.corp.enron.com/linkFromExcel.asp?report_cd=36&report_name=West+VaR&category_cd=2&category_name=WEST&toc_hide=1&sTV1=2&TV1Exp=Y&current_efct_date=11/07/2001>, published as of 11/07/2001 is now available for viewing on the website.');
INSERT INTO email([from],[to],subject,body) VALUES('mjones7@txu.com', 'cstone1@txu.com, ggreen2@txu.com, timpowell@txu.com,', 'Enron / HPL Actuals for July 10, 2000', 'Teco Tap 10.000 / Enron ; 110.000 / HPL IFERC

LS HPL LSK IC 30.000 / Enron
');
INSERT INTO email([from],[to],subject,body) VALUES('susan.pereira@enron.com', 'kkw816@aol.com', 'soccer practice', 'Kathy-

Is it safe to assume that practice is cancelled for
tonight??

Susan Pereira');
INSERT INTO email([from],[to],subject,body) VALUES('mark.whitt@enron.com', 'barry.tycholiz@enron.com',

'Huber Internal Memo', 'Please look at this.  I didn''t know how deep to go with the desk.  Do you think this works.

');
INSERT INTO email([from],[to],subject,body) VALUES('m..forney@enron.com', 'george.phillips@enron.com', '', 'George,
Give me a call and we will further discuss opportunities on the 13st floor.

Thanks,
JMForney
3-7160');
INSERT INTO email([from],[to],subject,body) VALUES('brad.mckay@enron.com', 'angusmcka@aol.com', 'Re: (no subject)', 'not yet');
INSERT INTO email([from],[to],subject,body) VALUES('adam.bayer@enron.com', 'jonathan.mckay@enron.com', 'FW: Curve Fetch File', 'Here is the curve fetch file sent to me.  It has plenty of points in it.  If you give me a list of which ones you need we may be able to construct a secondary worksheet to vlookup the values.

adam
35227

-----Original Message-----
From:  Royed, Jeff
Sent: Tuesday,
 September 25, 2001 11:37 AM
To: Bayer, Adam
Subject: Curve Fetch File

Let me know if it works.  It may be required to have a certain version of Oracle for it to work properly.

Jeff Royed
Enron
Energy Operations
Phone: 713-853-5295');
INSERT INTO email([from],[to],subject,body) VALUES('matt.smith@enron.com', 'yan.wang@enron.com', 'Report Formats', 'Yan,

The merged reports look great.  I believe the only orientation changes are to
"unmerge" the following six reports:

31 Keystone Receipts
15 Questar Pipeline
40 Rockies Production
22 West_2
23 West_3
25 CIG_WIC

The orientation of the individual reports should be correct.  Thanks.

Mat

PS.  Just a reminder to add the "*" by the title of calculated points.');
INSERT INTO email([from],[to],subject,body) VALUES('michelle.lokay@enron.com', 'jimboman@bigfoot.com',
'Egyptian Festival', '---------------------- Forwarded by Michelle Lokay/ET&S/Enron on 09/07/2000
10:08 AM ----------------------------

"Karkour, Randa" <Randa.Karkour@COMPAQ.com>
 on 09/07/2000 09:01:04 AM
To: ""Agheb (E-mail)" <Agheb@aol.com>, "Leila Mankarious (E-mail)"
<Leila_Mankarious@mhhs.org>, ""Marymankarious (E-mail)"
<marymankarious@aol.com>, "Michelle lokay (E-mail)" <mlokay@enron.com>, "Ramy
Mankarious (E-mail)" <Mankarious@aol.com>
cc:

Subject: Egyptian Festival

<<Egyptian Festival.url>>

http://www.egyptianfestival.com/

- Egyptian Festival.url
');
INSERT INTO email([from],[to],subject,body) VALUES('errol.mclaughlin@enron.com',
'sherry.dawson@enron.com', 'Urgent!!! --- New EAST books', 'This has to be done.....

Thanks
---------------------- Forwarded by Errol McLaughlin/Corp/Enron on 12/20/2000
08:39 AM ----------------------------

 From:  William Kelly @ ECT                    12/20/2000 08:31 AM

To: Kam Keiser/HOU/ECT@ECT, Darron C Giron/HOU/ECT@ECT, David
Baumbach/HOU/ECT@ECT, Errol McLaughlin/Corp/Enron@ENRON
cc: Kimat Singla/HOU/ECT@ECT, Kulvinder Fowler/NA/Enron@ENRON,
 Kyle R
Lilly/HOU/ECT@ECT, Jeff Royed/Corp/Enron@ENRON, Alejandra
Chavez/NA/Enron@ENRON, Crystal Hyde/HOU/ECT@ECT

Subject: New EAST books

We have new book names in TAGG for our intramonth portfolios and it is extremely important that any deal booked to the East is communicated quickly to someone on my team. I know it will take some time for the new names to sink in and I do not want us to miss any positions or P&L.

Thanks for your help on this.

New:
Scott Neal : East Northeast
Dick Jenkins: East Marketeast

WK
');
INSERT INTO email([from],[to],subject,body) VALUES('david.forster@enron.com', 'eol.wide@enron.com', 'Change to Stack Manager', 'Effective immediately, there is a change to the Stack Manager which will affect any Inactive Child.

An inactive Child with links to Parent products will not have their calculated prices updated until the Child product is Activated.

When the Child Product is activated, the price will be recalculated and updated BEFORE it
is displayed on the web.

This means that if you are inputting a basis price on a Child product, you will not see the final, calculated price until you Activate the product, at which time the customer will also see it.

If you have any questions, please contact the Help Desk on:

Americas: 713 853 4357
Europe: + 44 (0) 20 7783 7783
Asia/Australia: +61 2 9229 2300

Dave');
INSERT INTO email([from],[to],subject,body) VALUES('vince.kaminski@enron.com', 'jhh1@email.msn.com', 'Re: Light reading - see pieces beginning on page 7', 'John,

I saw it. Very interesting.

Vince

"John H Herbert" <jhh1@email.msn.com> on 07/28/2000 08:38:08 AM
To: "Vince J Kaminski" <Vince_J_Kaminski@enron.com>

cc:
Subject: Light reading - see pieces beginning on page 7

Cheers and have a nice weekend,

JHHerbert

- gd000728.pdf

');
INSERT INTO email([from],[to],subject,body) VALUES('matthew.lenhart@enron.com',
'mmmarcantel@equiva.com', 'RE:', 'i will try to line up a pig for you ');
INSERT INTO email([from],[to],subject,body)
VALUES('jae.black@enron.com', 'claudette.harvey@enron.com, chaun.roberts@enron.com,
judy.martinez@enron.com,', 'Disaster Recovery Equipment', 'As a reminder...there are several pieces of equipment that are set up on the 30th Floor, as well as on our floor, for the Disaster Recovery Team. PLEASE DO NOT TAKE, BORROW OR USE this equipment. Should you need to use another computer system, other than yours, or make conference calls please work with your Assistant to help find or set up equipment for you to use.

Thanks for your understanding in this matter.

T.Jae Black
East Power Trading
Assistant to Kevin Presto
off. 713-853-5800
fax 713-646-8272
cell 713-539-4760');
INSERT INTO email([from],[to],subject,body) VALUES('eric.bass@enron.com', 'dale.neuner@enron.com', '5 X 24', 'Dale,

Have you heard anything more on the 5 X 24s? We would like to get this
product out ASAP.

Thanks,

Eric');
INSERT INTO email([from],[to],subject,body) VALUES('messenger@smartreminders.com',
'm..tholt@enron.com', '10% Coupon - PrintPal Printer Cartridges - 100% Guaranteed', '[IMAGE]
[IMAGE][IMAGE][IMAGE]
Dear SmartReminders Member,

[IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE] [IMAGE]

We respect your privacy and are a Certified Participant of the BBBOnLine
Privacy Program. To be removed from future offers,click here.
SmartReminders.com is a permission based service. To unsubscribe click here . ');
INSERT INTO email([from],[to],subject,body) VALUES('benjamin.rogers@enron.com',
'mark.bernstein@enron.com', '', 'The guy you are talking about left CIN under a ''cloud of suspicion'' sort of
speak. He was the one who got into several bad deals and PPA''s in California
for CIN, thus he left on a bad note. Let me know if you need more detail
than that, I felt this was the type of info you were looking for. Thanks!
Ben');
INSERT INTO email([from],[to],subject,body)
VALUES('enron_update@concureworkplace.com', 'michelle.cash@enron.com', 'Expense Report Receipts Not
Received', 'Employee Name: Michelle Cash
Report Name: Houston Cellular 8-11-01
Report Date: 12/13/01
Report ID: 594D37C9ED2111D5B452
Submitted On: 12/13/01

You are only allowed 2 reports with receipts outstanding. Your expense reports will not be paid until you meet this
requirement.');
INSERT INTO email([from],[to],subject,body) VALUES('susan.mara@enron.com', 'ray.alvarez@enron.com,
mark.palmer@enron.com, karen.denne@enron.com,', 'CAISO Emergency Motion -- to discontinue market-based
rates for', 'FYI. the latest broadside against the generators.

Sue Mara
Enron Corp.
Tel: (415) 782-7802

Fax:(415) 782-7854
----- Forwarded by Susan J Mara/NA/Enron on 06/08/2001 12:24 PM -----

"Milner, Marcie" <MMilner@coral-energy.com> 06/08/2001 11:13 AM To: ""smara@enron.com"" <smara@enron.com> cc: Subject: CAISO Emergency Motion

Sue, did you see this emergency motion
the CAISO filed today? Apparently
they are requesting that FERC discontinue market-based rates immediately and
grant refunds plus interest on the difference between cost-based rates and
market revenues received back to May 2000. They are requesting the
commission act within 14 days. Have you heard anything about what they are
doing?

Marcie

http://www.caiso.com/docs/2001/06/08/200106081005526469.pdf
');
INSERT INTO email([from],[to],subject,body) VALUES('fletcher.sturm@enron.com', 'eloy.escobar@enron.com',
'Re: General Brinks Position Meeting', 'Eloy,

Who is General Brinks?

Fletch');
INSERT INTO email([from],[to],subject,body) VALUES('nailia.dindarova@enron.com',
'richard.shapiro@enron.com', 'Documents for Mark Frevert (on EU developments and lessons from', 'Rick,

Here are the documents that Peter has prepared for Mark Frevert.

Nailia
---------- Forwarded by Nailia Dindarova/LON/ECT on 25/06/2001
16:36 ----------

Nailia Dindarova
25/06/2001 15:36
To:
Michael Brown/Enron@EUEnronXGate
cc: Ross Sankey/Enron@EUEnronXGate, Eric Shaw/ENRON@EUEnronXGate, Peter
Styles/LON/ECT@ECT

Subject: Documents for Mark Frevert (on EU developments and lessons from
California)

Michael,

These are the documents that Peter promised to give to you for Mark Frevert.
He has now handed them to him in person but asked me to transmit them
electronically to you, as well as Eric and Ross.

Nailia

');
INSERT INTO email([from],[to],subject,body) VALUES('peggy.a.kostial@accenture.com',
'dave.samuels@enron.com', 'EOL-Accenture Deal Sheet', 'Dave -

Attached are our comments and suggested changes. Please call to review.

On the time line for completion, we have four critical steps to complete:
Finalize market analysis to refine business case, specifically
projected revenue stream
Complete counterparty surveying, including targeting 3 CPs for letters
of intent
Review Enron asset base for potential reuse/ licensing
Contract
negotiations

Joe will come back to us with an updated time line, but it is my
expectation that we are still on the same schedule (we just begun week
three) with possibly a week or so slippage.....contract negotiations will
probably be the critical path.

We will send our cut at the actual time line here shortly. Thanks,

Peggy

(See attached file: accenture-dealpoints v2.doc)
- accenture-dealpoints v2.doc ');
INSERT INTO email([from],[to],subject,body) VALUES('thomas.martin@enron.com', 'thomas.martin@enron.com',
'Re: Guadalupe Power Partners LP', '---------------------- Forwarded by Thomas A Martin/HOU/ECT on 03/20/2001
03:49 PM ----------------------------

Thomas A Martin
10/11/2000 03:55 PM
To: Patrick Wade/HOU/ECT@ECT
cc:
Subject: Re: Guadalupe Power Partners LP

The deal is physically served at Oasis Waha or Oasis Katy and is priced at
either HSC, Waha or Katytailgate GD at buyers option three days prior to
NYMEX  close.

');
INSERT INTO email([from],[to],subject,body)
 VALUES('judy.townsend@enron.com', 'dan.junek@enron.com, chris.germany@enron.com', 'Columbia
Distribution"s Capacity Available for Release - Sum', '---------------------- Forwarded by Judy Townsend/HOU/ECT
on 03/09/2001 11:04
AM --------------------------



agoddard@nisource.com on 03/08/2001 09:16:57 AM
To: "  -  *Koch, Kent" <kkoch@nisource.com>, "  -
*Millar, Debra" <dmillar@nisource.com>, "  -  *Burke, Lynn"
<lburke@nisource.com>
cc: "  -  *Heckathorn, Tom" <theckathorn@nisource.com>
Subject: Columbia Distribution"s Capacity Available for Release - Sum



Attached is Columbia Distribution"s notice of capacity available for release
for
the summer of 2001 (Apr. 2001 through Oct. 2001).

Please note that the deadline for bids is 3:00pm EST on March 20, 2001.

If you have any questions, feel free to contact any of the representatives
listed
at the bottom of the attachment.

Aaron Goddard



- 2001Summer.doc
');
INSERT INTO
 email([from],[to],subject,body) VALUES('rhonda.denton@enron.com', 'tim.belden@enron.com,
dana.davis@enron.com, genia.fitzgerald@enron.com,', 'Split Rock Energy LLC', 'We have received the executed
EEI contract from this CP dated 12/12/2000.
Copies will be distributed to Legal and Credit.');
INSERT INTO email([from],[to],subject,body) VALUES('kerrymcelroy@dwt.com', 'jack.speer@alcoa.com,
crow@millernash.com, michaelearly@earthlink.net,', 'Oral Argument Request', ' - Oral Argument Request.doc');
INSERT INTO email([from],[to],subject,body) VALUES('mike.carson@enron.com', 'rlmichaelis@hormel.com', '',
'Did you come in town this wk end..... My new number at our house is :
713-668-3712..... my cell # is 281-381-7332

the kid');
INSERT INTO email([from],[to],subject,body) VALUES('cooper.richey@enron.com', 'trycooper@hotmail.com', 'FW: Contact Info', '

-----Original Message-----
From: Punja, Karim
Sent: Thursday, December 13, 2001 2:35 PM
To: Richey, Cooper
Subject: Contact Info

Cooper,

Its
been a real pleasure working with you (even though it was for only a small amount of time)
I hope we can stay in touch.

Home# 234-0249
email: kpunja@hotmail.com

Take Care,

Karim.
');
INSERT INTO email([from],[to],subject,body) VALUES('bjm30@earthlink.net', 'mcguinn.k@enron.com, mcguinn.ian@enron.com, mcguinn.stephen@enron.com,', 'email address change', 'Hello all.

I haven''t talked to many of you via email recently but I do want to give you
my new address for your email file:

bjm30@earthlink.net

I hope all is well.

Brian McGuinn');
INSERT INTO email([from],[to],subject,body) VALUES('shelley.corman@enron.com', 'steve.hotte@enron.com', 'Flat Panels', 'Can you please advise what is going on with the flat panels that we had planned to distribute to our gas logistics team. It was in the budget and we had the okay, but now I''m hearing there is some hold-up & the units are stored on 44.

Shelley');
INSERT INTO email([from],[to],subject,body) VALUES('sara.davidson@enron.com', 'john.schwartzenburg@enron.com, scott.dieball@enron.com, recipients@enron.com,', '2001 Enron Law Conference (Distribution List 2)', ' Enron Law Conference

San Antonio, Texas May 2-4, 2001 Westin Riverwalk

See attached memo for more details!!

? Registration for the law conference this year will be handled through an Online RSVP Form on the Enron Law Conference Website at http://lawconference.corp.enron.com. The website is still under construction and will not be available until Thursday, March 15, 2001.

? We will send you another e-mail to confirm when the Law Conference Website is operational.

? Please complete the Online RSVP Form as soon as it is available and submit it no later than Friday, March 30th.

');
INSERT INTO email([from],[to],subject,body) VALUES('tori.kuykendall@enron.com', 'heath.b.taylor@accenture.com', 'Re:', 'hey - thats funny about john - he definitely remembers him - i''ll call pat and let him know - we are
coming on saturday - i just havent had a chance to
call you guys back -- looking forward to it -- i probably need the
directions again though');
INSERT INTO email([from],[to],subject,body) VALUES('darron.giron@enron.com', 'bryce.baxter@enron.com', 'Re: Feedback for Audrey Cook', 'Bryce,

I''ll get it done today.

DG 3-9573

From: Bryce Baxter 06/12/2000 07:15 PM

To: Darron C Giron/HOU/ECT@ECT
cc:
Subject: Feedback for Audrey Cook

You were identified as a reviewer for Audrey Cook. If possible, could you complete her feedback by end of business Wednesday? It will really help me in the PRC process to have your input. Thanks.

');
INSERT INTO email([from],[to],subject,body) VALUES('casey.evans@enron.com', 'stephanie.sever@enron.com', 'Gas EOL ID', 'Stephanie,

In conjunction with the recent movement of several power traders, they are changing the names of their gas books as well. The names of the new gas books and traders are as follows:

PWR-NG-LT-SPP:
Mike Carson
PWR-NG-LT-SERC: Jeff King

If you need to know their power desk to map their ID to their gas books, those desks are as follows:

EPMI-LT-SPP: Mike Carson
EPMI-LT-SERC: Jeff King

I will be in training this afternoon, but will be back when class is over. Let me know if you have any questions.

Thanks for your help!
Casey');
INSERT INTO email([from],[to],subject,body) VALUES('darrell.schoolcraft@enron.com', 'david.roensch@enron.com, kimberly.watson@enron.com, michelle.lokay@enron.com,', 'Postings', 'Please see the attached.

ds

');
INSERT INTO email([from],[to],subject,body) VALUES('mcominsky@aol.com', 'cpatman@bracepatt.com, james_derrick@enron.com', 'Jurisprudence Luncheon', 'Carrin & Jim --

It was an honor and a pleasure to meet both of you yesterday. I know we will
have fun working together on this very special event.

Jeff left the jurisprudence luncheon lists for me before he left on vacation.
I wasn"t sure whether he transmitted them
to you as well. Would you please
advise me if you would like them sent to you? I can email the MS Excel files
or I can fax the hard copies to you. Please advise what is most convenient.

I plan to be in town through the holidays and can be reached by phone, email,
or cell phone at any time. My cell phone number is 713/705-4829.

Thanks again for your interest in the ADL"s work. Martin.

Martin B. Cominsky
Director, Southwest Region
Anti-Defamation League

713/627-3490, ext. 122
713/627-2011 (fax)
MCominsky@aol.com');
INSERT INTO email([from],[to],subject,body) VALUES('phillip.love@enron.com', 'todagost@utmb.edu, gbsonnta@utmb.edu', 'New President', 'I had a little bird put a word in my ear. Is there any possibility for Ben Raimer to be Bush''s secretary of HHS? Just curious about that infamous UTMB
rumor mill. Hope things are well, happy holidays.
PL');
INSERT INTO email([from],[to],subject,body) VALUES('marie.heard@enron.com', 'ehamilton@fna.com', 'ISDA Master Agreement',
'Erin:

Pursuant to your request, attached are the Schedule to the ISDA Master Agreement, together with Paragraph 13 to the ISDA Credit Support Annex. Please let me know if you need anything else. We look forward to hearing your comments.

Marie

Marie Heard
Senior Legal Specialist
Enron North America Corp.
Phone: (713) 853-3907
Fax: (713) 646-3490
marie.heard@enron.com

');
INSERT INTO email([from],[to],subject,body) VALUES('andrea.ring@enron.com', 'beverly.beaty@enron.com', 'Re: Tennessee Buy - Louis Dreyfus', 'Beverly - once again thanks so much for your help on this.

');
INSERT INTO email([from],[to],subject,body) VALUES('karolyn.criado@enron.com', 'j..bonin@enron.com, felicia.case@enron.com, b..clapp@enron.com,', 'Price List week of Oct. 8-9, 2001', '
Please contact me if you have any questions regarding last weeks prices.

Thank you,
Karolyn Criado
3-9441

');
INSERT INTO email([from],[to],subject,body)
VALUES('kevin.presto@enron.com', 'edward.baughman@enron.com, billy.braddock@enron.com', 'Associated', 'Please begin working on filling our Associated short position in 02. I would like to take this risk off the books.

In addition, please find out what a buy-out of VEPCO would cost us. With Rogers transitioning to run our retail risk management, I would like to clean up our customer positions.

We also need to continue to explore a JEA buy-out.

Thanks.');
INSERT INTO email([from],[to],subject,body) VALUES('stacy.dickson@enron.com', 'gregg.penman@enron.com', 'RE: Constellation TC 5-7-01', 'Gregg,

I am at home with a sick baby. (Lots of fun!) I will call you about this
tomorrow.

Stacy');
INSERT INTO email([from],[to],subject,body) VALUES('joe.quenet@enron.com', 'dfincher@utilicorp.com', '', 'hey big guy.....check this out.....

w ww.gorelieberman-2000.com/');
INSERT INTO email([from],[to],subject,body) VALUES('k..allen@enron.com', 'jacqestc@aol.com', '',
'Jacques,

I sent you a fax of Kevin Kolb''s comments on the release. The payoff on the note would be $36,248 ($36090(principal) + $158 (accrued interest)).
This is assuming we wrap this up on Tuesday.

Please email to confirm that their changes are ok so I can set up a meeting on Tuesday to reach closure.

Phillip');
INSERT INTO email([from],[to],subject,body) VALUES('kourtney.nelson@enron.com', 'mike.swerzbin@enron.com', 'Adjusted L/R Balance', 'Mike,

I placed the adjusted L/R Balance on the Enronwest site. It is under the "Staff/Kourtney Nelson". There are two links:

1) "Adj L_R" is the same data/format from the weekly strategy meeting.
2) "New Gen 2001_2002" link has all of the supply side info that is used to calculate the L/R balance
-Please note the Data Flag column, a value of "3" indicates the project was cancelled, on hold, etc and is not included in the calc.

Both of these sheets are interactive Excel spreadsheets and thus you can play around with the data as you please. Also, James Bruce is working to get his gen report on the web. That will help with your access to information on new gen.

Please let me know if you have any questions or feedback,

Kourtney

Kourtney Nelson
Fundamental Analysis
Enron North America
(503) 464-8280
kourtney.nelson@enron.com');
INSERT INTO email([from],[to],subject,body) VALUES('d..thomas@enron.com', 'naveed.ahmed@enron.com',
'FW: Current Enron TCC Portfolio', '

-----Original Message-----
From: Grace, Rebecca M.
Sent: Monday, December 17, 2001 9:44 AM
To: Thomas, Paul D.
Cc: Cashion, Jim; Allen, Thresa A.; May, Tom
Subject: RE: Current Enron TCC Portfolio

Paul,

I reviewed NY''s list.  I agree with all of their contracts numbers and mw amounts.

Call if you have any more questions.

Rebecca

-----Original Message-----
From:  Thomas, Paul D.
Sent: Monday, December 17, 2001 9:08 AM
To: Grace, Rebecca M.
Subject: FW: Current Enron TCC Portfolio

<< File: enrontccs.xls >>
Rebecca,
Let me know if
you see any differences.

Paul
X 3-0403
-----Original Message-----
From: Thomas, Paul D.
Sent: Monday, December 17, 2001 9:04 AM
To: Ahmed, Naveed
Subject: FW: Current Enron TCC Portfolio

-----Original Message-----
From: Thomas, Paul D.
Sent: Thursday, December 13, 2001 10:01 AM
To: Baughman, Edward D.
Subject: Current Enron TCC Portfolio

');
INSERT INTO email([from],[to],subject,body) VALUES('stephanie.panus@enron.com',
'william.bradford@enron.com, debbie.brackett@enron.com,', 'Coastal Merchant Energy/El Paso Merchant Energy',
'Coastal Merchant Energy, L.P. merged with and into El Paso Merchant Energy,
L.P., effective February 1, 2001, with the surviving entity being El Paso
Merchant Energy, L.P.  We currently have ISDA Master Agreements with both
counterparties.  Please see the attached memo regarding the existing Masters
and let us know which agreement should be terminated.

Thanks,
Stephanie
');
INSERT INTO email([from],[to],subject,body) VALUES('kam.keiser@enron.com',
 'c..kenne@enron.com', 'RE: What about this too???', '

-----Original Message-----
From:  Kenne, Dawn C.
Sent: Wednesday, February 06, 2002 11:50 AM
To: Keiser, Kam
Subject: What about this too???

<< File: Netco Trader Matrix.xls >>
');
INSERT INTO email([from],[to],subject,body) VALUES('chris.meyer@enron.com', 'joe.parks@enron.com',
'Centana', 'Talked to Chip.  We do need Cash Committe approval given the netting feature of your deal, which
means Batch Funding Request.  Please update per my previous e-mail and forward.

Thanks

chris
x31666');
INSERT INTO email([from],[to],subject,body) VALUES('debra.perlingiere@enron.com',
'jworman@academyofhealth.com', '', 'Have a great weekend!  Happy Fathers Day!

Debra Perlingiere
Enron North America Corp.
1400 Smith Street, EB 3885
Houston, Texas 77002
dperlin@enron.com

Phone 713-853-7658
Fax  713-646-3490');
INSERT INTO email([from],[to],subject,body) VALUES('outlook.team@enron.com', '', 'Demo by Martha Janousek of Dashboard & Pipeline
 Profile / Julia  &', 'CALENDAR ENTRY: APPOINTMENT

Description:
 Demo by Martha Janousek of Dashboard & Pipeline Profile / Julia  & Dir Rpts. - 4102

Date:  1/5/2001
Time:  9:00 AM - 10:00 AM (Central Standard Time)

Chairperson: Outlook Migration Team

Detailed Description:');
INSERT INTO email([from],[to],subject,body) VALUES('diana.seifert@enron.com', 'mark.taylor@enron.com', 'Guest access Chile', 'Hello Mark,

Justin Boyd told me that your can help me with questions regarding Chile.
We got a request for guest access through MG.
The company is called Escondida and is a subsidiary of BHP Australia.

Please advise if I can set up a guest account or not.
F.Y.I.: MG is planning to put a "in w/h Chile" contract for Copper on-line as
soon as Enron has done the due diligence for this country.
Thanks !

Best regards

Diana Seifert
EOL PCG');
INSERT INTO email([from],[to],subject,body) VALUES('enron_update@concureworkplace.com', 'mark.whitt@enron.com', '<<Concur Expense Document>> - 121001',
 'The Approval status has changed on the following report:

Status last changed by: Barry L. Tycholiz
Expense Report Name: 121001
Report Total: $198.98
Amount Due Employee: $198.98
Amount Approved: $198.98
Amount Paid: $0.00
Approval Status: Approved
Payment Status: Pending

To review this expense report, click on the following link for Concur Expense.
http://expensexms.enron.com');

INSERT INTO email([from],[to],subject,body) VALUES('kevin.hyatt@enron.com', '', 'Technical Support', 'Outside the U.S., please refer to the list below:

Australia:
1800 678-515
support@palm-au.com

Canada:
1905 305-6530
support@palm.com

New Zealand:
0800 446-398
support@palm-nz.com

U.K.:
0171 867 0108
eurosupport@palm.3com.com

Please refer to the Worldwide Customer Support card for a complete technical support contact list.');
INSERT INTO email([from],[to],subject,body) VALUES('geoff.storey@enron.com', 'dutch.quigley@enron.com', 'RE:', 'duke contact?

-----Original Message-----
From:  Quigley, Dutch

Sent: Wednesday, October 31, 2001 10:14 AM
To: Storey, Geoff
Subject: RE:

bp corp Albert LaMore 281-366-4962

running the reports now

-----Original Message-----
From:  Storey, Geoff
Sent: Wednesday, October 31, 2001 10:10 AM
To: Quigley, Dutch
Subject: RE:

give me a contact over there too
BP

-----Original Message-----
From:  Quigley, Dutch
Sent: Wednesday, October 31, 2001 9:42 AM

To: Storey, Geoff
Subject:

Coral Jeff Whitnah 713-767-5374
Relaint Steve McGinn 713-207-4000');
INSERT INTO email([from],[to],subject,body) VALUES('pete.davis@enron.com', 'pete.davis@enron.com', 'Start Date: 4/22/01; HourAhead hour: 3;  <CODESITE>', 'Start Date: 4/22/01; HourAhead hour: 3;  No ancillary schedules awarded.
Variances detected.
Variances detected in Load schedule.

  LOG MESSAGES:

PARSING FILE -->> O:\Portland\WestDesk\California Scheduling\ISO Final Schedules\2001042203.txt

---- Load Schedule ----
$$$ Variance found in table tblLoads.
   Details: (Hour: 3 / Preferred:
  1.92 / Final:   1.89)
 TRANS_TYPE: FINAL
 LOAD_ID: PGE4
 MKT_TYPE: 2
 TRANS_DATE: 4/22/01
 SC_ID: EPMI

');
INSERT INTO email([from],[to],subject,body) VALUES('john.postlethwaite@enron.com', 'john.zufferli@enron.com', 'Reference', 'John, hope things are going well up there for you. The big day is almost here for you and Jessica. I was wondering if I could use your name as a job reference if need be. I am just trying to get everything in order just in case something happens.

John');
INSERT INTO email([from],[to],subject,body) VALUES('jeffrey.shankman@enron.com', 'lschiffm@jonesday.com', 'Re:', 'I saw you called on the cell this a.m.  Sorry I missed you.  (I was in the shower).  I have had a shitty week--I suspect my silence (not only to you,
but others) after our phone call is a result of the week.  I"m seeing Glen at
11:15....talk to you');
INSERT INTO email([from],[to],subject,body) VALUES('litebytz@enron.com', '', 'Lite Bytz RSVP', '
This week"s Lite Bytz presentation
 will feature the following TOOLZ speaker:

Richard McDougall
Solaris 8
Thursday, June 7, 2001

If you have not already signed up, please RSVP via email to litebytz@enron.com by the end of the day Tuesday, June 5, 2001.

*Remember: this is now a Brown Bag Event--so bring your lunch and we will provide cookies and drinks.

Click below for more details.

http://home.enron.com:84/messaging/litebytztoolzprint.jpg');
  COMMIT;
 }
} {}

```
###########################################################################
# Everything above just builds an interesting test database.  The actual
# tests come after this comment.
###########################################################################

do_test fts2c-1.2 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark'
 }
} {6 17 25 38 40 42 73 74}
do_test fts2c-1.3 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'susan'
 }
} {24 40}
do_test fts2c-1.4 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark
 susan'
 }
} {40}
do_test fts2c-1.5 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'susan mark'
 }
} {40}
do_test fts2c-1.6 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH '"mark susan"'
 }
} {}
do_test fts2c-1.7 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark -susan'
 }
} {6 17 25 38 42 73 74}
do_test fts2c-1.8 {
 execsql {
```

```
  SELECT rowid FROM email WHERE email MATCH '-mark susan'
 }
} {24}
do_test fts2c-1.9 {
 execsql {
  SELECT rowid FROM email WHERE email MATCH 'mark OR susan'
 }
} {6 17 24 25 38 40 42 73 74}

# Some simple tests of the automatic "offsets(email)" column.  In the sample
# data set above, only one message, number 20, contains the words
# "gas" and "reminder" in both body and subject.
#
do_test fts2c-2.1 {
 execsql {
  SELECT rowid, offsets(email) FROM email
   WHERE email MATCH 'gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8 3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}
do_test fts2c-2.2 {
 execsql {

  SELECT rowid, offsets(email) FROM email
   WHERE email MATCH 'subject:gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8 3 1 54 8}}
do_test fts2c-2.3 {
 execsql {
  SELECT rowid, offsets(email) FROM email
   WHERE email MATCH 'body:gas reminder'
 }
} {20 {2 1 54 8 3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}
do_test fts2c-2.4 {
 execsql {
  SELECT rowid, offsets(email) FROM email
   WHERE subject MATCH 'gas reminder'
 }
} {20 {2 0 42 3 2 1 54 8}}
do_test fts2c-2.5 {
 execsql {
  SELECT rowid, offsets(email) FROM email
   WHERE body MATCH 'gas reminder'
 }
} {20 {3 0 42 3 3 1 54 8 3 0 129 3 3 0 143 3 3 0 240 3}}

# Document 32 contains 5 instances of the world "child".  But only
# 3 of them are paired with "product".  Make sure only those instances
# that match the phrase appear in the offsets(email) list.
```

```
#
do_test fts2c-3.1 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE body MATCH 'child product' AND +rowid=32
 }
} {32 {3 0 94 5 3 0 114 5 3 0
 207 5 3 1 213 7 3 0 245 5 3 1 251 7 3 0 409 5 3 1 415 7 3 1 493 7}}
do_test fts2c-3.2 {
 execsql {
   SELECT rowid, offsets(email) FROM email
    WHERE body MATCH '"child product"'
 }
} {32 {3 0 207 5 3 1 213 7 3 0 245 5 3 1 251 7 3 0 409 5 3 1 415 7}}

# Snippet generator tests
#
do_test fts2c-4.1 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'subject:gas reminder'
 }
} {{Alert Posted 10:00 AM November 20,2000: E-<b>GAS</b> Request <b>Reminder</b>}}
do_test fts2c-4.2 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'christmas candlelight'
 }
} {{<b>...</b> place.? What do you think about going here <b>Christmas</b>
eve?? They have an 11:00 a.m. service and a <b>candlelight</b> service at 5:00 p.m.,
among others. <b>...</b>}}

do_test fts2c-4.3 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'deal sheet potential reuse'
 }
} {{EOL-Accenture <b>Deal</b> <b>Sheet</b> <b>...</b> intent
    Review Enron
 asset base for <b>potential</b> <b>reuse</b>/ licensing
    Contract negotiations <b>...</b>}}
do_test fts2c-4.4 {
 execsql {
   SELECT snippet(email,'<<<','>>>',' ') FROM email
    WHERE email MATCH 'deal sheet potential reuse'
 }
} {{EOL-Accenture <<<Deal>>> <<<Sheet>>>  intent
    Review Enron asset base for <<<potential>>> <<<reuse>>>/ licensing
```

```
   Contract negotiations  }}
do_test fts2c-4.5 {
 execsql {
   SELECT snippet(email,'<<<','>>>',' ') FROM email
    WHERE email MATCH 'first things'
 }
} {{Re: <<<First>>> Polish Deal!  Congrats!  <<<Things>>> seem to be building rapidly now on the  }}
do_test fts2c-4.6 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'chris is here'
 }
} {{<b>chris</b>.germany@enron.com <b>...</b> Sounds good to me.  I bet this <b>is</b> next to the Warick??
Hotel. <b>...</b> place.? What do you think about going <b>here</b> Christmas
eve?? They have an 11:00 a.m. <b>...</b>}}
do_test fts2c-4.7 {
 execsql {
   SELECT
 snippet(email) FROM email
    WHERE email MATCH '"pursuant to"'
 }
} {{Erin:

<b>Pursuant</b> <b>to</b> your request, attached are the Schedule to <b>...</b>}}
do_test fts2c-4.8 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'ancillary load davis'
 }
} {{pete.<b>davis</b>@enron.com <b>...</b> Start Date: 4/22/01; HourAhead hour: 3;  No <b>ancillary</b>
schedules awarded.
Variances detected.
Variances detected in <b>Load</b> schedule.

   LOG MESSAGES:

PARSING <b>...</b>}}

# Combinations of AND and OR operators:
#
do_test fts2c-5.1 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'questar enron OR com'
 }
} {{matt.smith@<b>enron</b>.<b>com</b> <b>...</b> six reports:

31 Keystone Receipts
```

```
15 <b>Questar</b> Pipeline
40 Rockies Production
22 West_2 <b>...</b>}}
do_test fts2c-5.2 {
 execsql {
   SELECT snippet(email) FROM email
    WHERE email MATCH 'enron OR com questar'
 }
} {{matt.smith@<b>enron</b>.<b>com</b> <b>...</b>
 six reports:

31 Keystone Receipts
15 <b>Questar</b> Pipeline
40 Rockies Production
22 West_2 <b>...</b>}}

finish_test

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/test/fts2c.test
No license file was found, but licenses were detected in source scan.

%define name sqlite
%define version SQLITE_VERSION
%define release 1

Name: %{name}
Summary: SQLite is a C library that implements an embeddable SQL database engine
Version: %{version}
Release: %{release}
Source: %{name}-%{version}.tar.gz
Group: System/Libraries
URL: http://www.hwaci.com/sw/sqlite/
License: Public Domain
BuildRoot: %{_tmppath}/%{name}-%{version}-root

%description
SQLite is a C library that implements an embeddable SQL database engine.
Programs that link with the SQLite library can have SQL database access
without running a separate RDBMS process. The distribution comes with a
standalone command-line access program (sqlite) that can be used to
administer an SQLite database and which serves as an example of how to
use the SQLite library.

%package -n %{name}-devel
Summary: Header files and libraries for developing apps which will use sqlite
Group: Development/C
Requires: %{name} = %{version}-%{release}
```

```
%description
 -n %{name}-devel
The sqlite-devel package contains the header files and libraries needed
to develop programs that use the sqlite database library.

%prep
%setup -q -n %{name}

%build
CFLAGS="%optflags -DNDEBUG=1" CXXFLAGS="%optflags -DNDEBUG=1" ./configure --prefix=%{_prefix}

make
make doc

%install
install -d $RPM_BUILD_ROOT/%{_prefix}
install -d $RPM_BUILD_ROOT/%{_prefix}/bin
install -d $RPM_BUILD_ROOT/%{_prefix}/include
install -d $RPM_BUILD_ROOT/%{_prefix}/lib
make install prefix=$RPM_BUILD_ROOT/%{_prefix}

%clean
rm -fr $RPM_BUILD_ROOT

%files
%defattr(-, root, root)
%{_libdir}/*.so*
%{_bindir}/*

%files -n %{name}-devel
%defattr(-, root, root)
%{_libdir}/pkgconfig/sqlite3.pc
%{_libdir}/*.a
%{_libdir}/*.la
%{_includedir}/*
%doc doc/*
```

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/spec.template
No license file was found, but licenses were detected in source scan.

<li>Sources are in the <a href="copyright.html">public domain</a>.

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/index.tcl
No license file was found, but licenses were detected in source scan.

feature license {Public domain} {
The source code for SQLite is in the public domain.  No claim of copyright

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/www/different.tcl
No license file was found, but licenses were detected in source scan.

```
/*
** The "printf" code that follows dates from the 1980's.  It is in
** the public domain.  The original comments are included here for
** completeness.  They are very out-of-date but might be useful as
** an historical reference.  Most of the "enhancements" have been backed
** out so that the functionality is now the same as standard printf().
**
**************************************************************************
**
** The following modules is an enhanced replacement for the "printf" subroutines
** found in the standard C library.  The following enhancements are
** supported:
**
**      +  Additional functions.  The standard set of "printf" functions
**         includes printf, fprintf, sprintf, vprintf, vfprintf, and
**         vsprintf.  This module adds the following:
**
**           *  snprintf -- Works like sprintf, but has an extra argument
**                          which is the size of the buffer written
 to.
**
**           *  mprintf --  Similar to sprintf.  Writes output to memory
**                          obtained from malloc.
**
**           *  xprintf --  Calls a function to dispose of output.
**
**           *  nprintf --  No output, but returns the number of characters
**                          that would have been output by printf.
**
**           *  A v- version (ex: vsnprintf) of every function is also
**              supplied.
**
**      +  A few extensions to the formatting notation are supported:
**
**           *  The "=" flag (similar to "-") causes the output to be
**              be centered in the appropriately sized field.
**
**           *  The %b field outputs an integer in binary notation.
**
**           *  The %c field now accepts a precision.  The character output
**              is repeated by the number of times the precision specifies.
```

```
**
**          *  The %' field works like %c, but takes as its character the
**             next character of the
 format string, instead of the next
**             argument.  For example,  printf("%.78'-")  prints 78 minus
**             signs, the same as  printf("%.78c",'-').
**
**     +  When compiled using GCC on a SPARC, this version of printf is
**        faster than the library printf for SUN OS 4.1.
**
**     +  All functions are fully reentrant.
**
*/
```

Found in path(s):
* /opt/cola/permits/1332727043_1653392698.341362/0/sqlite-3-3-17-tar-gz/sqlite-3.3.17/src/printf.c
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</body>
</html>

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# 1.139 libnsl 2.24

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```
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  Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
  This is free software, and you are welcome to redistribute it
  under certain conditions; type `show c' for details.
```

The hypothetical commands `show w' and
`show c' should show the appropriate
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necessary.  Here is a sample; alter the names:

```
 Yoyodyne, Inc., hereby disclaims all copyright interest in the program
 `Gnomovision' (which makes passes at compilers) written by James Hacker.

 <signature of Ty Coon>, 1 April 1989
 Ty Coon, President of Vice
```

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# 1.141 vim 7.3

## 1.141.1 Available under license :

*uganda.txt*    For Vim version 7.3.  Last change: 2010 Aug 07

```
   VIM REFERENCE MANUAL    by Bram Moolenaar
```

```
  *uganda* *Uganda* *copying* *copyright* *license*
SUMMARY
      *iccf* *ICCF*
```

Vim is Charityware.  You can use and copy it as much as you like, but you are
encouraged to make a donation for needy children in Uganda.  Please see |kcc|

below or visit the ICCF web site, available at these URLs:

http://iccf-holland.org/
http://www.vim.org/iccf/
http://www.iccf.nl/

You can also sponsor the development of Vim. Vim sponsors can vote for features. See |sponsor|. The money goes to Uganda anyway.

The Open Publication License applies to the Vim documentation, see |manual-copyright|.

=== begin of license ===

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b) If you have received a modified Vim that was distributed as mentioned under a) you are allowed to further distribute it unmodified, as mentioned at I). If you make additional changes the

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- You keep the changes for at least three years after last distributing the corresponding modified Vim. When the maintainer or someone who you distributed the modified Vim to asks you (in any way) for the changes within this period, you must make them available to him.
- You clearly describe in the distribution how to contact you. This contact information must remain valid for at least three years after last distributing the corresponding modified Vim, or as long as possible.

e) When the GNU General Public License (GPL) applies to the changes, you can distribute the modified Vim under the GNU GPL version 2 or any later version.

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4) The contact information as required under 2)a) and 2)d) must not be removed or changed, except that the person himself can make corrections.

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If the number of changes is small (e.g., a modified Makefile) e-mailing a context diff will do. The e-mail address to be used is <maintainer@vim.org>

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=== end of license ===

Note:

- If you are happy with Vim, please express that by reading the rest of this file and consider helping needy children in Uganda.

- If you want to support further Vim development consider becoming a |sponsor|. The money goes to Uganda anyway.

- According to Richard Stallman the Vim license is GNU GPL compatible. A few minor changes have been made since he checked it, but that should not make a difference.

- If you link Vim with a library that goes under the GNU GPL, this limits further
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- Once a change is included that goes under the GNU GPL, this forces all further changes to also be made under the GNU GPL or a compatible license.

- If you distribute a modified version of Vim, you can include your name and contact information with the "--with-modified-by" configure argument or the MODIFIED_BY define.

==============================================================================

Kibaale Children's Centre *kcc* *Kibaale* *charity*

Kibaale Children's Centre (KCC) is located in Kibaale, a small town in the south of Uganda, near Tanzania, in East Africa. The area is known as Rakai District. The population is mostly farmers. Although people are poor, there is enough food. But this district is suffering from AIDS more than any other part of the world. Some say that it started there. Estimations are that 10 to 30% of the Ugandans are infected with HIV. Because parents die, there are
many orphans. In this district about 60,000 children have lost one or both parents, out of a population of 350,000. And this is still continuing.

The children need a lot of help. The KCC is working hard to provide the needy with food, medical care and education. Food and medical care to keep them healthy now, and education so that they can take care of themselves in the future. KCC works on a Christian base, but help is given to children of any religion.

The key to solving the problems in this area is education. This has been

neglected in the past years with president Idi Amin and the following civil wars. Now that the government is stable again, the children and parents have to learn how to take care of themselves and how to avoid infections. There is also help for people who are ill and hungry, but the primary goal is to prevent people from getting ill and to teach them how to grow healthy food.

Most of the orphans are living in an extended family. An uncle or older sister is taking care of them. Because these families are big and the income (if any) is low, a child is lucky if it gets healthy food. Clothes, medical care and schooling is beyond its reach. To help these needy children, a sponsorship program was put into place. A child can be financially adopted. For a few dollars a month KCC sees to it that the child gets indispensable items, is healthy, goes to school and KCC takes care of anything else that needs to be done for the child and the family that supports it.

Besides helping the child directly, the environment where the child grows up needs to be improved. KCC helps schools to improve their teaching methods. There is a demonstration school at the centre and teacher trainings are given. Health workers are being trained, hygiene education is carried out and households are stimulated to build a proper latrine. I helped setting up a production site for cement slabs. These are used to build a good latrine. They are sold below cost price.

There is a small clinic at the project, which provides children and their family with medical help. When needed, transport to a hospital is offered. Immunization programs are carried out and help is provided when an epidemic is breaking out (measles and cholera have been a problem).

*donate*

Summer 1994 to summer 1995 I spent a whole year at the centre, working as a volunteer. I have helped to expand the centre and worked in the area of water and sanitation. I learned that the help that the KCC provides really helps. When I came back to Holland, I wanted to continue supporting KCC. To do this I'm raising funds and organizing the sponsorship program. Please consider one of these possibilities:

1. Sponsor a child in primary school: 17 euro a month (or more).
2. Sponsor a child in secondary school: 25 euro a month (or more).
3. Sponsor the clinic: Any amount a month or quarter
4. A one-time donation

Compared with other organizations that do child sponsorship the amounts are very low. This is because the money goes directly to the centre. Less than 5% is used for administration. This is possible because this is a small organization that works with volunteers. If you would like to sponsor a child, you should have the intention to do this for at least one year.

How do you know that the money will be spent right? First of all you have my
personal guarantee as the author of Vim. I trust the people that are working
at the centre, I know them personally. Further more, the centre has been
co-sponsored and inspected by World Vision, Save the Children Fund and is now
under the supervision of Pacific Academy Outreach Society. The centre is
visited about once a year to check the progress (at our own cost). I have
visited the centre myself many times, starting in 1993. The visit reports are
on the ICCF web site.

If you have any further questions, send me e-mail: <Bram@vim.org>.

The address of the centre is:
Kibaale Children's Centre
p.o.
box 1658
Masaka, Uganda, East Africa

Sending money: *iccf-donations*

Check the ICCF web site for the latest information! See |iccf| for the URL.

USA: The methods mentioned below can be used.
Sending a check to the Nehemiah Group Outreach Society (NGOS)
is no longer possible, unfortunately. We are looking for
another way to get you an IRS tax receipt.
For sponsoring a child contact KCF in Canada (see below). US
checks can be sent to them to lower banking costs.

Canada: Contact Kibaale Children's Fund (KCF) in Surrey, Canada. They
take care of the Canadian sponsors for the children in
Kibaale. KCF forwards 100% of the money to the project in
Uganda. You can send them a one time donation directly.
Please send me a note so that I know what has been donated
because of Vim. Ask KCF for information about sponsorship.
Kibaale Children's Fund c/o Pacific Academy
10238-168 Street
Surrey, B.C. V4N 1Z4
Canada
Phone: 604-581-5353
If
you make a donation to Kibaale Children's Fund (KCF) you
will receive a tax receipt which can be submitted with your
tax return.

Holland: Transfer to the account of "Stichting ICCF Holland" in Lisse.
This will allow for tax deduction if you live in Holland.

Postbank, nr. 4548774

Germany: It is possible to make donations that allow for a tax return.
Check the ICCF web site for the latest information:
http://iccf-holland.org/germany.html

World: Use a postal money order. That should be possible from any country, mostly from the post office. Use this name (which is in my passport): "Abraham Moolenaar". Use Euro for the currency if possible.

Europe: Use a bank transfer if possible. Your bank should have a form that you can use for this. See "Others" below for the swift code and IBAN number.
Any other method should work. Ask for information about sponsorship.

Credit Card: You can use PayPal to send money with a Credit card. This is the most widely
used Internet based payment system. It's
really simple to use. Use this link to find more info:
https://www.paypal.com/en_US/mrb/pal=XAC62PML3GF8Q
The e-mail address for sending the money to is:
Bram@iccf-holland.org
For amounts above 400 Euro ($500) sending a check is preferred.

Others: Transfer to one of these accounts if possible:
Postbank, account 4548774
Swift code: INGB NL 2A
IBAN: NL47 PSTB 0004 5487 74
under the name "stichting ICCF Holland", Lisse
If that doesn't work:
Rabobank Lisse, account 3765.05.117
Swift code: RABO NL 2U
under the name "Bram Moolenaar", Lisse
Otherwise, send a check in euro or US dollars to the address below. Minimal amount: $70 (my bank does not accept smaller amounts for foreign check, sorry)

Address to send checks to:
stichting ICCF Holland
Bram Moolenaar
Finsterruetihof 1
8134 Adliswil
Switzerland

This address is expected to be valid for a long time.

vim:tw=78:ts=8:ft=help:norl:

# 1.142 lsof 4.83

## 1.142.1 Available under license :

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write to the Free Software Foundation, Inc., 59 Temple Place - Suite 330,
Boston, MA 02111-1307, USA.  */

Found in path(s):
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/lib/regex.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/lib/regex.c
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*/
```

Found in path(s):
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-

tar/lsof_4.83_src/dialects/freebsd/dnode2.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/util.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/freebsd/dzfs.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/freebsd/dzfs.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/freebsd/dnode2.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/util.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/sun/ddev.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/kmem/dsock.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/du/dlsof.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/kmem/machine.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/hpux/kmem/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/freebsd/dlsof.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/aix/machine.h
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/sun/dstore.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/hpux/kmem/dmnt.c
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*

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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/aix/dsock.c
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*
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/du/dnode.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/proto.h
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tar/lsof_4.83_src/dialects/sun/dlsof.h
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*
/opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/hpux/kmem/machine.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/sun/dproto.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/darwin/kmem/dproto.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/n+obsd/dlsof.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/du/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/proc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/aix/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/n+os/dlsof.h
*
/opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/sun/dsock.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/node.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/sun/machine.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/n+obsd/dproto.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/sun/ddev.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/n+os/dnode.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/aix/ddev.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/sun/machine.h
*

/opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/sun/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/hpux/kmem/dsock.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/n+obsd/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/aix/dproto.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/du/dproto.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/du/machine.h
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/n+obsd/dproc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/misc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/n+obsd/dnode.c
*
/opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/du/dproc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/aix/dproc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/n+os/dproc.c
No license file was found, but licenses were detected in source scan.

/*
* Copyright 2002 Purdue Research Foundation, West Lafayette, Indiana
* 47907.  All rights reserved.
*
* Written by V. Abell.
*
* This software is not subject to any license of the American Telephone
* and Telegraph Company or the Regents of the University of California.
*
* Permission is granted to anyone to use this software for any purpose on
* any computer system, and to alter it and redistribute it freely, subject
* to the following restrictions:
*
* 1. Neither the authors nor Purdue University are responsible for any
*    consequences of the use of this software.
*
* 2. The origin of this software must not be misrepresented, either by
*    explicit claim or by omission.  Credit to the authors and Purdue
*    University must appear in documentation and sources.
*
* 3. Altered versions must be plainly marked as such, and must not be
*    misrepresented as being the original software.
*
*
4. This notice may not be removed or altered.
*/
/*

```
     * If this is a regular file with a non-numeric FD, it may be the
     * executable.
     */
```

Found in path(s):
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/tests/LTbasic.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/tests/LTbasic.c
No license file was found, but licenses were detected in source scan.

Notes for the distribution of lsof version 4

```
**************************************************************************
| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu.  Look in pub/tools/unix/lsof.         |
**************************************************************************
```

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4.39, December 29, 1998
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4.41, February 27, 1999
4.42, March 30, 1999
4.43, May 11, 1999
4.44, June 24, 1999
4.45, July 30, 1999
4.46,
October 23, 1999
4.47, November 29, 1999
4.48, January 14, 2000
4.49, April 3, 2000
4.50, June 29, 2000
4.51, August 21, 2000
4.52, November 8, 2000
4.53, December 6, 2000
4.54, January 19, 2001

4.55, February 15, 2001
4.56, May 3, 2001
4.57, July 19, 2001
4.58, September 13, 2001
4.59, October 20, 2001
4.60, November 9, 2001
4.61, January 22, 2002
4.62, March 7, 2002
4.63, April 23, 2002
4.64, June 26, 2002
4.65, October 10, 2002
4.66, December 22, 2002
4.67, March 27, 2003
4.68, June 18, 2003
4.69, October 16, 2003
4.70, January 16, 2004
4.71, March 11, 2004
4.72, July 13, 2004
4.73, October 21, 2004
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4.75, May 16, 2005
4.76, August 30, 2005
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4.79, April 15, 2008
4.80, May 12, 2008
4.81, October 21, 2008
4.82, March 25, 2009
4.83, January 18, 2010

Dialects Supported
==========

Lsof (for LiSt Open Files) lists files opened by processes on selected
Unix systems. Version 4 is a source reorganization of version 3, itself a major revision of version 2. Version 4 has been tested on:

AIX 5.3
Apple Darwin 9 (Mac OS X 10.5)
FreeBSD 4.9 for x86-based systems
FreeBSD 7.[012], 8.0 and 9.0 for AMD64-based systems
Linux 2.1.72 and above for x86-based systems
Solaris 9, 10 and 11

(The pub/tools/unix/lsof/contrib directory on lsof.itap.purdue.edu

contains information on other ports.)

If your favorite Unix dialect is not in the list, or if your version
of it is more recent than the ones listed, please contact me at
<abe@purdue.edu>.

Version 3 of lsof was tested on:

 AIX 3.2.5, 4.1[.[1234]], and 4.2
 BSDI BSD/OS 2.0, 2.0.1, and 2.1 for x86-based systems
 DC/OSx 1.1 for Pyramid systems
 Digital UNIX (DEC OSF/1) 2.0, 3.0, 3.2, and 4.0
 EP/IX 2.1.1 for the CDC 4680
 FreeBSD 1.1.5.1, 2.0, 2.0.5, 2.1, 2.1.5 for x86-based
  systems
 HP-UX 8.x, 9.x, 10.01, 10.10, and 10.20
 IRIX 5.2, 5.3, 6.0, 6.0.1, and 6.[124]
 Linux through 2.0.27
 for x86-based systems
 NetBSD 1.0, 1.1, and 1.2 for x86 and SPARC-based
  systems
 NEXTSTEP 2.1 and 3.[0123]
 OpenBSD 1.2 and 2.0 for x86-based systems
 Reliant UNIX 5.43 for Pyramid systems
 RISC/os 4.52 for MIPS R2000-based systems
 SCO OpenServer Release 1.1, 3.0, and 5.0.x for x86-based
  systems
 SCO UnixWare 2.1 and 2.1.1 for x86-based systems
 Sequent PTX 2.1.[1569], 4.0.[23], 4.1.[024], 4.2[.1],
  and 4.3
 Solaris 2.[12345], 2.5.1, and 2.6-Beta
 SunOS 4.1.x
 Ultrix 4.2, 4.3, 4.4, and 4.5

Version 3 and its predecessor, version 2, may be found at:

 ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD

How Lsof Works
==============

Using available kernel data access methods -- getproc(), getuser(),
kvm_*(), nlist(), pstat(), read(), readx(), /proc -- lsof reads
process table entries, task table entries, user areas and file
pointers to reach the underlying structures that describe files
opened by processes.

Lsof interprets most file node structures -- advfsnodes, autonodes, cnodes,
 cdrnodes, devnodes, fifonodes, gnodes, hsnodes, inodes, mfsnodes, pcnodes, procnodes, rnodes, snodes, specnodes, s5inodes, tmpnodes.  It understands NFS connections.  It recognizes FIFOs, multiplexed files, Unix and Internet sockets.  It knows about streams.  It understands /proc file systems for some dialects.  On many dialects it recognizes execution text and library references. It knows about AFS on some Unix dialects.

Lsof Output
==========

The lsof output describes:

  * the identification number of the process (PID) that has opened the file;

  * the process group identification number (PGID) of the process (optional);

  * the process identification number of the parent process (PPID) (optional);

  * the command the process is executing;

  * the owner of the process;

  * for all files in use by the process, including the executing text file and the shared libraries it is using:

    * the file descriptor number of the file, if applicable;

    * the file's access mode;

    * the file's lock status;

    * the file's device numbers;

    * the file's inode number;

    * the file's size or offset;

    * the name of the file system containing the file;

    * any available components of the file's path name;

* the names of the file's stream components;

* the file's local and remote network addresses;

* the TLI network (typically UDP) state of the file;

* the TCP state, read queue length, and write queue length of the file;

* the file's TCP window read and write lengths (Solaris only);

* other file or dialect-specific values.

## Getting Started Quickly

If you want to get started using lsof quickly, or see some examples of how lsof can be used, consult the 00QUICKSTART file of the lsof distribution.

The 00QUICKSTART file won't help you build or install lsof, but it will cut through the density of the lsof man page, giving you more readily an idea of what you can do with lsof.

For information on building and installing lsof, consult the 00README file of the lsof distribution.

## Limiting, Filtering, and Selecting Lsof Output

Lsof accepts options to limit, filter, and select its output. These are the possible criteria:

* Process ID (PID) number -- to list the open files for a given process;

* Process Group ID (PGID) -- to list the open files for all the processes of a given process group;

* User ID number or login name -- to list the open files for all the processes of a given user;

* Internet address -- to list the open files using a given

Internet address (host name), protocol, or port (number or name); or to list all open Internet files;

* command name;

* file descriptor name or number;

* list all open NFS files;

* list all open Unix domain socket files;

* list all uses of a specific file;

* list all open files on a file system.

Selection options are normally ORed -- i.e., an open file meeting any of the criteria is listed. The selection options may be ANDed so that an open file will be listed only if it meets all the criteria.

In the absence of any selection criteria, lsof lists files open to all processes.

## Parsing Lsof Output with Another Program

The lsof -F option directs it to produce "field" output that can easily be parsed by another program. The lsof distribution contains sample awk, perl 4, and perl 5 scripts in its scripts subdirectory that show how to post-process field output.

## Repeat Mode

Lsof can be directed to produce output, delay for a specified time, then repeat the output, cycling until stopped by an interrupt or quit signal. This mode is useful for monitoring the status of some file operation -- e.g., an ftp transfer or a tape backup operation.

Repeat mode is more efficient when combined with lsof's selection options, since they limit lsof overhead.

It's possible to use lsof's field output options to supply repeat mode output to another process for its manipulation. The scripts subdirectory of the lsof distribution has sample Perl scripts

showing how to consume lsof repeat mode output from a pipe.

Distribution Restrictions
==========

Lsof may be used and distributed freely, subject to these limitations:

1. Neither the author nor Purdue University is responsible for
any consequences of the use of this software.

2. The origin of this software must not be misrepresented, either
by explicit claim or by omission. Credit to the author and
Purdue University must appear in documentation and sources.

3. Altered versions must be plainly marked as such, and must not
be misrepresented as being the original software.

4. This notice may not be removed from or altered in the lsof source
files.

Cautions
========

Lsof is a tool that is
closely tied to the Unix operating system
version. It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER.

On some Unix dialects, notably SunOS and Solaris, lsof versions
may be even more restricted by architecture type. An lsof binary,
compiled for SunOS 4.1.3 on a sun4c machine, for example, won't
work on a sun4m machine.

AN LSOF BINARY, COMPILED FOR ONE SOLARIS 1.X ARCHITECTURE, ISN'T
GUARANTEED TO WORK ON A DIFFERENT SOLARIS 1.X ARCHITECTURE.

Distribution Contents
==========

The lsof distribution is checked for completeness when it is
constructed and by the Inventory script when you run the Configure

script.  (See The Inventory Script section of the 00README file of this distribution.)

Lsof is organized in these parts:

  *  The main lsof directory, containing common sources, configuration and setup
scripts and three subdirectories:
     dialects/, lib/, and scripts/.

     Lsof is compiled in the main lsof directory after configuration. The selected dialect sources are copied or linked from the specified subdirectory.  (Symbolic linking is the standard method.)

     Common lsof definitions may be found in lsof.h; common function prototypes, proto.h; and common storage, store.c.

  *  The dialects/ subdirectory contains subdirectories with sources specific to UNIX dialect implementations -- e.g., the dialects/sun/ subdirectory contains sources for the SunOS (Solaris 1.x) and Solaris (2.x) implementations of lsof.  The dialects subdirectories also contain Makefiles and scripts for assisting dialect source configuration.

     Dialect configuration definitions may be found in dlsof.h; other dialect definitions, dlsof.h; dialect prototypes, dproto.h; and dialect storage, dstore.c.

  *  The lib/
subdirectory contains sources for common lsof
     functions.  Not all dialects use the functions -- some have their own versions of them.  The lib/ functions are enabled and customized with #define's in the dialect machine.h header files.

  *  The scripts/ subdirectory contains sample scripts for processing lsof field (-F) output.  The scripts are written in AWK, Perl 4, and Perl 5.

The 00PORTING file of the lsof distribution has more information on lsof components, configuration, and construction.

Warranty
========

Lsof is provided as-is without any warranty of any kind, either

expressed or implied, including, but not limited to, the implied
warranties of merchantability and fitness for a particular purpose.
The entire risk as to the quality and performance of lsof is with
you.  Should lsof prove defective, you assume the cost of all
necessary servicing, repair, or correction.

Bug Reports
==========

Now that the obligatory disclaimer
 is out of the way, let me hasten
to add that I accept lsof bug reports and try hard to respond to
them.  I will also consider and discuss requests for new features,
ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND A BUG REPORT ABOUT LSOF TO THE UNIX DIALECT
VENDOR.

At worst such a bug report will confuse the vendor; at best, the
vendor will forward the bug report to me.

Please send all bug reports, requests, etc. to me via email at
<abe@purdue.edu>.

The lsof-l Mailing List
=======================

Information about lsof, including notices about the availability
of new revisions, may be found in mailings of the lsof-l listserv.
For more information about it, including instructions on how to
subscribe, read the 00LSOF-L file of the lsof distribution.

Version 3 Release Notes
=======================

See 00DIST in the last lsof 3 revision 3.88, for its complete
set of release notes.  Lsof revision 3.88 may be found at:

 ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD

3.0  May
 24, 1994
  This is the first official release of lsof 3.

...

3.88  February 17, 1997

```
+======================================+
| This is the last version 3 revision. |
+======================================+
```

Added documentation files -- 00.README.FIRST[_<version>]
and 00RELEASE.SUMMARY_<version> -- to the distribution.

What's new in Version 4
=======================

The main goal of version 4 was to eliminate the confusing common/
fragment source file technique.  Changing the version number also
provided an opportunity to restart the numbering, which at 3.88
had risen to a large value.

The sources that appeared in the dialects/common subdirectory of
version 3 in fragment files have been incorporated into the version
4 liblsof.a library as *.c files.  This results in significant
changes to many source files, scripts, and Makefiles of all dialect
versions.  It allows elimination of some source files -- ddev.c,
dfile.c, dmnt.c -- for dialects now obtaining
 functions from
liblsof.a that formerly came from making dialect source files by
combining fragment files.

The version 4 liblsof.a sources are stored in the lib/ subdirectory
of the main lsof directory.  The liblsof.a functions are activated
and conditioned in their source files by values #define'd in the
dialect dlsof.h and machine.h header files.

Dialects that provide a private version of a library function refrain
from #define'ing the symbol that would activate the library function
code.

Version 4 Release Notes
=======================

4.0  February 24, 1997

```
+====================================+
| This is the first lsof 4 revision. |
+====================================+
```

Reorganized sources: eliminated code fragment files
and created a library in their place. Modified or
deleted many dialect source and header files.
Changed documentation accordingly.

Added a warning to sgi/Makefile and 00FAQ that advises
against using the IRIX C compiler -n32 option
when
compiling lsof. Thanks go to Peter Ilieve
<peter@memex.co.uk> for bringing this to my attention.

Dropped IRIX 5.2 in mid-stream, because my 5.2 test
system was upgraded to 5.3.

4.01 March 3, 1997
Added TFS support for Pyramid dialects.

Added test to Configure and to the IRIX dnode.c
for the different cnode struct that appears in
<cachefs/cachefs_fs.h> on the 6.2 IMPACT distribution.
Heddy Boubaker <boubaker@amfou.cenatls.cena.dgac.fr>
alerted me to the cnode change and helped test this
lsof adjustment.

Shut down the lsof child process before doing a -r
sleep(). A comment from Dan Mercer <dam@mmm.com>
prompted this.

4.02 March 21, 1997

Based on a report from Pasi Kaara <Pasi.Kaara@atk.tpo.fi>,
disabled HP-UX CCIT support in lsof for HP-UX
versions 10 and above. Pasi's report also led to
changes in the HP-UX machine.h to support use of
gcc to compile lsof for HP-UX 10.20 and warnings
against using `cc -Aa` or `gcc -ansi` to compile
lsof
under HP-UX 10.x.

With help from Richard Allen <ra@hp.is> taught
HP-UX 10.x lsof to name file systems better by
using the virtual file system device number. Elias
Halldor Agustsson <elias@rhi.hi.is> provided a test
system.

Changed NEXTSTEP and UNIXWARE Makefiles to use
safer quoting when generating version.h. The change
was suggested by Bob Farmer <ucs_brf@unx1.shsu.edu>.

Added SHELL=/bin/sh string to all Makefiles.

Added support for Linux 2.1.28 on a test system,
kindly provided by Jonathan Sergent <sergent@purdue.edu>.
Configure tests the Linux 2.1.x's C library lseek()
function for proper handling of kernel offsets.
If lseek() appears suspect, Configure activates
the use of a private lseek() function. Changed
the private nlist() function to nlist_private()
and taught it to use the query_module() syscall in
place of the deprecated get_kernel_syms() one.
Added rudimentary AX.25 support for Pierfrancesco
Caci <ik5pvx@infogroup.it>
who helped test it.
Updated the old get_kernel_syms() code to recognize
and skip module name entries.

Prompted by Marty Leisner <leisner@sdsp.mc.xerox.com>,
eased the requirement that service name lookup for
the -i option be accompanied by a protocol name. The
name is not needed if both TCP and UDP names yield the
same port number.

Added xusers.awk script from Dan Mercer <damercer@mmm.com>
to the distribution scripts/ subdirectory.

Changed Configure script to use LSOF_VERS for all
UNIX dialect version numbers and to pass LSOF_VERS
to the dialect Mksrc functions. Also added the
ability for a dialect stanza to declare a different
dialect Makefile source. Modified dialect Mksrc
files -- e.g., linux and sun -- accordingly.

Added support for BSD/OS 3.0 with help from Jim
Reid <jim@mpn.cp.philips.com>. Terry Kennedy
<TERRY@spcvxa.spc.edu> kindly provided a test
system. During the port corrected a bug that
prevented proper handling of revoked
files.

4.03 April 7, 1997
At the suggestion of Dan Mercer <damercer@mmm.com>,
made HP-UX building of lsof aware of differences
between the HP-UX bundled and unbundled C compilers.

Added the ability for the lsof builder to define the
default warning message issuance state. By default the

issuance of warning messages is disabled; defining
WARNINGSTATE in machine.h disables it. The Customize
script was updated to handle WARNINGSTATE. Dan Mercer
suggested this.

Eliminated compiler complaint about improperly cast
get_Nl_value() argument in ncache_load() in lib/rnch.c.

Corrected zeromem() argument error in SCO dproc.c.
Sped up parent directory cache lookup slightly.

Updated for PTX 4.4, including additional VxFS (EFS)
file system support.

4.04 April 17, 1997
At the suggestion of Bela Lubkin <belal@sco.COM>
changed device cache handling to be more tolerant
of a device cache file whose [cm]times are older
than the ones on /dev or /devices. The
change
required adding information to Solaris device cache
file clone lines, so the first time lsof 4.04 is
run under Solaris it will complain about a bad
cached clone device in a previous device cache
file, then regenerate it.

Added boot file path detection for SCO OSR 5 and
above, based on information supplied by Bela.

Fixed two bugs in DEC OSF/1 lsof -- an error in
reporting locks and a missing continue statement
in readdev() after a failure to open a directory.
Jan Ole Suhr <josuhr@informatik.tu-clausthal.de>
reported the second bug and supplied a fix.

Fixed XFS problems with IRIX 6.2 by abandoning the
idea that SGI will distribute XFS header files and
defining an lsof-private xfs_inode structure. John
Paul Morrison <John.Paul.Morrison@MultiActive.com>
helped develop and test the 5.3 definition. John
R. Vanderpool <fish@daacdev1.gsfc.nasa.gov> helped
develop and test the 6.2 definition.

Remove obsolete comments about common/*.frag files.

Updated
Linux lsof for Linux version 2.1.35.

4.04 April 18, 1997
Supplement Regenerated the 4.04 distribution to correct a non-
device-cache #define misplacement in the Solaris and
SunOS dlsof.h. Alexandre Oliva <oliva@dcc.unicamp.br>
reported the problem.

4.05 April 24, 1997
Corrected an error in 00DCACHE.

Made sure SCO /etc/ps/booted.systems is closed.

Based on an observation by Bela Lubkin <belal@sco.COM>
that the lsof child had needless file descriptors
open, closed all but the open pipes between the
lsof parent and child.

Decommissioned CDC EP/IX support; I no longer have a
test system.

Based on a suggestion from Patrick Connor
<connor@phreak.csd.sgi.com>, added -xansi to CFLAGS
for IRIX 5.3 and 6.[234].

Also at Patrick's suggestion changed Configure to
propagate exact SunOS 4.1.x version to the main
and library Makefiles. This allowed the sunos413
and sunos413cc Configure abbreviations to be
shortened to sunos and sunoscc.

Updated
obsolete argument uses (-H changed to -n)
in count_pf.perl* and watch_a_file.perl scripts.

Adjusted Solaris 2.6 lsof for Beta_Update with tips
from Casper Dik <casper@holland.Sun.COM>.

Fixed a Solaris 2.4 TCP address reporting bug.

4.06 April 30, 1997
Added a step to the Makefile clean rules that does
a make clean in the lib subdirectory; suggested by
Casper Dik <casper@holland.Sun.COM>. (Configure's
-clean argument already did this.)

Fixed an incorrect awk argument in the sunos*)
Configure stanza, reported by Alexandre Oliva
<oliva@dcc.unicamp.br>.

Added CD9660 (aka ISO) file system support to
FreeBSD, NetBSD, and OpenBSD with mods and help
from Kenneth Stailey <kstailey@disclosure.com>.
(BSDI already had CD9660 support.) While at it,
added file descriptor system support to BSDI and
FreeBSD.

Added /kern file system support to OpenBSD. The
support wasn't extended to BSDI, FreeBSD, or NetBSD,
because it requires Kenneth Stailey's
changes to
/sys/miscfs/kernfs/kernfs.h.

Updated IRIX 6.3 support after getting access to
a test system, provided by John Paul Morrison
<John.Paul.Morrison@MultiActive.com>. Improved
the handling of IRIX 5.1 and greater FIFOs.

4.07 May 12, 1997
Based on AIX problem reports from David Capshaw
<David.Capshaw@SEMATECH.Org>, changed the aix*
Configure script stanza to avoid -bnolibpath for
gcc (which the GNU loader doesn't grok) and AIX
below 4.1.4 (where -bnolibpath hasn't been tested
or is known to be unimplemented), and to refuse to
use gcc for compiling lsof in AIX versions below
4.1 (because of possible structure alignment
problems). Updated 00FAQ appropriately.

Added OpenBSD support for EXT2FS. This support
has yet to be tested.

Tested lsof under OpenBSD 2.1.

Activated /kern file system support for NetBSD when
Configure senses that /sys/miscfs/kernfs/kernfs.h
defines the kern_target structure. This support
has not been tested under
NetBSD, although it has
been tested under OpenBSD.

Made some simple changes to the BSDI machine.h,
suggested by Jeffrey C. Honig <jch@bsdi.com>.

Improved handling of alternate dialect Configure
abbreviations -- aix and aixgcc, hpux and hpuxgcc,
solaris and solariscc, and sunos and sunoscc.

4.08 May 23, 1997
Cleaned up dialect Makefile's, staring with a suggestion
from Christopher Schanzle <chris@cam.nist.gov>.

Improved Configure's -clean processing.

Corrected bugs in Solaris lock reporting.

Changed NetBSD Configure stanza to put -I/usr/include
before -I/sys.

4.09 June 1, 1997
Adjusted for latest FreeBSD 3.0 release. This
required adding a new kernel name cache module for
reading BSD-form hashed kernel name cache entries,
rnmh.c, to the lsof library, and adding a #define
to each machine.h to select it.

Activated rnmh.c for BSDI 2.1, BSDI 3.0, NetBSD
1.2, and OpenBSD 2.1.

4.10 June 8, 1997
Adjusted for Linux 2.1.x (x > 35) kernels with
hashed
task structure pointers. Marty Leisner
<leisner@sdsp.mc.xerox.com> and Jonathan Sergent
<sergent@io.com> tested the adjustment.

Replaced readdev() stat() calls with lstat() to
reduce device table and cache entries with the same
device number and inode values. Added code to
remove all remaining duplicates. This fixes a
Linux problem reported by Jonathan Sergent and
makes device node name output predictable.

Corrected a bug in UnixWare stream file handling
that prevented searching for the stream file by
its associated character device name.

Added Pyramid code to determine Reliant UNIX clone
major device number differently from that of DC/OSx.

4.11 June 12, 1997
Changed Configure to sense that the PTX inp_[fl]addr
members of the inpcb structure of <netinet/in_pcb.h>
have a struct type and set HASINADDRSTR for use in
PTX dnode.c and dsock.c tests.

Changed PTX version 4.1.4 tests to use 4.1.3 instead.
Carson Wilson <carson@mcs.com>
reported the need
to do this and tested the change.

Fixed a block device table indexing bug in lib/rdev.c,
reported by Carson Wilson. The same bug was squashed
in pyramid/ddev.c.

Added code to the Pyramid Reliant UNIX kread()
function to compensate for an address boundary
error in the kernel's /dev/kmem driver.

Verified that lsof compiles and works under AIX
4.2.1. Added an AIX test for the presence of NFS
header files, defined HAS_NFS and adjusted AIX
dialect sources accordingly.

Based on a suggestion from Gaylord Holder
<holder@phy.ucsf.EDU>, added DEC OSF/1 code to
auto-detect the booted file, whence kernel symbol
addresses are obtained.

4.12 June 24, 1997
Corrected a device number sign extension problem
in the reading and writing of device cache file.
The problem was reported by Bela Lubkin <belal@sco.com>
and he suggested a fix.

Fixed an SCO stream device lookup problem. The
report and solution came from Bela Lubkin

Enhanced the
Configure script to enable cross-
configuration of lsof, based on suggestions from
Marty Leisner <leisner@sdsp.mc.xerox.com>. A new
documentation file, 00XCONFIG, describes the process.

Made Pyramid OBJFS support conditional on the
presence of supporting header files. Corrected
the Pyramid MkKernOpts script so it generates the
necessary -D's for the Nile/Jolt architecture.
Richard Coley <rcoley@pyra.co.uk> helped.

Added another IRIX xfs_inode variant for 6.2, 32
bits, no XFS rollup patch.

Tested under UnixWare 2.1.2.

4.13 July 9, 1997

Taught Pyramid lsof to grok ttyfs vnodes with help from Richard Coley <rcoley@pyra.co.uk>. Fixed some minor bugs in Pyramid FIFO reporting. Eliminated use of the Pyramid UCB compatibility library at Richard's suggestion.

Eliminated reporting of "strange" inode numbers for SCO OSR 3.2v5.0.x HPPS files with help from Bela Lubkin <belal@sco.com>

Modified port to service name lookup to use a small number
of getservbyport() calls before reading the entire map with getservent(). Changed port reporting to represent a zero as `*' to be consistent with other prt number reporting tools like netstat. Casper Dik <casper@holland.Sun.COM> suggested these changes -- the getserv*() one to improve performance for large NIS service name maps.

Changed all readdev() functions to make the absence of block devices a warning instead of a fatal error after Brian Redman <ber@ms.com> reported his IRIX 6.4 system had no block devices. (It really did have block devices, but readdev()'s lstat() use caused it to miss them in a directory symbolically linked from /dev/dsk->/hw/disk.) Fixed Brian's real problem by changing the IRIX readdev() to use stat() on /dev nodes if a Configure test shows /hw is readable. Extended the potential to do the same to all readdev() functions.

For consistency and convenience changed some Configure abbreviations and dialect subdirectory names:
"decosf" abbreviation and "osf" dialect subdirectory name to "du"; "netbsd" dialect subdirectory name to "n+obsd"; "next3" abbreviation and "next" dialect subdirectory name to "ns"; "sco" abbreviation and dialect subdirectory name to "osr"; "sgi" dialect subdirectory name to "irix"; and "unixware" abbreviation and dialect subdirectory name to "uw".

Added #if/#endif clauses to the AIX rmdupdev() function to avoid clone processing for AIX versions

less than 4.1.4. The problem was reported by Toralf Foerster <toralf.foerster@io-warnemuende.de>, who supplied corrective code.

Added support for new style NetBSD inode with i_ffs and i_e2fs union members.

Improved Configure and 00FAQ information on Digital UNIX configuration subdirectory with suggestions from Brad Krebs <brad@EECS.Berkeley.EDU>.

4.14 July 22, 1997
Reorganized the Solaris handling of the inode structure header file, ufs_inode.h, to eliminate VxFS structure definition conflicts for Solaris 2.4, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Cleaned up some typos and confusion in Configure's help output, based on comments from Bela Lubkin <belal@sco.com>

Added a 00DIALECTS file, containing UNIX dialect version numbers, that can be used by Configure and the man page.

4.15 August 15, 1997
Aligned `Configure -help` output better. Removed Configure's 2.6 Beta test adjustments.

Added improved Solaris VxFS configuration and handling, based on information from Greg Earle <earle@netbsd4me.jpl.nasa.gov>.

Added socket state -- TCO or TPI -- for socket files at the suggestion of Ian Fitchet <I.D.Fitchet@ftel.co.uk>.

4.16 September 25, 1997
Added reporting of TCP/TPI queue lengths and window sizes ala netstat to NAME column. Added -T option to select or de-select TCP/TPI info reporting. (Window sizes are only reported for Solaris.) Fixed anomalies along the way in SIZE/OFF processing for some dialects.

Fixed service name argument processor to allow minus signs as part of the name. Consequently this disallows names with embedded minus signs from being specified as the start of a range.

Added 00FAQ entries explaining why lsof won't find a file being edited with vi, why window sizes aren't reported for all dialects, and what the "no more information" message means.

Forced Pyramid CC to be /usr/ccs/bin/cc to avoid accidental use of the BSD variant in /usr/ucb/cc.

Added support for Linux glibc2, including a Configure test; cross-Configure support (00XCONFIG); and much unfortunate and risky sleight-of-hand in lsof Linux dialect header and source files, forced upon lsof by incompatibilities between Linux kernel and glibc2 header files.

Included in scripts/identd.perl5 a Perl 5 implementation of an identd server, using lsof, provided by Kapil Chowksey <kchowksey@hss.hns.com>.

Updated IRIX 6.4 xfs_inode guess.

4.17 October 14, 1997

Added

-V option for verbose search result reporting. Verbose reports are prepared for failure to locate file names, command names, Internet addresses or files, login names, NFS files, PIDs, PGIDs, and UIDs.

Augmented Linux NFS file test to cope with kernels whose NFS code is in a loadable module. Need for the test was pointed out by Jonathan Sergent <sergent@csociety.ecn.purdue.edu>. The change required that Linux have private dmnt.c source,

Completed a Linux 2.1.57 port on a system provided by Jonathan Sergent.

4.18 October 25, 1997

Eliminated memory leaks in alloc_lfile(), lkup_port(), and NEXTSTEP's process_text() function.

Added recognition of OpenBSD 2.2 in Configure, supplied by Kenneth Stailey <kstailey@disclosure.com>.

Consolidated print_file() functions to use the one
in lib/prtf.c. Made it configurable and changed
it to size print columns dynamically.

!!! WARNING !!!

WITH DYNAMICALLY SIZED PRINT COLUMNS LSOF 4.18
PRODUCES OUTPUT
SIGNIFICANTLY DIFFERENT FROM THAT
OF PREVIOUS REVISIONS. LINES ARE GENERALLY SHORTER
AND THERE IS GENERALLY LESS BLANK SPACE BETWEEN
COLUMNS AND THE ITEMS IN THEM. THERE ARE NO LONGER
ANY SPACES BETWEEN DEVICE NUMBER ELEMENTS, ONLY
COMMAS.

!!! WARNING !!!

Added special types and print specification modifiers
for file size and offset to handle UNIX dialects
with 64 bit sizes and offsets. Paul Eggert
<eggert@twinsun.com> reported the need for this
addition.

With Paul Eggert's help picked lint from the lsof
library, the main level lsof sources, and the Sun
dialect sources.

Added documentation, including the file 00LSOF-L,
about the lsof-l LISTSERV.

Added support for Reliant UNIX on the RM600. Bob
Passarella <rmpassar@pyramid.com> supplied the
changes. Kevin Smith <kevin@pyramid.com> helped
arrange test systems. While incorporating Bob's
changes, modified lib/rnch.c to handle kernel ncache
structs whose name is accessed via a char
*, rather
than in a char array.

Changed #include order of <sys/socketvar.h> for
Solaris 2.x. W. Richard Stevens <rstevens@kohala.com>
pointed out the need to do this.

4.19 October 30, 1997
Changed Pyramid Reliant RM600 proc scan to skip
SSYS (p_flag) processes, since they don't seem to
have a readable u_cdir vnode.

Enabled Pyramid Reliant UNIX kread() work-around
for DC/OSx, too, since its read(/dev/kmem) kernel
driver seems to share the page boundary bug this
work-around circumvents.

Changed SzOffFtm_d and SzOffFtm_dv (new formats at
4.18 to print size and offset) from signed to
unsigned. Setting them signed at 4.18 was an
oversight.

Plugged a memory leak that caused the loss of 130
bytes per repeat-mode pass. Fixed it with a simple
work-around in main(). Lionel Cons <Lionel.Cons@cern.ch>
reported the leak.

4.20 November 11, 1997
Tested under BSDI 3.1.

Added support for Reliant UNIX Mesh IPC files with
help from Billy Ho <bho@pyramid.com>.

Added
support to Digital UNIX lsof that uses the
libmsfs tag_to_path() function (when it exists) to
look up AdvFS path names. The idea and sample code
came from Dean Brock <brock@cs.unca.edu>. Converted
Dean's code into more general purpose support for
private name cache lookups via the HASPRIVNMCACHE
#define in the dialect machine.h file and code
conditional on it in the printname() function.

Taught Digital UNIX lsof to recognize NFS3 file
systems. Corrected Digital UNIX lsof DEVICE column
alignment.

4.21 December 1, 1997
Squashed bug, introduced at revision 4.18, that
resulted in double reporting of each selected PID
when terse mode (-t) was specified.

Corrected minor bug, also introduced at 4.18, that
might cause an extra print_proc() pass when one
PID has been specified.

Added -R to lsof options in scripts/idrlogin.perl*.
The option should have been there -- it was supposed
to be mandatory for PGID reporting -- but a bug,

corrected
in revision 4.18, previously made -R
unnecessary.

Enabled configuring for BSDI BSD/OS 4.0 per a
suggestion from Jeff Honig <jch@bsdi.com>.

Enabled replacement of scoff_t with off64_t (scoff_t
is used to type r_size and r_localsize in the rnode
struct) for IRIX 5.3 systems that have the NFS
kernel rollup patch (1477). This compensates for
SGI's failure to distribute an updated <sys/fs/rnode.h>
with their patch.

Validated under Linux 2.0.3[12], Linux 2.1.64, and
NetBSD 1.3.

Added FreeBSD root directory reporting, courtesy
of Dan Nelson <dnelson@emsphone.com>.

4.22 December 15, 1997
Made adjustments for Linux 2.1.7[02].

Improved NAME information for Linux UNIX domain
sockets.

Added option +|-M to control the reporting of
portmapper registration information in square
brackets after the TCP or UDP port or service name.
Kenneth Stailey <kstailey@disclosure.com> suggested
the feature and provided sample code from OpenBSD.
Reporting
is disabled by default in the distribution
and may be enabled with +M; if lsof is compiled
with HASPMAPENABLED (e.g., from machine.h), reporting
will be enabled by default and can be disabled with
-M.

Changed the -w option to +|-w to match the syntax
of the +|-M option and to eliminate any options
that flip meaning when a symbol is defined at
compile time. For both +|-M and +|-w, specifying
`-' when the default state is disabled or specifying
`+' when the default state is enabled causes no
problems.

!!!WARNING The -w option has changed in lsof 4.22. WARNING!!!

Made the +|- prefix legal for most options, but
didn't document it in the man page or help panel.
Most options that disable something -- e.g., -b,
-C, -n, -P -- now disable when the prefix is `-'
and enable when it is `+'. Since the states these
options disable are enabled by default, I chose to
avoid documentation complexity and confusion by
not mentioning that they can be used
with the `+'
prefix.

Condensed the help panel.

Made sure Digital UNIX Configure stanza puts normal
include path (e.g., /usr/include) before system
include paths.

Added IPX socket information reporting to Linux
with help from Jonathan Sergent <sergent@purdue.edu>.

4.23 January 16, 1998
Fixed conflict arising from the quondam replacement
of the Sun Solaris <netdb.h> with a BIND/BSD version.

With help from Jonathan Sergent <sergent@purdue.edu>
developed a /proc file system based Linux lsof.
It needs some Linux 2.1.x release to work -- I'm
not sure which, but I tested under 2.1.72, 2.1.76,
and 2.1.79. The Configure script selects special
sources for this lsof, so the full lsof distribution
now contains both /dev/kmem and /proc based sources
for Linux lsof. An optional kernel mod, written
by Jonathan, enhances the /proc-based lsof ability
to recognize IPX socket files. Reorganized and
augmented the Linux sections in 00FAQ to explain
the two
types of Linux lsof.

Defined DOSTAT_FUNCTION for dostat() in misc.c to
select the function, stat() or lstat(), it will use.
DOSTAT_FUNCTION is normally undefined, defaults to
lstat(), and is only defined for the /proc-based
Linux lsof in its dlsof.h.

Made conditional on the presence of IRIX 6.4 XFS
rollup patch #6 an XFS node change introduced in
revision 4.16. Identified the patch with help
from John R. Vanderpool <fish@daacdev1.gsfc.nasa.gov>.

Added NFS node compensation for NetBSD 1.3. The
code and suggestion for it was supplied by Jean-Luc
Richier <richier@imag.fr>.

Added diagnostic messages to the /dev/kmem-based
Linux Mksrc script to report errors during the
construction of the kernel name cache header file,
kncache.h. Added 00FAQ information on kncache.h.

Added a new Linux test host, running 2.0.33 and
GlibC, provided by Steve Logue <stevel@mail.cdsnet.net>.

Ported to PTX 4.1.3 and 4.4.2. Adjusted lib/rnch.c
for 4.4.2 to allow
customization f additional ncache
struct element names.

4.24 January 28, 1998
Changed /proc-based Linux lsof offset test to use "/"
instead of "/etc/passwd".

To assist Jim Mintha <jim@geog.ubc.ca> with the
packaging of lsof for Debian Linux, added a
DEBIAN_LINUX_LSOF #define to trigger the activation
of special system map file location code in the
/dev/kmem-based dproc.c.

Applied modification to dialects/bsdi/dlsof.h from
Ingimar Robertson <iar@skyrr.is>, enabling lsof to
compile for BSDI BSD/OS 2.0.

Corrected a documentation error in 00DCACHE, pointed
out by Thomas Anders <anders@hmi.de>. The error was
created when the -V option was added at lsof 4.17.

Made IRIX 5.3 through 6.3 lsof aware of IRIX SCSI
tape devices (e.g., /dev/tape). Dave Olson of SGI
and Randolph J. Herber of FNAL provided valuable
advice, and Igor Schein <ischein@air-boston.com>
helped test.

Added a machine.h symbol (NEVER_HASDCACHE) that
prevents Customize from offering
to change HASDCACHE.
The symbol may appear anywhere in machine.h --
e.g., in a comment. Included the symbol in a
comment of the HASDCACHE section of the /proc-based

Linux lsof machine.h, and accompanied it with
warnings against #define'ing HASDCACHE. Did the
same thing for WARNDEVACCESS (NEVER_WARNDEVACCESS
is the suppressant.)

4.25 February 7, 1998
Corrected an IRIX mis-cast of file offset (position).
Igor Schein <ischein@air-boston.com> reported the
problem. This was offered as a patch to 4.24.
Picked some lint Igor pointed out.

At Igor's suggestion added an optional decimal
digit size argument to the -o option. This argument
specifies how many file offset decimal digits can
follow "0t" before lsof switches to a "0x..." form.
The argument size specification doesn't count the
two characters of the "0t". A size of 0 means
unlimited. The default is OFFDECDIG (8), preserving
compatibility with existing lsof output; it can be
changed by
the lsof builder. When size is specified
with -o it does not force offset display; -o without
a size still must be used to do that.

Added an IRIX 6.2, 32 bit system, XFS node patch,
courtesy of Ulrich Bernhard <rzubu@rzu.unizh.ch>.

For my own convenience enabled Configure to use
/usr/local/bin/gcc for NEXTSTEP. This allows
circumvention of a gcc 2.8.0 ranlib problem on
my test 3.1 `040 cube.

Added flags recommended by the RISC/os and Ultrix
compilers for the updated (and longer) main.c.

Updated FreeBSD cd9660_node.h Configure test.

4.26 February 17, 1998
Added shared process group processing for IRIX 5.3,
and IRIX 6.1 and above, based on investigation of
a bug report from Igor Schein <ischein@air-boston.com>.
Igor helped test this addition.

Improved handling of file system name arguments.
It's now done in a manner similar to fuser. The
-f argument forces path names to be considered as
simple files, rather than as file system names.
The

+f flag forces them to be considered as file
system names. Normally path arguments are considered
file system names when they match a mounted-on
directory in the system's mount table, or when they
match a mounted file system's block device. Igor
Schein helped test this change.

Igor also suggests that the proper compilation of
the IRIX 6.4 proc structure after patch 2536 has
been installed may need -DPIOMEMOPS. So lsof's
MkKernOpts script was updated to propagate that
option from CCOPTS in /var/sysgen/system/irix.sm,
even though patch 2536 doesn't add -DPIOMEMOPS to
it. Added a 00FAQ item on this patch.

Added a fatal warning message about names forced
to be file system names (with +f) that have no
match in the mount table.

Improved the -V message for files and file systems
for which no open files were found. Added reporting
of /proc file and file system search failures.

Did some code reorganization to combine the multiple
ck_file_arg()
functions into one. Moved the new
function from the library to the top level and put
it in arg.c; moved the usage function from arg.c
to a new top-level source file, usage.c, to balance
top-level source file size. The new usage.c depends
on version.h; arg.c no longer does.

Added flag recommended by the DU compiler for the
updated (and longer) main.c.

4.27 March 6, 1998
At the request of Igor Schein <ischein@air-boston.com>
added a conditional repeat mode option, using the
`+' prefix to the `r' option. +r operates as does
-r with the exception that it exits the first time
no open files have been listed during a cycle.
The exit code will be zero when any open files have
been listed; one, if none were ever listed.

Ported lsof to HP-UX 11.0 with the help of Richard
Allen. This port hasn't been tested on a 64 bit
kernel; I'm sure it won't work there without more
mods. It may not work on PA 2 architectures; I've

only tested it under PA 1 and a separate,
busy
tester reported PA 2 problems that I've been unable
to investigate.

In anticipation of getting access to a 64 bit HP-UX
kernel and the pending start of the Solaris 2.7
Beta test (It will have 64 bit kernel addressing.),
started adding support for 64 bit kernel pointers.
This includes: ubiquitous use of the KA_T cast
for kernel pointers; a format to print them,
KA_T_FMT_X; a function to print them, print_kptr();
and modifications to most kernel-related functions
-- e.g., process_file(), process_node(),
process_socket(), readvfs() -- to process kernel
addresses as KA_T types.

Fixed minor bug in handling path name arguments
that end with a `/'.

Removed support for RISC/os; its test system is no
longer available.

Made modifications to insure that lsof output
doesn't contain non-printable characters. All such
characters are now printed in the printf form
"\x%02x". Several new common functions were
installed in misc.c to support
"safe" printing.
This second major modification in 4.27 to common
and dialect code could have introduced bugs not
yet detected.

4.28 March 10, 1998
Refined unprintable format to use \b, \f, \r, \n,
\t, and ^* (for CTRL) forms. Corrected omission
of safestrprt() use for field output command name.
These changes were offered as patches to 4.27.

Made space an unprintable character (\x20) in the
COMMAND column; printable elsewhere, including the
NAME column, field output, and error messages.

Made sure FD column is parseable as a single entity
-- i.e., has no embedded space. Thus, if the access
mode is unknown but there is a known lock mode, (a
very rare case) the access mode will be printed as
`-'.

Picked lint with gcc 2.8.0 under Solaris 2.6.

With the help of Dave Olson of SGI identified a proc struct element that should have been added to <sys/proc.h> by IRIX 6.4 patch 2536. Added a work-around for it to the lsof Configure script. Igor Schein <ischein@air-boston.com> identified that the patch caused a proc structure length complaint from lsof. Removed an obsolete 00FAQ item on the patch, installed at lsof 4.26, explaining that no solution was yet available.

Added a 00FAQ item on how BIND installs its own header files, including <netdb.h>, which may cause the rpcent struct definition to vanish. Solaris has an automatic lsof work-around, but that hasn't been (and probably can't be) propagated to all dialects supported by lsof. The 00FAQ item recommends re-installation of the vendor header files that BIND has replaced. (Others include <rpcent.h>, <sys/bitypes.h>, and <sys/ctypes.h>.)

Made AIX AFS fixes.

4.29 March 26, 1998

Corrected bug in Internet address matching. The matching formerly stopped if the foreign address matched, thus failing to check the local address for a match. That led to a possible false "Internet address not located" warning (i.e., in response to -V) about the local address, when both foreign and local addresses were specified with -i. This correction was offered as a patch to 4.28.

Changed readmnt() usage in an attempt to defer mount readlink() and stat() delays until they are necessary.

Corrected two bugs in the Digital UNIX readdev() function. Made the correction available as a patch to 4.28 and regenerated the 4.28 DU binaries.

Added a missing argument to a print-kptr() call in the HP-UX dsock.c. The missing argument causes a fatal gcc error. The problem was reported by Eyal

Shaynis <eyal.shaynis@telrad.co.il>. The fix was offered as a 4.28 patch.

Adjusted for Digital UNIX 4.0D; the spec_node structure is now defined in <sys/specdev.h>. Kris Chandrasekhar <Kris.Chandrasekhar@digital.com> identified the need for the adjustment.

Incorporated a bug fix from Brian McAllister <mcallister@mit.edu> to the DU readmnt() function. This fix was offered as a patch to 4.28.

Added "safe" printing to a SunOS clone device error message.

Corrected bug in tabling of Linux /proc-based lock info.

Corrected bug in handling of SunOS TLI streams. Dan Farmer <zen@trouble.org> reported the problem.

Added a Solaris 2.6 work-around to keep the BIND <sys/bitypes.h> from colliding with the Solaris <sys/int_types.h>.

Strengthened the Configure test for /proc-based Linux lsof, based on a report from Marty Leisner <leisner@sdsp.mc.xerox.com>.

Tested on OpenBSD 2.3.

Made AIX changes that allow use with 3.2.5. The changes were suggested and tested by Brett Hogden <hogden@rge.com>.

Added Solaris 2.6 AFS support. Disabled reporting of some node numbers for Solaris 2.5 and above open AFS files. The node number computation algorithms used for SunOS 4.1.x and Solaris less than 2.5 no longer always work under Solaris 2.5 and above.

4.30 April 9, 1998

Corrected a pid structure member naming error for UnixWare < 2.1.2. The problem was reported by Richard van Meurs <vanmeurs.anva@atriserv.nl>. He supplied the correction. This was offered as a

patch to 4.29.

Had a report from Igor Schein <ischein@air-boston.com>
that IRIX 6.4 patch 2839 is another SGI kernel
patch, along with 2536, that changes the size of
the proc structure in the kernel without changing
the proc structure in <sys/proc.h>. Upon further
investigation found that the effect of these patches
on the proc structure is not consistent. Therefore,
dropped the Configure patch test for IRIX 6.4 and
made the code in irix/dproc.c slightly more tolerant
of proc structure size differences for IRIX 6.4.
Igor help test the change.

Corrected Solaris >= 2.5 AFS inode number generation.
Craig Everhart <Craig_Everhart@transarc.com> helped
find the cause of the problem. This was offered as
a patch to 4.29.

Refined the Linux /dev/kmem-based glibc evasion
for the timeval structure to make it work with
glibc version 2.0.7. This required
defining a new
global symbol, TIMEVAL_LSOF, default timeval, that
the /dev/kmem-based Linux lsof can set to its
private glibc timeval name, distinct from the kernel
timeval name.

Added support for Alpha to the /dev/kmem-based
Linux lsof. Alexandre Oliva <oliva@dcc.unicamp.br>
provided a test system. Added an item to 00FAQ
about lsof, the Alpha processor, and Linux.

Added a 00FAQ item about lsof year 2000 compliance.
Basically it says lsof is probably compliant,
because its only date or time computations are done
with time_t values, but I haven't done any specific
Y2K validation. I don't have plans to do any.

Added support for UnixWare 7. Chris Daniels
<chrisd@dlpco.com> provided a test system and Don
Draper <dond@sco.COM> provided technical information.
Added BFS and SFS file system support to lsof for
UW 2.1.[12] and 7.

Updated Solaris VxFS support for VxFS 3.2.1. Greg
Earle <earle@netbsd4me.jpl.nasa.gov> reported the
need for

the update. Greg and Roger Klorese
<rogerk@veritas.com> provided technical information.
Scott McClung <mcclung@primenet.com> tested.

Changed IRIX XFS patch detection in anticipation of
learning there are multiple XFS patches for IRIX 6.4
that require different versions of the lsof-invented
xfs_inode structure.

4.31 April 21, 1998
Added a VxFS #if/#endif wrap to a section of the
HP-UX dnode.c that wasn't properly protected. The
problem was reported by Peter Klosky <PKlosky@bdm.com>.
This was offered as a patch to 4.30.

Added support for Solaris 2.7 (first Beta release).
Mike Sullivan <Mike.Sullivan@Eng.Sun.COM> provided
technical advice and helped test. Charles Stephens
<cfs@jurassic.eng.Sun.COM> also helped test.

Fixed bug in /proc-based Linux that caused it to
access /proc/mounts excessively. Marty Leisner
<leisner@sdsp.mc.xerox.com> provided a syscall
trace that identified the bug. The fix was offered
as a patch to 4.30.

Adjusted the
IRIX 6.4 private structure definition
for the XFS node to accommodate patch 2970. Igor
Schein <ischein@air-boston.com> identified the
patch and the required adjustment.

4.32 May 11, 1998
Corrected Solaris 2.7 code for reporting PCFS
(floppy disk) node numbers. Casper Dik
<casper@holland.sun.com> supplied the fix. The
fix was offered as a patch to 4.31.

Corrected a bug in conditional repeat mode handling
pointed out by Igor Schein <ischein@air-boston.com>.
This was offered as a patch to 4.31.

Improved reporting of AIX open(/dev/memory device)
errors.

Corrected a Solaris < 2.5 KA_T declaration error,
pointed out by Robert Kiessling <robert@easynet.de>.
Changed KA_T from a #define to a typedef for all

dialects to prevent future problems of this kind.

Changed the sample Perl 5 script big_brother.perl5
to report a four digit year from localtime().

Added support for AIX 4.3[.1]. Bill Pemberton
<wfp5p@tigger.itc.virginia.edu> provided a test
system.
Andrew Kephart <akephart@austin.ibm.com>
and Tom Weaver <tvweaver@austin.ibm.com> provided
technical assistance. Niklas Edmundsson
<nikke@ing.umu.se> did 4.3.1 testing.

Added -qmaxmem option to CFLAGs for an AIX compilation
with an xlc version 4.x compiler.

Adjusted Linux socket handling for changes in the
AX25 members of the sock struct. Richard Green
<rtg@tir.com> pointed out the problem. Tested
/dev/kmem-based lsof under Linux 2.0.34.

4.33 May 22, 1998
Added generic IPv6 support to common lsof sources
and specific IPv6 support to AIX sources. Andrew
Kephart <akephart@austin.ibm.com> supplied the
additions and helped with testing. Bill Pemberton
<wfp5p@tigger.itc.virginia.edu> provided a test
system. The modification affected sources for
every dialect, whether it supports IPv6 or not, by
changing the interfaces to the common Internet
address function ent_inaddr().

Added support for the NetBSD UVM virtual memory
system.
Paul Kranenburg <pk@cs.few.eur.nl> supplied
technical details.

Bracketed HP-UX 11 use of <sys/spinlock.h> with
#if/#endif _KERNEL.

Corrected printing of PCB address in DEVICE column
for IRIX.

4.34 June 26, 1998
Updated 00FAQ to discuss TCP and UDP ports private
to the AIX kernel and 00README to describe how ACLs
can be used to give lsof permission to read the
kernel memory devices. Add information to 00FAQ

and 00README about other OpenBSD architectures
where lsof is reported to compile and run. Added
section to 00FAQ discussing how an incorrect loader
path environment variable value can prevent lsof
from loading correctly.

Improved Solaris namefs and doorfs support so that
it is now possible to search for an open VDOOR file
by the path name of its fattached file system
object. Igor Schein <igor@txc.com> requested the
ability to do such a search. Even with the change,
lsof can't always identify path names for open
VDOOR files.

Also
at Igor's request, improved reporting of
information on open Solaris VCHR files that share
a common vnode, and Solaris UNIX domain socket
files.

Corrected print_kptr() argument error in PTX dnode.c,
reported by Mark Price <mprice@sequent.com>.
Compensated for ncache element naming differences,
introduced at PTX 4.4.2; Kurtis D. Rader
<krader@sequent.com> reported the problem.

Changed output column title from INODE to NODE to
better reflect the column's contents of node IDs
for more than just inodes.

Improved Configuration and processing for Solaris
AFS. Corrected AIX AFS 3.4 afs_rwlock_t simulation.

Corrected a cast problem with two AIX knlist()
calls, thus quieting an AIX 4.2.1 compiler argument
type warning. Jon Champlin <champlin@us.ibm.com>
reported the problem.

Added support to most dialect versions (exception:
/proc-based Linux) to warn when the identity of
the kernel where lsof was compiled doesn't match
the running identity. The
warning can be suppressed
with -w. Note: determining AIX state requires
calling oslevel, a potentially slow operation.
Jon Champlin <champlin@us.ibm.com> suggested this
addition.

!!!! WARNING !!!!  !!!! WARNING !!!!  !!!! WARNING !!!!

Those using the lsof cross-configuration capability
(see 00XCONFIG), should be aware that the kernel
identity test feature introduces two new basic
cross configuration environment variables, LSOF_ARCH
and LSOF_VSTR.

!!!! WARNING !!!!  !!!! WARNING !!!!  !!!! WARNING !!!!

Identified a situation where a Solaris UNIX domain
socket name is known and can be searched for by
name; added the necessary code.

4.35 July 17, 1998

Made the kernel identity check an option with the
HASKERNIDCK #define in machine.h. Enabled altering
of HASKERNIDCK with the Customize script. Added
a clause to the help output that indicates the
build-time HASKERNIDCK status.

Added more information to the NAME column for
Solaris UNIX
domain sockets. Made them searchable
by their clone device path name. Igor Schein
<igor@txc.com> requested this.

Completed the HP-UX 11 port with support for its
optional 64 bit kernel. Rich Rauenzahn
<rrauenza@cup.hp.com> provided a test system.
Corrected errors with HP-UX 11 lock reporting and
private kernel structure and type definitions.
Added support for HP-UX NFS3 files.

Limited mount table warnings -- e.g., when -b is
used -- to one set per mount point.

Fixed some mount table scanning and usage bugs,
including one in Solaris, reported by Kjetil Torgrim
Homme <kjetilho@ifi.uio.no>.

4.36 August 4, 1998

Made corrections and additions to IPv6 support and
to AF_ROUTE socket handling, supplied by Jean-Luc
Richier <Jean-Luc.Richier@imag.fr>. Jean-Luc's
additions provide IPv6 support for the Inria IPv6
implementations on FreeBSD and NetBSD.

Fixed two Solaris 2.5, 2.5.1, 2.6 and 2.7 TCP and
UDP host name or IP address reporting bugs,
reported
by James Mathiesen <James-Mathiesen@deshaw.com>.
This fix was offered as a patch to 4.35.

Updated the Customize script to cause ENTER to use
all defaults. Amir J. Katz <amir@ndsoft.com>
suggested this and helped test the changes.

Updated Solaris ICMP and IP stream handling, based
on a report from Igor Schein <igor@txc.com>.

Fixed a bug in the Digital UNIX mount table handling,
reported by Bob Ward <bward@thehartford.com>.
While working on the bug, found and updated some
obsolete AdvFS code. This fix was offered as a
patch to 4.35.

4.37 September 15, 1998
Deactivated SGI IRIX support and archived revision
4.36 sources and binaries in pub/tools/unix/lsof/OLD.

Improved performance of FD searching. This was
offered as a patch to 4.36.

Amir J. Katz <amir@ndsoft.com> pointed out that
ranlib isn't needed for AIX or Solaris. Made
appropriate Configure script changes.

Fixed a file offset reporting bug for HP-UX VCHR
and VBLK device
nodes located on a VxFS root. Doug
Siebert <douglas-siebert@iowa.edu> reported the
bug. The fix was offered as a patch to 4.36.

Resolved an HP-UX root device name reporting bug,
partly caused by an out-dated local copy of the
<sys/mount.h> mount structure, by generating a
local header file with the structure that can be
compiled without needing _KERNEL defined. Doug
Siebert also reported this bug.

Changed some dialect source code -- Digital UNIX,
Solaris, SunOS, and UnixWare -- to make more
consistent with ps the user ID lsof reports in the
USER column. Added a 00FAQ entry about it. Igor
Schein <igor@txc.com> reported the Solaris and

SunOS lsof inconsistencies with what ps(1) reports.

Ported lsof to Pyramid ReliantUNIX 5.44.

Added brackets as comments to case, do, done, else,
endif, esac, if, and while statements in Configure
to assist in navigating its clauses.

Added more Linux 2.0.x glibc work-arounds.

Added support for UnixWare 7.0.1.

Ralph
Forsythe <ralph@contact-paging.com> provided
a new FreeBSD test system.

4.38 November 25, 1998
Added support for recent FreeBSD 3.0 distributions.
A 3.0 test system was provided by David O'Brien
<obrien@NUXI.com>. This was offered as a patch
to 4.37.

Updated the scripts/idrlogin.perl* files to look
for sshd processes in addition to rlogind and
telnetd ones.

Added support for DU 5.0 Beta. Berkley Shands
<berkley@cs.wustl.edu> provided a test system.

Added support for OpenBSD 2.4 with changes supplied
by Kenneth Stailey <kstailey@disclosure.com>.

Changed the Solaris 2.7 tests and documentation to
Solaris 7.

Made some changes to the header files for NEXTSTEP
3.3 and added support for OPENSTEP 4.x with help
from Michael A. Hovan III <mhovan@BLaCKSMITH.com>
and Carl Lindberg <Carl_Lindberg@BLaCKSMITH.com>.
The combined dialect subdirectory is named n+os.
One of Carl's changes propagates RC_CFLAGS to the
library Makefile. Timothy
J. Luoma <luomat@peak.org>
helped test under NEXTSTEP 3.3 and OPENSTEP 4.2.

Made UW 7.x version sensitive to the presence of
ptf7038. Added peer PCB address to Unix domain
socket Name column, even when a path name has been

located. Information for these changes was supplied by Francis Le Bourse <flebourse@intelcom.fr>. Lee Penn <lee@dlpco.com> provided a test system.

Tested lsof under OSR 5.0.5 on a test system also provided by Lee Penn.

Made path name argument processing more tolerant of errors per a suggestion from Julian Gordon <julian@cadence.com>.

Acquired a new UnixWare 2.x test system, generously provided by Computer Classroom, Inc. -- Matthew Thurmaier <matt@compclass.com>, Ken Laing <ken@compclass.com>, and Andrew Merril <andrew@compclass.com>. Updated Configure to accept a UnixWare version of 2.1.3.

Updated kmem-based lsof for Linux 2.0.36.

Updated NetBSD sources for a change in a UVM virtual mapping header file.

Corrected
a cache allocation bug in Sun format kernel name cache handling. The bug only shows up when the kernel name cache is inaccessible.

4.39 December 29, 1998

Corrected problems with large device number handling for 64 bit Solaris 7. The problems were reported by Steve Bellenot <bellenot@math.fsu.edu>. Steve helped test the fixes. The fixes were offered as two patches to lsof 4.38.

Improved FreeBSD Configure operations for header files that must be obtained from the kernel source tree, based on a suggestion from David O'Brien <obrien@NUXI.com>.

For Bela Lubkin <filbo@deepthought.armory.com> made optional with +f[cfn] the display of file structure address, shared use count, and node structure address. /proc-based Linux doesn't implement this feature, because it doesn't read kernel structures from kernel memory. Modified the PTX -X option to take advantage of the new file structure display option. Added shared.perl5 to the scripts/

subdirectory
to provide an example of how +f[fn]
might be used to track shared file descriptors and
files.

Added more /dev/kmem-based Linux glibc evasions,
provided by Jeff Johnson <jbj@redhat.com> and Maciej
Lesniewski <nimir@kis.p.lodz.pl>. Jeff helped test
them on various Linux architectures.

Tested on AIX 4.3.2; no changes were required.
Doug Crabill <dgc@purdue.edu> provided a test
system.

Fixed -c option to detect missing command name when
following option begins with `+'.

4.40 January 25, 1999
Added support for using the CDS compiler for Reliant
Unix 5.44 and above. Made Reliant Unix MIPC support
optional, dependent on the presence of <sys/mipc.h>.

Based on a report from Michael Schmitz <MSchmitz@lbl.gov>
that /dev/kmem-based lsof misbehaves on a Linux
2.0.x m68k kernel without module support, made the
absence of query_module() or get_kernel_syms()
Linux kernel support a fatal error. Updated relevant
sections of 00FAQ to reflect the change.

Added
the ability to force the Linux Configure
stanza to use the /proc or /dev/kmem source base
via a LINUX_BASE environment variable specification.
This is a cross-configuration assist.

Added "+D <dir>" and "+d <dir>" options for directory
searching. +D searches the entire tree, starting
at <dir>, including <dir>, its contents, and its
subdirectory branches; +d searches only <dir> and
its contents, but not its subdirectory branches.
Improved lsof's searching of the specified name
list to compensate for anticipated long lists from
+d and +D.

Made an egrep in the Solaris Configure stanza usable
by the standard and XPG4 egrep's. Kenneth Stailey
<kstailey@disclosure.com> pointed out the improvement.

Fixed bugs in /dev/kmem-based Linux and UnixWare
Unix domain socket name searching.

Changed a Linux Alpha #include to be conditional
on the presence of its named header file, so that
lsof will compile on Red Hat 5.1 and 5.2 (Linux
kernel 2.0.35)
where the header file is absent.
The problem was reported by Alexandre Oliva
<oliva@dcc.unicamp.br>.

Fixed an AIX 4.3+ bug in procinfo struct space
allocation, reported by Jeff Stewart <jws@purdue.edu>.
This was offered as a patch to 4.39.

Added an lstatsafely() function to offer the same
isolation for lstat() calls that statsafely() offers
for stat() calls. This made DOSTAT_FUNCTION no
longer necessary, so deleted it.

With help from Laurent P. Montaron <lpm@sequent.com>
ported lsof to PTX 4.4.4. Laurent did a monumental
job of identifying TCP/IP changes by their TCP
version, rather than by their PTX (With mix 'n
match PTX and TCP/IP versions, the PTX version
often has no bearing on the TCP/IP version.), and
changed the Configure script and pre-processor
#if/#else/#endif blocks to match. He also updated
Unix domain socket handling for PTX TCP/IP versions
4.5 and above.

Updated CLIENT handle acquisition of fill_portmap()
in print.c to
use the more modern RPC function
clnt_create() in place of clnttcp_create() where
possible. PTX 4.4.4 requires clnt_create().

4.41 February 27, 1999
Added FreeBSD 3.1 and and 4.0 support with help
from Sheldon Hearn <axl@iafrica.com>, David O'Brien
<obrien@NUXI.com>, and John Polstra <jdp@polstra.com>.

Corrected bungled AIX 4.3+ patch that went into
lsof 4.40.

Reorganized the Configure script to improve Makefile
construction. A specific impetus for this was to
allow FreeBSD system-wide make flags to be propagated

to the lsof Makefiles, but other goals were to make
sure that the DEBUG= make entry can over-ride
standard CFLAGS values, and to better manage the
identification of compilers and their versions.
Two compiler-related values may now be supplied in
environment variables: 1) the compiler path in
LSOF_CC; and 2) the compiler version in LSOF_CCV.
00XCONFIG documents them.

Added support for Pyramid Reliant Unix bsdsfs,
msockfs, and sockfs
file systems.

Added an optional LSOF_CINFO string to Configure,
producing a CINFO string in selected Makefiles,
producing a #define LSOF_CINFO in selected version.h
header files. The purpose of this is to allow
Configure the option to propagate information to
the lsof -v output. It is now used for Linux to
identify the code base, and for HP-UX 10.30 and
11.0 and Solaris 7 to identify the kernel bit size.

Added system information to NEXTSTEP and OPENSTEP
-v output, from the second line of hostinfo's
output.

Fixed a login name buffer overflow problem in the
processing of -u option values. This was offered
as a patch to 4.40. !!!THIS IS A SERIOUS STACK
OVERFLOW BUG; A LINUX EXPLOIT EXISTS FOR IT THAT
OPENS A BASH SHELL WITH LSOF'S AUTHORITY -- E.G,
SETGID(KMEM) POWER!!!

Improved the Solaris mount table filter so the
volume manager's fake mount point, "/vol", is
ignored and doesn't supplant "/" in NAME column
path assemblies. Igor Schein
<igor@txc.com> reported
this bug and provided important help in finding
it. This was offered as a patch to 4.40.

Changed the Linux /dev/kmem-based lock ownership
test to answer a problem reported by Tom Christiansen
<tchrist@jhereg.perl.com>. This was offered as a
patch to 4.40.

Installed an HP-UX 11 patch, suggested by Kevin
Vajk <kvajk@cup.hp.com>, that adjusts a private

lsof kernel header file, derived via Q4, to correspond
to an HP-UX patch bundle.

Made NetBSD 1.3I sockproto structure adjustment.

4.42 March 30, 1999
Fixed a typo in the HP-UX dfile.c that caused +fF
and +fN output controls to swap effect.

Enabled for OpenBSD 2.5 per notice from Kenneth
Stailey <kstailey@kstailey.tzo.com>

Made more VM accommodations for FreeBSD 4.0.

Improved file system search reporting to include
path name components when they're available, instead
of mindlessly reporting the file system name in
the NAME column. Guy Dallaire <gdallair@geocities.com>
brought
the need for this change to my attention.

Updated Solaris 2.6 VxFS for Veritas Oracle Database
Edition 2.0, VxFS version 3.3, and VxVm version
2.5.4, based on a report from Chris Kordish
<chris.kordish@East.Sun.COM>. Chris kindly provided
a test system.

Improved HP-UX ipc_s patch detection in Configure,
response in .../dialects/hpux/hpux11/ipc_s.h, and
documentation in 00FAQ, Kevin Vajk <kvajk@cup.hp.com>
helped test.

Added to Customize the option to suppress HASKERNIDCK
selection for specified dialects. Suppressed it
for /proc-based Linux lsof, and removed its test
and code from there. Tin Le <tin@netimages.com>
alerted me to the need for this update.

Ported to official Digital UNIX 5.0 release.

Changed DU lsof to use the knlist(3) function when
no kernel file has been specified with -k. This
change was suggested by Erich Wimmer
<Erich.Wimmer@digital.com>.

Updated Configure for latest NetBSD (1.3I?) with
UVM support the

default.

4.43 May 11, 1999
Corrected a typo in the Solaris gcc discussion in
00FAQ. Made changes to the Solaris 2.5[.1] private
tcp_s structure. Both changes were done in response
to reports from Igor Schein <igor@txc.com>, who
tested the Solaris 2.5 change.

Made more IPv6 adjustments to lsof for Tru64 UNIX
(Digital UNIX) 5.0, based on information obtained
from Compaq by Berkley Shands <berkley@cs.wustl.edu>.

Corrected HP-UX error message about HP-UX 11 q4 usage.
Amir Katz <amir@ndsoft.com> reported the correction.

Fixed a GlibC 2.1 conflict in /proc-based Linux lsof.

Fixed a man page typo reported by Vlad Harchev
<hvv@hippo.ru>.

Changed some Solaris 2.7 references to Solaris 7
in Configure and 00XPORTING.

Added a Solaris example to the echo statements that
are the install rule in the SunOS/Solaris Makefile.

Added a field to the file structure output --
FILE-FLAG (file structure open flags, f_flag[s],
and process file flags, typically
u_pofile)) --
enabled with +f[gG]. Its field output character
is 'G'.

Figured out another piece of the HP-UX 11 patched
ipc_s structure puzzle with the help of Keith Kalet
<KEITH_KALET@HP-USA-om41.om.hp.com>.

Fixed a PTX real vnode to real inode interpretation
bug.

Added link count to lsof output. Eric Dumazet
<dumazet@risgw.ris.fr> requested and helped test
it. The new +L option enables and filters it.
Its field output character is `k'.

Updated Configure script to recognize NetBSD 1.4.

Updated AFSConfig to handle default answers to
questions.

Incorporated patch from Jonathan Sergent <sergent@io.com>
that enables /proc-based Linux lsof to run on both
32 and 64 bit kernels.

Updated Configure script with a patch from David
O'Brien <obrien@NUXI.com> that recognizes FreeBSD 3.2.

4.44 June 24, 1999
Corrected use of nlink member of hsnode for SunOS
4.1.x High Sierra File System files. John Dzubera
<zube@tlaloc.stat.colostate.edu> reported
the
problem and helped test the fix. Also fixed a
SunOS segmentation fault bug. These fixes were
offered as a patch to 4.43.

Improved handling of /proc-based Linux UNIX PCB
address.

Fixed a NEXTSTEP and OPENSTEP bug that made repeat
option (-r) processing malfunction. This fix was
offered as a patch to 4.43.

Fixed Configure so it doesn't use -O in the Cflags
for the bundled HP-UX C compiler. Jim Ankenbrandt
<jankenbrandt@penton.com> reported the problem.

Corrected output ordering of parent PID and process
group ID when both -R and -g are specified.

Enhanced the pdev.c and pdvn.c library modules for
wider use. These dialect versions use the new
library modules: DEC OSF/1, Digital UNIX, and Tru64
UNIX; Pyramid DC/OSx and Reliant UNIX; SCO OSR and
UnixWare; and Sequent PTX.

Added basic clone device support to /dev/kmem-based
HP-UX lsof for HP-UX 10.30 and higher.

Added raw socket support to /proc-based Linux lsof.

Changed NODE-ADDR
column title to NODE-ID in
anticipation of using more general identification
information in the column.

Ported to UnixWare 7.1, using a test system kindly
provided by Matt Thurmaier <matt@compclass.com>
and Don Draper <dond@sco.com>.

Updated for NetBSD 1.4C VM changes, and a new
current and root working directory structure.

Made minor adjustment for latest Tru64 UNIX 5.0
Beta release.

4.45 July 30, 1999
Fixed quoting problem in DEC OSF/1, Digital Unix,
and Tru64 UNIX Makefile's install rule. The problem
was reported by Berkley Shands <berkley@cs.wustl.edu>.
Fixed bug in Tru64 UNIX 4 lsof that caused FDs to
be skipped. These fixes were offered in a patch
to 4.44.

Fixed a repeat-mode /proc-based Linux lsof bug,
reported by Sami Farin <sfarin@ratol.fi>. This
was offered as a patch to 4.44.

Picked lint, some reported by Sami Farin.

Corrected a 00DCACHE documentation error in a sample
shell script. The problem was reported by Chad R.
Larson
<chad@larsons.org>. Changed commented-out
entries in machine.h files so they require more
thought and work when the comments are removed,
based on a remark by Chad.

Compensated for the practice of Solaris 7 and above
to record the dev= value in /etc/mnttab in 32 bit
mode, even on 64 bit systems. This was offered as
a patch to 4.44.

Added a C library test for /proc-based Linux lsof,
so that the #include files can be adjusted for a
non-GlibC environment. The need for this was
reported by Andrew Hill <andrewh@tirin.openworld.co.uk>.
This was offered as a patch to 4.44.

Added support for Auspex LFS 1.8.1 and 1.9.2 to
SunOS 4.1.4 lsof. The support was requested by
Quentin Fennessy <quentin@dvorak.amd.com>, who
provided information and did testing.

Enabled IPv6 support code for NetBSD and OpenBSD, conditional on Configure script tests. Wolfgang Rupprecht <wolfgang@wsrcc.com> supplied the NetBSD code and tested it. The OpenBSD code I constructed has been compiled but not tested.

Updated the identd Perl 5 script, based on a report from Wendy Lin <af5@taiyang.cc.purdue.edu> that the space in its response line in front of the user name violates RFC 1413.

Added IPv6 support to /proc-based Linux lsof. Jonathan Sergent <sergent@ETLA.NET> and Andrew Thomas Sydelko <sydelko@ecn.purdue.edu> kindly provided a test system.

Updated man page description of AIX multiplexed files to indicate that they might be /dev/ptc or /dev/pts, depending on the AIX version. The correction was suggested by Onno van der Linden <onno@simplex.nl>.

Sylvain Robitaille <syl@alcor.concordia.ca> reports lsof passes his Y2K tests.

4.46 October 23, 1999

Corrected /proc-based Linux lsof to detect that an IPv6 address is a mapped IPv4 address. The problem was reported and analyzed by Arkadiusz Miskiewicz <misiek@misiek.eu.org>, who also tested the fix.

Added a libc5 library /dev/kmem-based Linux lsof circumvention, supplied by Jason Lingohr <lingman@lucid.net.au>.

Corrected a bug in -t (terse) AIX output, reported by Wendy Lin <af5@taiyang.cc.purdue.edu>. I introduced the bug at revision 4.43 when adding FILE_FLAG reporting. This was offered as a patch to 4.45.

Added a work-around for a problem in the OpenBSD 2.3 <sys/pipe.h> header file. Volker Borchert <bt@teknon.de> provided and tested it.

Improved description of cross-building lsof for a
64 bit Solaris 7 system on a 32 bit system with
suggestions from Phillip Edwards
<Philip.Edwards@sn.wpafb.af.mil>.

Fixed a gawk POSIX-mode pattern error in the Linux
/dev/kmem-based Mksrc script, based on a tip from
Ambrose C. Li <acli@mingpaoxpress.com>.

Fixed a bug in the Tru64 UNIX IPv6 handling, courtesy
of a report from Casper Dik <casper@holland.sun.com>.

Enabled support for OpenBSD 2.6.

Enabled support for BSDI BSD/OS 4.1, based on a
report from Jeffrey C Honig <jch@bsdi.com> that
only
a Configure script change is necessary.

Enabled Configure script to use gcc for building
lsof for a 64 bit Solaris 7 and 8 kernels, if the
gcc version is 2.95 or above.

Improved -i option handling for systems with IPv6
support so that it will search for a host name in
both IPv4 and IPv6 families, when that is possible.
As a companion modification, changed -V processing
to report a single error when a multiple host name
match is requested. Casper Dik <casper@holland.Sun.COM>
helped test.

Fixed a DEC OSF/1, Digital UNIX, Tru64 UNIX repeat
mode bug, reported by Mayer Ilovitz <mayer@cooper.edu>.
Mayer helped test the fix. The fix was offered as a
patch to 4.45.

Changed Solaris socket file recognition scheme, so it
is (nearly) the same through Solaris 8, where the
previous clone device scheme no longer works.

With significant assistance from Casper Dik, added
support for Solaris 8 Beta and Beta refresh. The
IPv6 support in Solaris 8 is still
in some flux,
so there are temporary compensations for the
differences between Beta IPv6 support and Beta
refresh IPv6 support. Casper and I hope those
differences disappear by FCS.

Improved the delivery of information on Solaris
2.5.1, 2.6, 7, and 8 door files.

Fixed a repeat mode bug that surfaces when /etc/passwd
changes between cycles. The bug report and diagnostic
help were supplied by Igor Schein <igor@txc.com>.
The fix was offered as a patch to 4.45.

Added support for INRIA IPv6 to NetBSD. Jean-Luc
Richier <Jean-Luc.Richier@imag.fr> provided patches
and a test system on which to verify them.

Added support for AIX 4.3.3. Jeff W. Stewart
<jws@anaconda.cc.purdue.edu> provided a test system.

Made adjustments for FreeBSD 4.0-current.

Improved reporting of information for AIX sockets that
lack protocol control blocks.

4.47 November 29, 1999
Based on a query from Jean-Pierre Radley <jpr@jpr.com>,
changed the lsof top-level Makefile to
propagate
CFGF to the library Makefile. (DEBUG was already
being propagated.) Added osrgcc and scogcc Configure
abbreviations (to use gcc) for Jean-Pierre.

In response to a query from Igor Schein <igor@txc.com>,
improved the Configure script test for Solaris 7
and 8 that decides if the compiler can produce 64
bit executables.

Made an ugly hack, based on making a private rnode
structure definition from q4 output, to compensate
for HP-UX 10.20 and lower recent NFS3 patches. HP
didn't supply an updated <nfs/rnode.h> with the
patches. The problem was reported by Will Partain
<partain@mekb2.sps.mot.com>. Elias Halldor Agustsson
<elias@hi.is> helped identify the patches as
PHNE_18173, PHNE_19426, PHNE_19937, and PHNE_20091,
and provided a test system.

Switched BSDI test system from 2.1 and 3.1 to 4.0.1,
courtesy of Terry Kennedy <terry@tmk.com>.

Added some more dev_t hacks for Alpha FreeBSD 4.0.

Added support for IPv6 on BSD 4.x. The support hasn't
yet been tested, just compiled.

Added support for the mnt file system (mntfs or
/etc/mnttab) on Solaris 8. Tested on Solaris 8
BETA-Refresh.

Made selection of optional fields (e.g., PPID with
-FR) in a field output specification select the
optional field, too, so that the option selector
for the field (e.g., -R) isn't also required. This
change was made in response to an inquiry from John
DuBois <spcecdt@armory.com>. This may require some
revision to scripts that parse all field output;
two scripts in the lsof distribution's scripts/
subdirectory had to be updated.

Corrected handling of Linux IPv4 addresses mapped
in IPv6 addresses.

Tested under OpenBSD 2.6.

4.48 January 14, 2000

Modified -i argument processing of colon-separated
IPv6 addresses to recognize an IPv4 address mapped
in an IPv6 address and handle it as an IPv4 address.
This was offered as a patch to 4.47.

Added a defined symbol (NOWARNBLKDEV) to control
(inhibit)
the issuance of a warning when no block
devices are found. This was done anticipating its
need in FreeBSD 4.x, but that dialect version no
longer has any block devices, so HASBLKDEV was
disabled for it instead. NOWARNBLKDEV was left in
place for possible use in the future.

Enabled KAME IPv6 Configure support for FreeBSD
when <netinet6/in6.h> is found.

Disabled use of gcc to compile lsof for 64 bit
HP-UX 11.

Updated Configure to recognized FreeBSD 3.4.

Based on suggestions from Bernt Christandl

<beb@MPA-Garching.MPG.DE> improved AFS configuration
for AIX and Solaris, and updated AIX AFS 3.5 support.
Johannes Tax <tax@bluedog.oit.unc.edu>, Hung T.
Pham <hung_pham@unc.edu>, and Curt Freeland
<curt@grumpy.cse.nd.edu> provided test systems.

Updated lsof's private rnode definition for AIX
4.3.3, since IBM still doesn't ship the
<oncplus/nfs/rnode.h> header file and the rnode
structure definition in <nfs/rnode.h> doesn't match
what the kernel
uses. This was offered as a patch
to 4.47.

Weakened the test in the Linux /proc-based lsof of
the field count of data lines in /proc/net/{tcp,udp}.
It appears that recent 2.3.x Linux kernels have
added untitled fields to these files. The bug
report came from Gabor Liptak <gaborliptak@usa.net>.

Adjusted for a FreeBSD 4.0 change in the definition
of [_]KERNEL. David O'Brien <obrien@NUXI.com> reported
the problem and provided a test system.

Removed the HASPPID bracket from Fppid (the -R
option state variable) so that the field select
table will compile even when HASPPID is not defined.
This problem was introduced at revision 4.47 with
code that causes some field output characters to
set option states. The problem was reported by
David Bacon <bacon@birch.eecs.lehigh.edu>.

4.49 April 3, 2000
Made clearer in man page that "Lxx" FDs are AIX
loader table references. Also updated the 00FAQ
discussion of the Stale Segment ID bug to include
AIX
4.3.x.

Modified support for NetBSD 1.4Q to include the
<sys/buf.h> header file to cope with an MFS change.

Added support for OpenBSD UVM virtual memory.

Added support for AIX systems with > 2GB of memory.
Chris Sylvain <csylvain@itg.ummc.umaryland.edu>
reported the problem and provided the solution.
Chris also supplied some minor code cleanup. This

was offered as a patch to 4.48.

Based on new information from Igor Schein <igor@txc.com>
made additional compensation in Configure script
for 64 bit Solaris 7 and 8 gcc.

Added some 00FAQ info on the effect ordering of
the +fg and -FG options has on output format.

Improved NetBSD IPv6 configuration, based on a
suggestion from Thomas Klausner
<wiz@danbala.ifoer.tuwien.ac.at>. Added code to
convert IPv4-mapped-in-IPv6 addresses to IPv4
addresses.

Updated the information in 00FAQ and the HP-UX 11
binary directory README files on the HP-UX 11 ipis_s
patch with new information supplied by Eric McWhorter
<emcwhorter@xsis.xerox.com>.

Added
documentation on changes to HASFSTYPE and
HASNCACHE, and the new HASPRIVPRIPP.

Adjusted Configure for FreeBSD 5.0. Made additional,
necessary changes to Configure and the BSDI sources
to eliminate load errors.

Added KAME IPv6 support to FreeBSD at the request
of Ollivier Robert <roberto@eurocontrol.fr>, who
provided a test system.

Corrected the script that generates the CHECKSUMS
files for binaries to correctly name the detached
PGP certificate. The documentation bug was reported
by Michael Hennecke <hennecke@rz.uni-karlsruhe.de>.

4.50 June 29, 2000
Added a NetBSD alpha test host, courtesy of Ray
Phillips <r.phillips@mailbox.uq.edu.au>. An lsof
4.49 binary, built on Ray's 1.4.1 system was made
available prior to the 3.50 release.

Upgraded the system map file tests in /dev/kmem-based
Linux lsof, making the use of DEBIAN_LINUX_LSOF
unnecessary. Tested the changes on a system made
available by

Vincent Kujala <kujala@geog.ubc.ca>
and Jim Mintha <jim@ic.uva.nl>.

Forced AIX to use the large-file-enabled versions
of lstat (lstat64) and stat (stat64) if <sys/stat.h>
contains stat64. This should allow lsof to stat()
AIX files > 2GB even when the builder has not
defined the "large file enabled programming
environment." Configure tests <sys/stat.h> and
puts -DHASSTAT64 in the Makefile's CFLAGS to make
this happen. Fernando A.B. Whitaker
<whitaker@cenapad.unicamp.br> reported the problem.
This was offered as a patch to 4.48.

Enabled Configure script to handle OpenBSD 2.7.
Angelos D. Keromytis <angelos@dsl.cis.upenn.edu>
reported the availability of OpenBSD 2.7 and supplied
the Configure script patch.

Improved handling of DOOR and fattach()'d files in
Solaris.

Changed message about missing kernel symbol file
from "not yet determined" to "none found".

Updated FreeBSD, NetBSD, NEXTSTEP, OpenBSD, and
OPENSTEP support to report "no PCB" and
the values
of the SO_CANTSENDMORE and SO_CANTRCVMORE state
flags when a socket structure has no inpcb pointer.
This modification was made to AIX lsof at revision
4.46. Added an entry to 00FAQ about sockets that
have no inpcb pointer.

Upgraded support for FreeBSD 5.0-CURRENT. Ben
Smithurst <ben@scientia.demon.co.uk> supplied
patches and did testing. David O'Brien <obrien@NUXI.com>
supplied a test system. The update included dropping
the Fctty part of file descriptor file system
support, conditional on a Configure script test.
I propagated those changes to BSDI, NetBSD, and
OpenBSD in anticipation of their having the
modification in the future. David also arranged
with Michael Haro <mharo@area51.fremont.ca.us> for
a FreeBSD 3.4 test system.

In response to an lsof 3.72 bug report from Jim Mewes
<jim@corp.phone.com>, added more kernel address

filtering to the lsof function, kread(), that reads
Solaris kernel data.

In response to a report
from Marc Duponcheel
<marc@offline.be>, added tests to the /proc-based
Linux lsof to ignore file systems of types "autofs"
and "pipfs".

Based on a report and information supplied by Casper
Dik <casper@holland.Sun.COM>, updated the ncache_load()
function in lib/rnch.c with new code that deals
with a post Solaris 8 change in kernel name cache
(DNLC) handling. Casper tested the update, which
should be invisible to Solaris versions without
the new DNLC code.

Added support for Solaris VxFS QIO files, based on
a report from Kieran Broadfoot <kieran.broadfoot@gs.com>.
Kieran help test the support.

Added support for PTX 4.4.6 and 4.5[.1] with help
from the usual cast of good people at Sequent.

Added support for 64 bit file sizes and offsets on
BSDI, FreeBSD, NetBSD, and OpenBSD, based on a
report from Dan Nelson <dnelson@emsphone.com>.
Dan supplied a patch and did FreeBSD testing.

Added Configure script recognition of NetBSD 1.5,
based on a report
from Andrew Brown <atatat@atatdot.net>.
Thomas Klausner <wiz@danbala.ifoer.tuwien.ac.at> updated
the NetBSD port package to use a pre-release of this
addition.

At the last minute saw a notice via deja.com's
UseNet search service that FreeBSD 3.5 had been
released and lsof didn't grok it. Added recognition
of 3.5 to lsof's Configure script, but didn't have
the opportunity to test lsof on 3.5.

4.51 August 21, 2000
Added Configure script support for the upcoming
Solaris 9 release based on suggestions from Casper
Dik <Casper.Dik@holland.sun.com>.

Changed sample Perl scripts to assume that

/usr/local/bin/perl is Perl 5 and Perl 4 may be
found in /usr/local/bin/perl4.

Updated Configure to recognize FreeBSD 4.1 and made
a FreeBSD pre-release distribution available.

Bela Lubkin <belal@sco.COM> tested lsof on the
upcoming SCO OSR 5.0.6 release and reports that
lsof appears to work properly.

Updated the AIX compiler test in Configure to
recognize
its version 5.

Updated AIX 4.3.3 support with automatic recognition
of the proper rnode structure, based on machine
bit width. Also added code to detect when processing
the -X option that lsof has been compiled with the
"other" AIX 4.3.3 user structure and to apply
compensations. When a compensation method works,
it's applied during subsequent -X processing; when
none works, further -X processing is disabled.

Added Tru64 UNIX 5.1 support. Updated Tru64 UNIX
library text file support to recognize new kernel
support for AdvFS library files. Berkley Shands
<berkley@cs.wustl.edu> and Klaus Saggerer USG
[saggerer@zk3.dec.com> helped put me in contact
with Chang Song <song@zk3.dec.com>, the developer
of 5.1's new kernel name cache and he helped me
develop new code in lsof to access it.

Corrected reporting of PTX fattach()'d address.

Changed Configure and dlsof.h for NetBSD and OpenBSD
to use /usr/include/uvm header files when available.
Andrew
Brown <atatat@atatdot.net>, Thomas Klausner
<wiz@danbala.ifoer.tuwien.ac.at>, and Wolfgang
Rupprecht <wolfgang@wsrcc.com> pointed out the need
to do this for NetBSD. Andrew provided access to
a NetBSD 1.5 system for verifying the changes.

Installed snprintf() support, including a private
version in the lsof library for those UNIX dialects
without the function. Changed all sources to use
it instead of sprintf() and strcpy().

Fixed a memory leak in the readvfs() functions of
BSDI, DEC/OSF1, Digital UNIX, FreeBSD, NetBSD,
OpenBSD, and Tru64 UNIX.

Tested on Linux 2.4.

Modified the Pyramid MkKernOpts script to compensate
for `uname -s` configuration alternatives. Robert
Dahlem <Robert.Dahlem@ffm2.siemens.de> supplied
the modification.

Obtained access to an FCS Solaris 8 64 bit system
and built lsof on it, using Sun Workshop C 5.0 and
gcc 2.96 20000814 (experimental). Both compilers
produce a working lsof.

4.52 November 8, 2000
Completed
work on an HP-UX 11.11 port that uses a
pstat(2) interface provided by HP. To distinguish
it from its predecessors for HP-UX, this lsof
version is called PSTAT-based and the predecessor
versions are now called /dev/kmem-based. I am
indebted to the far-sightedness and support of
these good people at HP for making PSTAT-based lsof
possible: Carl Davidson, Louis Huemiller, Rich
Rauenzahn, and Sailu Yallapragada. The PSTAT-based
sources are in lsof_4.52/dialects/hpux/pstat, the
/dev/kmem-based ones in lsof_4.52/dialects/hpux/kmem.

Ported to IBM Monterey for Merced|Itanium, aka AIX
5L. It configures via the Configure script's "aix"
abbreviation and has been tested on AIX 5L Beta 3.
Jay Beck, Steve Dibbell, Loc Le, Nasser Momtaheni,
and Malcom Zung of IBM provided generous support.
Since AIX 5L is still in Beta testing, this port
can't be considered complete.

Added Configure support for OpenBSD 2.8. David
Mazieres <dm@cs.nyu.edu> provided a test
system.

Based on a report from Marc Christensen
<marc@mecworks.com> added sockfs to the mount scan
exemption list for /proc-based Linux lsof.

Added large file, CDFS, and DOSFS for UnixWare 7.x.

Added UnixWare device memory mapping support. All
UnixWare changes were supplied by Eric Dumazet
<edumazet@cosmosbay.com> Eric also supplied some
miscellaneous bug fixes.

Deferred name cache loading until printname() needs
to use the name cache.

Terminated Pyramid, SunOS 4.1.x, and Ultrix support,
because test systems are no longer available.
Final Pyramid and Ultrix source code distributions
for lsof revision 4.51 may be found on lsof.itap.purdue.edu
in pub/tools/unix/lsof/OLD/src. The no longer
supported SunOS 4.1.x source code is still distributed
with the Solaris source code.

Added code to set Solaris node address to real vnode
address, when applicable.

John Speno <speno@lopan.isc-net.upenn.edu> provided
information that enabled me to update
the Tru64
AdvFS (MSFS) node definition for AdvFS version 5.

Added Tru64 5.x CFS support with help from Kris
Chandrasekhar <Kris.Chandrasekhar@compaq.com>,
Diane Lebel <lebel@zk3.dec.com>, and John Speno.
The support only provides information about cached
file attributes.

Installed a Configure patch for HP-UX 11 supplied by
Kenneth Stailey <kstailey@disclosure.com> that adds
another command to q4 input.

Tested on FreeBSD 4.2.

Will Day <willday@rom.oit.gatech.edu> and Frank
Winkler <frank.winkler@germany.sun.com> graciously
supplied Solaris 8 binaries.

Added Solaris 9 text file support, supplied by
Casper Dik <Casper.Dik@holland.sun.com>.

4.53 December 6, 2000
Added the AIX 5L j2_lock.h to the distribution with
a Configure script step to use it when it's missing
from /usr/include/j2.

Removed SunOS 4.1.x support.

Removed Linux 2.0.x /dev/kmem support.

Fixed VBLK and VCHR special device file reporting
to handle /dev information more
accurately.

Added a Apple Darwin / Mac OS X 1.2 port, provided
by Allan Nathanson <ajn@apple.com>. Allan also
arranged for a test system so I can maintain this
port. An additional test system was provided by
Dale Talcott.

Dropped claims of support for all UnixWare versions
except 7.1.0, since that is the only version on
which I can test lsof. Even though lsof 4.53 is
deprecated for UnixWare 2.1.3, installed a patch
for it with testing done by A. Channing Clark
<clark.channing@heb.com>.

Dropped claims of support for all SCO OpenServer
versions except 5.0.5, since that is the only
version on which I can test lsof.

4.54 January 19, 2001

Added compensation for a change that made the
FreeBSD mount structure invisible. I can only test
back to 3.2 and the compensation works there, so
it's been #ifdef'd for 3.2 and above. David O'Brien
<obrien@FreeBSD.org> provided the necessary clue.

Based on a report from Valdis Kletnieks
<Valdis.Kletnieks@vt.edu>,
changed all IPv6 support
to report a TYPE of IPv6 for sockets with IPv4
addresses mapped in IPv6 addresses. The previous
lsof behavior was to report their TYPE as IPv4.

Restored the Linux GlibC test to Configure, removed
at revision 4.53, based on a report from John Dzubera
<zube@cs.colostate.edu>, that RedHat Linux 6.0 still
needs the test.

Made setting of link count for Solaris more selective.

Limited Readlink() recursion to MAXSYMLINKS. The bug
was reported by Jan Dvorak <johnydog@go.cz>.

Dropped the *claim* that lsof runs on Solaris 2.5.1.
It may well do so, but I no longer have access to a
test system.

Fixed an #endif comment typo, reported by Igor Schein.

Fixed a typo in a cast for a Tru64 UNIX 5.1 function
and updated Configure for Tru64 UNIX 5.0 and 5.1 with
information from Jesse Perry <jesse.perry@compaq.com>.

Corrected non-fatal typos in the AdvFS support in
dnode.c for Tru64 UNIX.

Added msdos file system support for
NetBSD and OpenBSD.
Andrew Brown <atatat@atatdot.net> requested and helped
test it.

4.55 February 15, 2001
Based on a report from Bernd Eckenfels <ecki@lina.inka.de>
added support in lsof for files in /proc/<PID>/maps
that have been deleted.

Changed PGRP output title to PGID, conforming to
the most common current abbreviation for Process
Group ID (PGID). While some systems continue to
use *pgrp for internal kernel variable names, most
systems that support the display of PGID via ps(1)
now title it PGID. The lsof -g and -Fg options
operations are unchanged in function; only titles
and descriptions have changed. Also changed internal
variable names from *PGRP and *pgrp to *PGID and
*pgid where possible.

Dropped the *claim* that lsof runs on HP-UX 9.x.
It may well do so, but I no longer have access to
a test system.

In response to a suggestion from Jeff Howie
<jeff.howie@federated.ca> added support for command
name selection by regular expression.
A new form
of the -c option value is use to identify and
specify a regular expression.

Restore the *claim* that lsof works on UnixWare
7.0, since I re-acquired a test system.

4.56 May 3, 2001

Corrected some problems Amir Katz <Amir_Katz@bmc.com>
found with Insure++, one in lib/dvch.c, the rest
in Solaris sources. Amir's report also helped me
find an error in an snpf() call that caused (the
unsupported) Solaris 2.5.1 lsof to crash. Wally
Winzer, Jr. <wally.winzer@ChampUSA.COM> helped test.

Added support for UnixWare 7.1.1 and above in-kernel
UNIX sockets. John Hughes <john@Calva.COM> kindly
provided code and access to a test system. John
also provided a test system and advice for adding
UnixWare 7.1.1 NonStop Cluster and CFS support.
More help with that effort came from Kurt Gollhardt
(SCO), Barbara Howe (SCO), Bela Lubkin (SCO), and
Dewan Rashid <Dewan.Rashid@ir.com>.

Archived a set of compilation hints (patches) from
Bill Melvin
<Bill.Melvin@esc.edu> that make it
possible to compile the old, unsupported lsof 3.08
sources on UnixWare 1.x without NFS or CDFS support.

Installed support supplied by Allan Nathanson
<ajn@apple.com> for the Darwin "Gold Master" release,
Mac OS X 10.0 (aka Darwin 1.3 in its public source
version). Added Allan's CVS repository suggestions
to the script that gets additional header files
from an open source repository.

Tested an HP-UX 11.11 kernel patch from Sailu
Yallapragada that enables reporting of TCP/IP
information for telnetd processes that use the
telnet multiplexor. I don't yet know the kernel
patch ID.

Made the Solaris inclusion of <inet/mi.h> conditional
on the Solaris version. (It's apparently not needed
at 2.6 and above.) Bill Watson <bill.watson@uk.sun.com>
brought this to my attention.

Added alternate Linux 2.4.x lock extent test, supplied
by Jim Mintha <jim@ic.uva.nl>.

Rearranged the lines and pre-processor tests in
regex.h,

lib/regex.c, and lib/snpf.c so that unifdef
can be used to eliminate copyright and GPL statements
when the files aren't being used for a particular
dialect. (USE_LIB_* definitions in a dialect's
machine.h header file determine if one or more of
those three files are to be used.)

Added preliminary support for Solaris 8 with VxFS
3.4. This support will be refined as I get
information from Veritas about how they will
distribute the kernel header files lsof needs.
Those header files were omitted from the standard
VxFS 3.4 distribution. Technical assistance and
testing were provided by Calle Dybedahl <cdy@algonet.se>,
Gary Millen <gary.millen@veritas.com>, Rainer Orth
<ro@TechFak.Uni-Bielefeld.DE>, Peter C. Vernam
<pvernam@draper.com>, and Donna Yobs
<Donna.Yobs@veritas.com>

Tested on FreeBSD 4.3-STABLE.

Dropped the *claim* that lsof works on UNIX dialects
where I no longer have test systems: BSDI 2.1,
3.[01] and 4.0; DEC OSF/1, Digital
UNIX and True
64 UNIX 2.0 and 3.2; FreeBSD 2.1.[67], 2.2[.x],
3.[012345] and 4.[01]; HP-UX 10.20; NetBSD 1.[234];
SCO OpenServer 5.0.5; and SCO UnixWare 7.0

Tested on Solaris 9 BETA, s81_36.

4.57 July 19, 2001
Help (-h) and version (-v) output now have URLs
for the newly created and timeliest lsof FAQ
(00FAQ in the lsof distribution) at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

and the man page for the current lsof distribution
at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

Based on a report from Steve Laubscher
<slaubs@woodward.com>, modified dlsof.h for PTX
4.6[.1] to avoid a temporary dnlc_t definition
needed at PTX 4.5.1.

Corrected test for old Linux kernels in Configure.
Henri Karrenbeld <ishtar@cal044202.student.utwente.nl>
brought the error to my attention. Limited Linux
claims to 2.1.72 and above in the documentation.

Improved HP-UX 11 Configure stanza and stream socket
handling.

Constructed a work-around
for the HP-UX 11 optional
OnlineJFS package. The work-around sadly requires
lsof to have a private version of the vx_inode
structure, since the OnlineJFS package doesn't
update <sys/fs/vx_inode.h>. Troyan Krastev
<Troyan.Krastev@ricoh-usa.com> brought the bug to
my attention and Michael Bracewell
<michael@ra.TSS.PeachNet.EDU> provided a test system
where I developed the work-around.

Added locale support to lsof's isprint() test,
based on a suggestion from Dan Mercer <damercer@mmm.com>.
Lsof will use setlocale(), when that function and
its supporting <locale.h> header file are available.

Added OpenBSD 2.9 support.

Based on a report from Aaron Rhodes <arhodes@psionic.com>
and with testing help from Aaron, made the lsof
4.56 revision compile and work on OpenBSD 2.6.
While that OpenBSD version is no longer supported,
Aaron's report exposed a Configure script bug
affecting OpenBSD versions lsof does support.

Updated for FreeBSD 5.0-CURRENT.
Szilveszter Adam
<sziszi@petra.hos.u-szeged.hu> help test. The lsof
FreeBSD ports packager, David O'Brien <obrien@FreeBSD.org>,
assisted.

Tested on AIX 5.1. Loc Le and Nasser Momtaheni of
IBM provided test systems.

4.58 September 13, 2001
Added options to safestrprt() and safestrprtn() to
surround the string with "" and to suppress the
printing of an ending '\n'. Use of these functions
in device cache file error message reporting answers
a suggestion for better error reporting from John

Jackson <jrj@purdue.edu>.

Fixed a Solaris 2.6 and above problem related to
searching for "large" (O_LARGEFILE) files by name;
lsof was using the wrong version of [l]stat(2).
The bug was reported by Daniel Trinkle
<trinkle@cs.purdue.edu>.

Added AIX 4.1.4 and above XTI socket support.

Added OSR Xenix Shared Data and Semaphore file type
support with modifications supplied by Bela Lubkin.

Updated OPENSTEP support with modifications from Carl
E. Lindberg
<lindberg@clindberg.org>. The changes
enable the correct reporting of executable and
library open files ("txt" type).

Limited claims of OpenServer support to the versions
where I currently test, 5.0.4 and 5.0.6. (Lsof
probably works on 5.0.5.)

Enabled processing of -C option for PSTAT-based HP-UX
lsof.

Enabled and tested on FreeBSD 4.4.

Corrected a file system test example in 00QUICKSTART,
based on a report from Jun Biao WANG <wangjunb@cn.ibm.com>.

Made available for re-distribution a user-contributed
port of lsof 4.51 to Reliant UNIX 5.45. Thomas
Mauterer <Thomas.Mauterer@philosys.de> contributed
the port.

4.59 October 20, 2001
With the closing of the Sequent Synergy Links Lab
by IBM, terminated lsof support for PTX. The last
tested PTX lsof revision, 4.58, is available on
lsof.itap.purdue.edu in .../lsof/OLD/src.

Adjusted for FreeBSD 5.0-CURRENT NFS header file
changes, based on a report from Jos Backus
<josb@cncdsl.com>.

Corrected

a bug in the way Linux lsof identifies
the owner of a process. Lionel Cons <lionel.cons@cern.ch>
reported the problem and tested the fix. Added
code to avoid stat(2) calls on regular Linux files
whenever possible. Lionel reported the need to do
this (AFS files) and tested the new code.

Added new output field for raw device number in
hex. The field is identified with 'r'. This field
is NOT selected when -F or -F0 is specified so that
its appearance won't disturb existing scripts that
process field output.

Added support for OpenUNIX 8. A test system was
provided by Larry Rosenman <ler@lerctr.org>.
Matthew Thurmaier <matt@compclass.com> and many
people from Caldera provided technical assistance.

Added an additional UVM test to the NetBSD Configure
stanza. Andrew Brown <atatat@atatdot.net> supplied
the test; it recognizes NetBSD 1.5Y UVM changes to
the vnode structure recently committed by Chuck
Silvers.

Applied Configure and get-xnu-headers.sh
script
changes suppled by Allan Nathanson <ajn@apple.com>
for Darwin 1.4.

Added for Bela Lubkin <belal@mammoth.ca.caldera.com>
OSR-specific environment variables to supply values
to the Configure script. The variables are described
in 00XCONFIG.

Added an IP version selector to the -i option
parameters.

4.60 November 9, 2001
Added special handling to and corrected bugs in
the matching of IPv4 in IPv6 addresses to -i6:<...>
selectors.

Made 00FAQ corrections and updates, based on
discussions with Igor Schein <igor@txc.com>.

Modified Configure script to detect a 64 bit capable
gcc compiler and permit it to be used to build 64
bit (PA-RISC 2) lsof for HP-UX 11.00. Tested with

HP's gcc package, which Rich Rauenzahn of HP kindly
installed on a test system at HP. Stefan Marquardt
<stefan.marquardt@hagebau.de> helped test.

Made lsof's method of killing its child process
more robust, based on a suggestion from Bela Lubkin
<belal@caldera.com>.

Modified
all dialect Makefile segments to accept
select -v #define's from the environment -- a
builder's comment, host, logname, system information
and user name. This was done for Bela Lubkin, so
he can "tune" the -v output when he packages lsof
in the upcoming Caldera OSR 5.0.7 release.

Changed Perl scripts in scripts/ to put the lsof
path consistently in $LSOF. Also added a fix from
Bela Lubkin to scripts/big_brother.perl5 that allows
it to tolerate SCO OSR "ago" clauses in open UDP
file information. Strengthened emphasis in
scripts/00README that the scripts are examples that
shouldn't be expected to run on all UNIX dialects
without modification.

At Bela Lubkin's suggestion changed the device
cache file format examples in 00DCACHE and 00FAQ
to avoid "%U%". That's an SCCS escape sequence.

Added support for OpenBSD 3.0.

Added +DAportable to CFLAGS for 32 bit HP-UX 11.
Amir Katz <Amir_Katz@bmc.com> suggested the addition.

4.61 January
22, 2002
Updated field output example Perl scripts in the
scripts/ subdirectory to discover the lsof path,
starting at .. and proceeding through the PATH
environment variable's directories.

Added minor OSR Configure script fixes, provided
by Bela Lubkin <belal@caldera.com>.

In response to a report from Joshua Wright
<Joshua.Wright@jwu.edu> modified NetBSD and OpenBSD
Configure stanzas and sources so that lsof can be
built when there is no system source tree (e.g.,

/usr/src/sys).

In response to a report from Peter Valchev <pvalchev@openbsd.org> improved the UVM test in the OpenBSD Configure stanza.

Updated Configure script to recognize FreeBSD 4.5. Updated for FreeBSD 5.0 procfs and pseudofs changes.

Updated HP-UX stanza to see if the compiler named in the LSOF_CC environment variable is the bundled compiler. If it is, "-O" is omitted from the compiler flags.

Updated Digital UNIX 4.x and Tru64 UNIX error message related to kernel name list failures. Added an FAQ section about how a kloadsrv daemon failure can cause knlist(3) to fail. The condition was reported by Douglas B. Jones <douglas@gpc.peachnet.edu>

Based on a report from Mark W. Eichin <eichin@thok.org> made Linux lsof capable of handling and reporting file sizes greater than 32 bits.

Tested on Solaris 9 BETA-Refresh.

Corrected a bug in the matching of IPv4 addresses, mapped in IPv6 addresses, to an IPv4 parameter to an -i option.

Ported to 64 bit Power AIX 5.1 kernel with advice from David Clissold <cliss@austin.ibm.com> and Marc Stephenson <marc@austin.ibm.com>, and on a test system provided by Loc Le <lple@us.ibm.com>.

4.62 March 7, 2002

Updated 00README to reflect the usefulness of gcc for building AIX lsof. Documented a report from Brian L. Gentry <BGentry@nationsrent.com> of success on AIX 4.3.3. I documented my success on 32 bit Power AIX 5.1 and my lack of success on ia64 AIX 5.1 and 64 bit Power AIX 5.1.

Improved UnixWare >=7.1.1 reporting of UNIX socket NAME field information for NonStop Cluster systems with a patch provided by John Hughes <john@Calva.COM>.

Offered John's improvement as a patch to lsof 4.61.

Corrected bugs in handling of open files on block devices by OSR lsof. The bugs were reported by Bela Lubkin <filbo@deepthought.armory.com>.

Fixed bug in writing >32 bit device numbers for block devices to the device cache file.

Added support for reporting block special nodes not in /dev (or /devices). That required "like device special" be changed to "like block special" and "like character special". (00FAQ was updated.)

Based on a report from Peter Valchev <pvalchev@openbsd.org> improved the definition of the source for NetBSD and OpenBSD kernel symbols (the nlist() source file). NetBSD now defaults to getbootfile(3) if it is available, /netbsd otherwise. OpenBSD now defaults to /dev/ksyms if it is available,
/bsd
otherwise.

Made possible compilation under BSD/OS (BSDI) 5.0 with changes to Configure, dialects/bsdi/dlsof, dialects/bsdi/dproc.c and lib/rnmh.c. The changes were suggested by Steven Hinkle <hinkle@bsdi.com>. Note that these changes do not substantiate a claim that lsof works on BSDI 5.0, because I haven't tested it there.

Updated OpenUNIX private <sys/fs/memfs_mnode.h>, based on a report from Larry Rosenman <ler@lerctr.org> that it had been updated by Caldera patch OU800PK3. Unfortunately the patch only corrects some of the problems with the header file, so it is still necessary to distribute a private patched version of it with the lsof sources.

Applied a man page correction reported by Frederic Delanoy <max_ok@yahoo.com>.

Corrected cast bugs related to using the HP-UX bundled C compiler on HP-UX 11.11.

4.63 April 23, 2002

Added HPUX_BOOTFILE environment variable for use by the Configure script in determining HP-UX kernel

configuration
information -- e.g., the state of
the ipis_s structure in the HP-UX 11 kernel. The
change was suggested by Marc Bejarano <beej@alum.mit.edu>.
Marc also suggested some changes to the HP-UX
section in 00FAQ that discusses Configure's use of
q4 for HP-UX 11.

Fixed a bug in the Solaris lsof file system matching
code. It was not reporting that VCHR files in
/devices were in / when /devices was in /, too.

Corrected bugs in device number, file size, file
offset, and raw device number field output generation.

Added recognition of OpenBSD 3.1 to the Configure
script with a suggestion from Peter Valchev
<pvalchev@sightly.net>. Note that this change does
not constitute a claim that lsof works on OpenBSD
3.1, because I haven't tested it there.

Built an automated test suite. (See 00TEST and
the tests/ sub-directory of the lsof main directory).
Bela Lubkin requested it. Dale Talcott, John
Hughes, and Larry Rosenman helped me validate it
on their
systems.

During the development of the test suite I discovered
the following lsof bugs or missing features, and
corrected or supplied them.

* Corrected the reporting of locks for:
  o Digital UNIX 4.0d and Tru64 Unix 5.[01];
  o HP-UX 10.30 and 11.00;
  o OpenUNIX 8;
  o UnixWare 7.1.1.

* Enabled HP-UX 10.30 and 11.00 to report open NFS
  file link counts.

* Corrected the reporting of UNIX domain socket
  names for Apple Darwin, FreeBSD 4.5 and above,
  NetBSD 1.4.1 and above, and for OpenBSD 3.0 and
  above.

* Enabled HP-UX 11.11 to stat(2) large files.

* Fixed handling of combination 32 and 64 bit
device numbers in AIX 64 bit architectures.

Updated the AIX 4.3.3 NFS rnode recognition code,
first installed at revision 4.51. It looks like
some IBM update has restored a single rnode structure
independent of the machine bit width.

Updated the NetBSD and OpenBSD sources so NetBSD
can process DTYPE_PIPE files, as OpenBSD was already
able
to do.

Updated Darwin get-xnu-headers.sh script to reflect
information about a recent reorganization of the
Darwin CVS hierarchy, supplied by Allan Nathanson
<ajn@apple.com>.

Added defense against the standard I/O descriptor
attack.

4.64 June 26, 2002
Corrected some FreeBSD pre-processor directives.
David O'Brien <obrien@NUXI.com> pointed them out.

Updated lsof's main() function to: 1) close all
open file descriptors above 2 before starting; and
2) to set a non-interfering umask. Moved GET_MAX_FD
test from misc.c to proto.h, so that main() could
use it. Added multiple-include protection to
proto.h.

Moved FAQ's test suite Q's & A's to a more appropriate
section. Added a Q&A on HASSECURITY option and
its affect on searching for open files. (That was
already in the man page.)

Updated hpux/kmem/dnode.c for HP-UX < 11 compilation
with information from John Dzubera <Zube@CS.ColoState.EDU>.
While lsof doesn't support HP-UX < 11 any
more, I
try to avoid disabling it there when possible, and
a locking fix for HP-UX >= 11 in lsof 4.63
inadvertently disabled compilation of lsof for
HP-UX < 11. Fixed long-standing bug in HP-UX 10.20
lock reporting.

Removed language from the test suite programs that

requires an ANSI-C compiler.  This allowed the test
suite to be validated with cc and gcc on the un-
supported HP-UX 10.20.

At the suggestion of Manuel Bouyer <bouyer@antioche.eu.org>
switched NetBSD and OpenBSD lsof from using nlist()
to using kvm_nlist().  Made the same change for
BSDI, Darwin, and FreeBSD.

Validated test suite on OPENSTEP 4.2.

In response to a suggestion from Jeff Stoner
<jstoner@blackboard.com> enhanced support for the
FD list of the -d option to allow it to be either
an exclusion or inclusion list, using the '^' prefix
to denote exclusions.

Made adjustments for FreeBSD 4.6 and 5.0-CURRENT.
Fixed a FreeBSD /etc/make.conf CFLAGS extraction
bug, reported
by Kris Kennaway <kris@obsecurity.org>,
and new a bug in the fix, reported by Eric Cronin
<ecronin@eecs.umich.edu>

Added nullfs support for FreeBSD, NetBSD, and OpenBSD
at the request of Andrew Brown <atatat@atatdot.net>.

Modified all readmnt() functions to ignore mounted-on
directory names that don't begin with '/'.

Tested on NetBSD 1.6A and OpenBSD 3.1.

Upgraded to Solaris 9 FCS with two changes to the
BETA-Refresh support: 1) an adjustment to dnode.c
for a change in the so_so (sonode) structure; and
2) addition of Solaris 9 FCS specific DNLC code.
David Comay <David.Comay@Eng.Sun.COM> sent me the
dnode.c change and Casper Dik <Casper.Dik@sun.com>
helped with the new DNLC support code.

Applied OpenUNIX changes that permit lsof to compile
and run on the upcoming 8.0.1 release.  The changes
were supplied by Robert Lipe <robertl@caldera.com>.
Larry Rosenman <ler@lerctr.org> provided a test
system.

Added Solaris fd file system support.

4.65 October
10, 2002
Adjusted for change in FreeBSD 5.0-CURRENT inode
structure, reported by David O'Brien <obrien@NUXI.com>.
Adjusted for changes in FreeBSD 5.0-CURRENT <sys/vnode.h>.
One change was reported by Anders Nordby
<anders@FreeBSD.org>. Adjusted for FreeBSD 5.0-CURRENT
on sparc64 architecture.

Enhanced the error reporting of Solaris lsof when
it detects a kvm_open() failure, and added a 00FAQ
entry on the cause, based on a report from Peter
J. Bertoncini <pjb@anl.gov>.

Enabled compiling of lsof for NetBSD 1.5 with the
NULL file system, using a patch from Andrew Brown
<atatat@atatdot.net>.

Removed a hack in the LTbigf test program that was
once needed when it was compiled on Solaris 9 BETA-
Refresh with gcc. The hack isn't needed on Solaris
9 FCS. Janet Hempstead <jan@library.carleton.ca>
brought the need for this change to my attention.

Applied a patch, supplied by Andrew Brown
<atatat@atatdot.net>, that updates lsof for NetBSD
version
1.6F. Corrected handling of the NetBSD
nullfs.

Updated to BSDI BSD/OS 4.3 on a test system kindly
provided by Terry Kennedy <terry@tmk.com>.

Updated to FreeBSD 4.7.

Updated to Apple Darwin 1.5, 5.x and 6.x with
patches supplied by Allan Nathanson <ajn@apple.com>.
The patches include IPv6 support.

Updated Configure to use the -bnolibpath loader
option when building lsof on a PowerPC, running
AIX 5 or greater. Valdis Kletnieks
<Valdis.Kletnieks@vt.edu> informed me this was
needed. Lsof for AIX 5.x was initially developed
on the IA64, where -bnolibpath can't be used and
I didn't think to restore it to PowerPC loads when
AIX 5.x became available for that architecture.

Updated to UnixWare 7.1.3 on a test system provided
by Larry Rosenman <ler@lerctr.org>. Removed claims
that lsof works on OpenUNIX 8.0.1, because UnixWare
7.1.3 is the release name of OpenUNIX 8.0.1.

Based on a comment that his e-mail address was
wrong in the lsof distribution
from Kenneth Stailey
<kstailey@disclosure.com>, removed all e-mail
addresses from lsof documentation files except this
one, 00DIST. The addresses in 00DIST are used to
send revision release notices to those who contributed
to a revision, but the addresses in this file for
previous revisions and in other documentation files
sometimes grow stale and are never validated.

4.66 December 22, 2002
Acquired Solaris 7 and 8 test systems, courtesy of
John Dzubera <Zube@CS.ColoState.EDU>. Updated
00TEST and tests/TestDB accordingly.

Clarified FreeBSD 5.0 architecture claims at the
suggestion of David O'Brien <obrien@NUXI.com>.
Also implemented David's suggestion to change
Intel to x86.

Installed changes to DNLC handling in OSR lsof in
preparation for handling changes in the OSR 5.0.7
DNLC cache. Information about the changes and
patches to handle them were supplied by Bela Lubkin
<filbo@deepthought.armory.com>.

Upgraded True 64 UNIX support
to the 5.1B release
on a test system provided by Berkley Shands
<berkley@cse.wustl.edu> Had to used relaxed ANSI
compilation because of an error in a system header
file and other lsof source usages.

Implemented the HASNOSOCKSECURITY compile-time
option. When it and HASSECURITY are defined, lsof
will be built to list only the user's open files,
but will also list anyone else's open socket files,
provided the "-i" option selects their listing.
Updated the Customize script to ask about setting
HASNOSOCKSECURITY. Left it undefined in all dialect
machine.h header files. This change was requested
by Kenneth Stailey <kstailey@speakeasy.net> for

use with ntop.

Added support for OpenBSD 3.2 and its kernel trace
file.

Improved lsof help (-h) and version (-v) information
reporting.

Fixed a FreeBSD 4.7 and above off-by-two UNIX domain
socket path termination bug, reported by Ken Stailey
<kstailey@speakeasy.net>

4.67 March 27, 2003
Began the
transition of the lsof ftp server host
name from vic.cc.purdue.edu to lsof.itap.purdue.edu.
That reflects Purdue organizational changes. This
first step makes the new name an alias to the old
one. The old name, vic.cc.purdue.edu, will remain
usable for an extended period.

Corrected a revision number reference in section
17.17 of 00FAQ on the appearance of Solaris negative
DNLC caching handing.

Updated 00FAQ discussion of compilers for 64 bit
Solaris.

Validated test suite for 64 bit Solaris 8 and gcc.

At the request of Alek O. Komarnitsky <alek@komar.org>
added the "+c <width>" option to enable optional
changing of the COMMAND column output maximum width
from the default to <width>. The default maximum
width remains CMDL, as defined in lsof.h.

Fixed three AIX kernel bit size detection bugs,
one in the AIX Configure script stanza, the second
and third in the AIX dproc.c get_kernel_access()
function. The bugs were reported by Pierre-Yves
Fontaniere
<pyf@cc.in2p3.fr>, who tested the fixes.

Added kernel event queue file support for FreeBSD,
NetBSD and OpenBSD. Andrew Brown <atatat@atatdot.net>
supplied the code.

Updated to AIX 5.2 on a test system provided by

Dale Talcott <dtalcott@purdue.edu>. Had to build
work-arounds for two missing AIX 5.2 header files,
<j2/j2_snapshot> and <proc/proc_public.h>. Corrected
an off-by-one UNIX socket addressing bug. Taught
AIX lsof to handle both jfs and jfs2 files at the
same time. Adjusted for an IBM mistake in the
sizing of the fdsinfo structure in <procinfo.h>
Toshiya Nakamura <TOSHIYAN@jp.ibm.com> helped test,

Updated to FreeBSD 4.8. Corrected another bug in
FreeBSD UNIX domain socket name handling.

Corrected gcc build problems on HP-UX 11i, reported
by Yuliy Minchev <yuliy@mobiltel.bg>.

Updated BSDI BSD/OS support to 4.3.1.

Augmented a lock ID test on NetBSD to check if the
ID is an LWP pointer.

4.68 June 18, 2003
Enhanced Configure
script's cleanup operations.

Added support for OpenBSD 3.3, based on a report
from Peter Valchev <pvalchev@sightly.net>.

Improved the description of the detached PGP
signature certificate file in the main lsof README
file, based on a suggestion from Diana Stockdale
<diana@mpl.ucsd.edu>.

Installed a work-around for FreeBSD 5.0-CURRENT on
Alpha to avoid a compiler register use complaint.

Corrected a 'c' option error message. Gnele
<blaadeleng@yahoo.com> reported the problem.

Upgraded EXT2FS and UFS support for NetBSD and
OpenBSD to handle new inode information, and the
fast UFS1 and UFS2 file systems.

With the help of Andrew Brown <atatat@atatdot.net>
determined the NetBSD snapshot (1.6F) at which
<sys/mount.h> could be included under _KERNEL, thus
eliminating the lsof netexport.h hack. The same
change applies to OpenBSD versions 3.3 and above.

Applied a patch from Armin Gruner <ag@muc.de> that
corrects the use of the HASPROCFS definition
in the
FreeBSD dialect sources.

Corrected spelling errors in 00FAQ and in the
generated 00.README.FIRST_<version> file of the
distribution archive. John Jackson <jrj@purdue.edu>
and Ray Phillips <r.phillips@jkmrc.uq.edu.au>
spotted and reported the errors.

Corrected a spelling error in a comment and incorrect
use of an alarm function in the LTsock test program.

At the suggestion of Stuart Anderson <sba@srl.caltech.edu>
added preliminary (and incomplete) SAM-FS file system
support to Solaris lsof. Completion awaits availability
of SAM-FS internals.

Fixed a Solaris device name printing bug, reported by
Ric Anderson <ric@tick.Telcom.Arizona.EDU>, only
visible when HASDCACHE is not defined. Ric helped
test the fix.

Fixed an AIX kernel bit size handling bug related
to the NFS node (rnode) structure.

Corrected a print_kptr() function call error in the AIX
AFS code, reported by David Steiner
<david.r.steiner@Dartmouth.EDU>. Upon further
reflection
and because I no longer have appropriate AIX AFS test
systems, disabled AIX AFS support in the Configure script
for AIX versions above 4.3.3.0 or AIX AFS versions above 3.5.

Added support for FreeBSD 5.1.

With advice from Allan Nathanson <ajn@apple.com> adjusted
the Darwin get-xnu-headers.sh script to access the kernel
header files needed by lsof from a new form of the Apple
open source repository.

Installed Linux and lsof library bug fixes and
improvements, supplied by Marian Jancar <mjancar@suse.cz>.
One Linux improvement handles mount strings that
have octal escapes in them, eg., \040 for embedded
blanks. Marian tested the changes.

4.69 October 16, 2003

Received and applied an OpenBSD patch from Peter Valchev <pvalchev@sightly.net> that replaces a ctob() call with a sysconf() call. Peter claims sysconf() is needed for OpenBSD on SPARC. (It is not needed for NetBSD on SPARC.)

With the upgrade of my only Solaris 7 test system to,
Solaris 8, dropped the *claim* that lsof works on Solaris 7. That doesn't mean it won't work there, so those who want lsof for Solaris 7 probably should be able to build it there and it probably will work there.

Revised lsof's DNLC handling for BSD derivatives, including: BSDI; Darwin, DEC OSF/1, Digital UNIX and Tru64 UNIX; FreeBSD; NetBSD; and OpenBSD. The latest NetBSD distribution's dropping of the vnode capability ID (v_id) required the revision.

Adjusted to the latest FreeBSD 5.1-CURRENT.

Added NetBSD support for using kvm_getproc2().

Added a patch from Andrew Brown <atatat@atatdot.net> to handle NetBSD enum conflicts and changes in the <miscfs/kernfs/kernfs.h> and <miscfs/procfs/procfs.h> header files.

Added a "#define _KERNEL" to the AIX dnode2.c source file for compatibility with a new <j2/j2_inode.h> AIX 5.2 header file version. The addition was supplied by Dick Dunbar <Dick.Dunbar@Siebel.com> and was offered as a patch
to lsof 4.68/

Added support for a second type of Solaris SAMFS. Stuart Anderson <sba@srl.caltech.edu> provided the support. SAMFS support in lsof SOLARIS remains scanty, because Sun won't release any details on its kernel structures.

Dropped the *claim* that lsof works on AIX 4.3.3, because I was unable to test it there. That doesn't mean it won't work there, so those who want lsof for AIX 4.3.3 probably should be able to build it there and it probably will work there.

Updated for Solaris 10 on test systems provided by
Mike Miscevic <miscevic@hotpop.com>. Casper Dik
<casper@holland.sun.com> provided significant help.
During the Solaris 10 port found and fixed an lofs
handling bug that prevented reporting of open lofs
file lock status.

Updated the DNLC test, LTdnlc, to provide a possible
explanation about file systems on which the test
might fail.

Modified the procedure for obtaining missing Darwin
XNU kernel header files. The new one
requires more
manual intervention, but is the best that can be
done with the way Apple open sources are now
organized. 00FAQ explains the new procedures for
those not used to downloading Apple open source
files.

Added support for Apple Darwin 7.0 (Mac OS X 10.3)
with patches supplied by Allan Nathanson <ajn@apple.com>.
Dropped the *claim* that lsof builds and works on
Apple Darwin below 6.0.

Validated lsof on FreeBSD 4.9, using a test system
provided by Ben Lewis <bl@purdue.edu>.

Validated lsof on FreeBSD 5.1-CURRENT for Amd64.
David O'Brien <obrien@FreeBSD.org> provided a test
system.

Changed the NetBSD Configure stanza to do header
file searches in /usr/include by default. The
LSOF_INCLUDE and NETBSD_SYS environment variables
may still be used to specify other search paths.
Discussions with Andrew Brown and Wolfgang S.
Rupprecht <wolfgang@wsrcc.com> led to the change.

4.70 January 16, 2004
Improved shell-portability of the linux stanza
of
the Configure script with a patch from Paul Jarc
<prj@po.cwru.edu>.

Added a "silent" rule to tests/Makefile for Paul.
Updated, extended and clarified the test suite
documentation in 00FAQ and 00TEST.

Fixed Solaris 10 dlsof.h typo, reported by Mike Miscevic <miscevic@hotpop.com>. The typo prevents lsof from loading cleanly in Solaris 10 builds past 40.

Fixed a Solaris HSFS node number reporting bug and added a structure definition work-around for Solaris 10.

Converted PGP signing to GPG. My previous PGP key can be used, but the gpg "--allow-non-selfsigned-uid" option may have to be used when it is imported into a GPG key ring.

Added bz2 compression.

Updated for OpenBSD 3.4.

Added a work-around for a missing header file in the s10_44 Solaris 10 build.

Added support for FreeBSD 5.2-BETA and 5.2-CURRENT.

Updated Linux AX25 support with modifications supplied by Lutz Poetschulat <dl9cu@db0zwi.de>.

Added raw IPv6 support to Linux lsof.

Improved handling of parameters after "-i@".

Improved file name test in LTdnlc.c.

Added loop count controls to the reading of Solaris lock chains. The change was implemented as a result of a report from Steve Gonczi <steve@relicore.com>.

Based on a report from John Jackson <jrj@purdue.edu>, enabled a Solaris 10 <sys/lgrp.h> work-around for Solaris 9, too. (Patch 112233 installs an lgrp.h on Solaris 9 that needs the work-around.)

With help from Andrew Brown <atatat@atatdot.net> and John Heasley <heas@netbsd.org> added log-structured file system (LFS) support for NetBSD and OpenBSD.

Added AMD64 to the list of FreeBSD 5.x-CURRENT supported architectures. FreeBSD.org provides a test

system, courtesy of (I believe) David O'Brien
<obrien@FreeBSD.org>.

Added a cast to lseek() in the HP-UX /dev/kmem-based
kread() function to make it work properly with the
bundled HP C compiler.

4.71 March 11, 2004
Added text file support to Apple Darwin
lsof and
enabled the lsof executable portion of the LTbasic
test. Added support for Darwin kernel queue, POSIX
semaphore and POSIX shared memory files. Tested on
Darwin 7.2 (aka Mac OS 10.3.2).

Added process_kqueue() function prototypes for FreeBSD,
NetBSD and OpenBSD.

Picked some lint in AIX sources, lib/rnmh.c and
tests/LTsock.c.

Added "-x [fl]" cross-over option, which enables +d and
+D processing to cross over symbolic links and|or file
system mount points. Discussion with Johan Lindquist
<johan@smilfinken.net> and Eric Williams (aka The Ghost
In The Machine) <ewill3@earthlink.net> on Linux news
groups revealed the need for the option.

Updated support for UnixWare 7.1.4.

Added support for the optional reporting of socket
options, socket states and TCP flags for most currently
supported dialects. John Smith <lbalbalba@hotmail.com>
and Tristan Nefzger <tn@bhtrader.com> requested the
information. The dialects and their versions for which
this
feature has become available include:

AIX 4.3.2 and 5.[12]
Apple Darwin 7.2
BSDI BSD/OS 4.3.1
Digital UNIX and Tru64 UNIX 4.0
FreeBSD 4.9 and 5.2
HP-UX 11 and 11.11 (aka 11i)
NetBSD 1.6ZH
OpenBSD 3.4
OPENSTEP 4.2
OpenUNIX 8

SCO OpenServer Release 5.0.6
Solaris 2.6, 8, 9 and 10
UnixWare 7.1.[134]

Modified the Configure stanza for HP-UX 11 with better q4 detection. Steve Bonds <3vhmxxm02@sneakemail.com> supplied the modification.

Applied a patch from Mike Miscevic <miscevic@hotpop.com> to enable lsof to compile with the zone support in the Solaris 10 s10_b51 release. Added information on lsof zone behavior to 00FAQ.

Added a "-z [z]" option to Solaris 10 lsof. It enables the listing of zone name and can also be used to select the listing of processes and their files from specified zones.

4.72 July 13, 2004

Corrected Solaris 10 ZONE column title display bug with a patch from Joep Vesseur <Joep.Vesseur@Sun.COM>. Joep's fix was offered as a patch to 4.71.

Based on a report from Jean-Pierre Radley <jpr@jpr.com> about an unexpected GNU uname Configure interaction on OSR, and working from information received from Bela Lubkin, changed the OSR Configure stanza to use /bin/uname instead of uname. Added an FAQ entry about Configure version detection problems.

Added the +m and "+m m" options in response to a dialog with Robert T. Brown <rbrown@netmentor.com>. The options allow the creation of a mount table supplement file which can be used on selected dialects to get device numbers when stat(2) and lstat(2) can't deliver them. (That's generally the result of an inaccessible NFS server.) Currently the new options are supported only on Linux.

Made cpumask_t typedef _KERNEL compensation for FreeBSD 5.2-CURRENT. Refined it for 5.2.1-RELEASE with testing help from Scott Ellentuch <tuc@ttsg.com>.

Added support for FreeBSD 4.10. Larry Rosenmann <ler@lerctr.org> kindly provided a test system.

Added support for NetBSD 2.0 with patches supplied by
Andrew Brown <atatat@atatdot.net>. Andrew also
provided two test systems.

Made handling of Linux maps file more robust, based on
a report from Jan Blunck <J.Blunck@tu-harburg.de>. As
a side benefit, made handling of generated stat(2)
information more flexible.

As a result of a discussion with Jason Fortezzo
<fortezza@mechanicalism.net>, adjusted lsof for Solaris
to obtain the maximum user name length from ut_name of
the utmpx structure, if <utmpx.h> exists.

Tested under OpenBSD 3.5.

Updated 00README information about using gcc (via the
Configure aixgcc abbrevisiation) to compile lsof on
AIX. Ann Janssen <ajanssen@nebook.com> made me aware
the information was out of date.

Added an AIX SIGDANGER handler and some 00FAQ sections
on lsof memory usage after a discussion with Tom Qin
<tom.qin@citigroup.com> about lsof
memory usage.

Added scripts/sort_res.perl5, contributed by Fabian
Frederick <fabian.frederick@gmx.fr>. The script
displays lsof output sorted by size and path name.

Improved handling of files on Linux NFS mount points
that use the root_squash option, based on discussions
with Paul Szabo <psz@maths.usyd.edu.au>.

Updated FreeBSD 5.2-CURRENT support, based on a problem
report from Filippo Natali <filippo@widestore.net>.

Corrected improper FreeeBSD 5.x-CURRENT #if condition,
reported by Kim Culhan <kimc@kim.net>.

Added a Configure script work-around for AIX 5.2 lsof
with JFS2, compiled by gcc >= 3.3. The work-around
was supplied by Florian M. Weps <fmw@hactrn.ch>.

4.73 October 21, 2004
Added an __XPG4_CHAR_CLASS__ #define before
#include'ing <ctype.h> on Solaris to restore lsof's
ability to display special characters such as acute-e.

Added wide-character (e.g., UTF-8) support where
possible, prompted by a request from Kyungjoon Lee
<kjoonlee@gmail.com>.
Some older dialects -- e.g.,
NetBSD 1.4.1 -- don't support wide characters, so the
wide character support is enabled by definitions in
each dialect's machine.h. Dialects with wide-
character support are listed in 00FAQ.

Make a FreeBSD 5.2-CURRENT adjustment for <sys/pipe.h>,
supplied by Sergey A. Osokin <osa@FreeBSD.ORG>.

Implemented a Linux feature request made by Jakub
Jelinek <jakub@redhat.com> that enhances lsof's ability
to locate UNIX domain sockets whose paths are named as
arguments. Jakub supplied suggested code.

Dropped *claims* that lsof works on AIX below 5.1, SCO
Dropped *claims* that lsof works on AIX below 5.1, SCO
Openserver 5.0.4, Tru64 UNIX 5.0, and UnixWare below
7.1.4. Lsof will probably build and work on those UNIX
dialect versions, but I no longer have any way to test
lsof on them.

Added support for FreeBSD 5.3 and 6.0. The FreeBSD
5.3 support hasn't been tested.

Added FD test code that will allow dialect
versions to
test FD option selections. Used the new code in the
PSTAT-based HP-UX lsof to enable it to avoid scanning
the mount table when its information is not needed.
The addition was made in response to a query from
Harvey Garner <Harvey.Garner@championusa.com> about
lsof performance in a busy NFS environment.

Upgraded lsof's AIX support level to AIX 5.3, based on
a report from Dick Dunbar <Dick.Dunbar@Siebel.com>. (I
have not tested lsof under AIX 5.3.) Based on Dick's
recommendation and local testing changed the C for AIX
version 6 and higher -qmaxmem option value to -1.

Made LSOF_AR environment variable more useful and
documented it in 00XCONFIG.

Corrected the use of sum(1) to generate signatures for
the lsof distribution and binaries to match the

documentation that claims it is sum -r output. Jin Guojun <jin@george.lbl.gov> noticed and reported the problem.

Tested under OpenBSD 3.6.

Added checksum and GPG certificate files for the bz2, gz and Z lsof distribution archives. The new files reside with the distribution archives and supplement the signature information already inside the archives.

Validated on Solaris 10, i8xpc, build s10_63.

4.74 January 17, 2005

Fixed a Solaris segment fault bug on systems that lack a /dev/allkmem device. Offered the fix as a patch to lsof 4.73. The bug was reported by Donald Zoch <donald.zoch@amd.com>.

Updated lsof for FreeBSD 6.0 and higher for a change in <sys/vnode.h>, based on a report from Sergey A. Osokin <osa@FreeBSD.ORG>. Made the update available in a 4.74 'A' edition pre-release.

Filed an HP bug report about missing pstat(2) CWD info for LOFS on HP-UX 11.11 and higher. The missing CWD info was noticed by Ermin Borovac <e.borovac@bom.gov.au>. Added info to 00FAQ about the problem, which can cause the lsof test suite's LTbasic test to fail.

Updated the q4-generated tcp_s.h in the lsof distribution and added socket option support for HP-UX 11.00. Erwin Reyns <ereyns@europarl.eu.int> helped test.

Updated for Solaris 10, build s10_69, with a patch supplied by Mike Miscevic <miscevic@hotpop.com>.

Added v_path support to Solaris 10 lsof. That relieves it of having to read and decode the kernel DNLC, and delivers full paths more reliably.

Added specialized NFS4 support to Solaris 10 lsof.

Applied Solaris 10 patches to lsof supplied by Casper Dik <casper@holland.sun.com>.

Updated lsof for NetBSD 2.99.10 and tested it on a
system provided by Andrew Brown <atatat@atatdot.net>.

Added support for the FreeBSD 6.0-CURRENT f_vnode
pointer in the file structure.

Added BSDI, FreeBSD, NetBSD and OpenBSD support for the
*effnlink member of the inode structure. This makes
the lsof LTnlink test run faster on all modified
dialects and correctly on OpenBSD.

Added ptyfs support for NetBSD, using modifications
provided by Andrew Brown.

Changed the netbsd Configure stanza
to look by default
for system header files in both /usr/include and
/usr/src. (The NETBSD_SYS environment variable can
still be used to select an alternate for /usr/src.)

Corrects two FreeBSD 4.10 RPC/XDR type definitions.

Added an FAQ Q&A about setuid and setgid restrictions
in HP-UX 11.11. The information in the answer was
supplied by Frank Sanders <frank.sanders@siemens.com>.

Added abbreviations for AXI FCIO and FSNAPSHOT file
flags. Holger VanKoll <Holger.VanKoll@swisscom.com>
reported the missing FCIO.

Adjusted lsof's private AIX 64 bit rnode structure for
64 bit AIX 5.2 systems. (IBM doesn't distribute a
correct <nfs/rnode.h> for it.)

Corrected a Linux socket inode printing bug reported by
Igor Schein <igor@txc.com>.

Updated for FreeBSD 4.11. The support compiles but
hasn't been tested.

Back-ported a FreeBSD 6.0-CURRENT fix to FreeBSD
5.3-RELEASE-p1. That was done to solve a compilation
problem reported by Radko Keves <rado@daemon.sk>.

4.75 May
16, 2005
Dropped the *claim* that lsof works on DEC OSF/1 and

Digital UNIX, since my last 4.0 test system has been
removed.  The last tested distribution of lsof on DEC OSF/1
and Digital UNIX was revision 4.74.  It has been archived
on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

Added negation forms to the values in the -g (PGID) and
-p (PID) lists.  Negated PGID and PID values, like
negated UID or login name values, are applied without
ORing or ANDing and take effect before any other
selection criteria are applied.

At the request of Marcin Gozdalik <gozdal@gmail.com>
added a -X option for Linux.  The option inhibits the
reading of the /proc/net/tcp* and /proc/net/udp*
files.

Based on a report from David Gutierrez
<davegu1@hotmail.com> changed DEC OSF/1 process table
allocation to request memory in smaller increments.

Based on a report from jayjwa <jayjwa@atr2.ath.cx>
updated the Customize script to use "tail -n
1" where
possible.

Enabled support for FreeBSD 5.4.

Improved the BSDI, FreeBSD, NetBSD, OpenBSD and Solaris
kvm_open() and kvm_openfiles() error messages.

Enabled support for NetBSD 2.99.12.

Improved HP-UX Configure stanza with help from Piet
Starreveld <pstarrev@csc.com>.  Picked some lint Piet
found.

Enabled IPv6 support for HP-UX > 11.  Piet Starreveld
helped test it on 11.23, among others.

Updated for HP-UX 11.23 on the ia64 architecture.

Updated to latest FreeBSD 6.0-CURRENT, using a test
system provided by Andrzej Tobola <ato@iem.pw.edu.pl>.

Added support for SCO OSR 6.0.0 and UnixWare 7.1.4 with
help from Richard at SCO.

Corrected a Linux bug in NFS handling, reported by Karel Zak

<kzak@redhat.com>. Karel supplied a patch.

Improved the code for accessing an AIX 3.2 and higher sockaddr_un structure, thus eliminating a segmentation fault possibility.

Updated for AIX 5.3.

Added preliminary (DEBUG) support for the AIX SANFS file
system.

Fixed a bug in the Solaris 10 processing of the vnode's v_path pointer with code supplied by Edward Jajko <ejajko@portal.com>. The fix was offered as a patch to 4.74.

Dropped support for OpenUNIX 8, since a test system is no longer available. Archived an OpenUNIX-only distribution of the last revision (4.74) tested on OpenUNIX in pub/tools/unix/lsof/OLD/src.

Tested under Openbsd 3.7.

Tested under Darwin 7.7.0.

Enabled building on amd64 Solaris 10 with hints from Marc Aurele La France <tsi@ualberta.ca>. Marc provided a test system.

Supplied a missing quote in the FreeBSD Configure stanza. Carl Cook <Info@quantum-sci.com> reported the problem.

Removed "-O" option from tests/Makefile so that the HP-UX bundled compiler won't complain.

4.76 August 30, 2005
Corrected an example and spelling errors in man page.

Updated for Apple Darwin 8.x with changes supplied by Allan Nathanson <ajn@apple.com>. Allan also provided a test
system.

Completed documentation of CLRLFILEADD in all machine.h files.

At the request of Chris Markle <cmarkle@sendmail.com>
added partial listen queue length to socket options
displayed when -Tf is specified. Partial queue length
is not reported for all dialects. (00FAQ lists the
ones where it is reported.)

Updated for FreeBSD 7.0 with information supplied by
Andrzej Tobola <ato@iem.pw.edu.pl>.

Updated Solaris VxFS support for VxFS versions 4 and
above with technical advice from Craig Harmer
<craig_harmer@symantec.com>, Gary Millen
<gary_millen@symantec.com> and Chuck Silvers
<charles_silvers@symantec.com>. Testing help was
provided by Michael Antlitz <mantlitz@prophasys.com>,
Steve Ginsberg <steve@dhapdigital.com> and Kenneth
Stailey <kstailey@yahoo.com>.

Fixed a Solaris address space map processing bug.
Janardhan Molumuri <mjanardhan@gmail.com> reported the
bug and help me identify it. Made the fix available as
a patch to 4.75.

Added
support for Solaris 10 port and CTFS files. The
CTFS support is imcomplete, because I don't know how
to get inode number, size and link count. (There's
a new 00FAQ entry about that.)

Investigated a report from Christopher J Warweg
<warwegc@GAO.GOV> that the CHECKSUMS for the lsof 4.75
binary for 64 bit Solaris 8 was incorrect. It was my
packaging error. I rebuilt and repackaged the binary.

Enabled support for Linux map file names with embedded
spaces.

4.77 April 10, 2006
Added -X option support for Solaris 10 and above. When
-X is specified lsof will report cached v_node path
names for unlinked files, followed by "(deleted)".
Improved cached vnode path name handling by adding
"(?)" to the end of path names of questionable accuracy.
Updated 00FAQ to reflect these changes.

Updated for FreeBSD 7.0-CURRENT.

Fixed name addition spacing bug, reported by Stuart

Anderson <anderson@ligo.caltech.edu>. Also updated
Solaris 10 SAMFS support
at Stuart's request.

Added missing "break;" and another HASSTATVFS test to
the NetBSD and OpenBSD dnode.c. Bill Behr
<bbehr@networkstoragecorp.com> reported those needs.

Fixed an HP-UX 11 file descriptor "chunk" size problem,
reported by Per Allansson <per@appgate.com>. Per helped
devise the fix and tested it. This fix was offered as
a patch to lsof 4.76.

Updated for FreeBSD 6.0-STABLE and FreeBSD
6.1-PRERELEASE.

Updated scripts/sort_res.perl5 with changes supplied by
Frederick Fabian <fabian.frederick@skynet.be>, the
author of the script.

Corrected +|-M man page documentation error, reported
by Roger Cornelius <rac@tenzing.org>.

Improved FreeBSD user device random seed generation in
response to a problem report from Danny Braniss
<danny@cs.huji.ac.il>.

Eliminated three syntax error bugs and other compiler
complaints from the PSTAT-based lsof. H. Merijn Brand
<h.m.brand@xs4all.nl> reported the problems and tested
the fixes.

Eliminated
compiler complaints in the test suite.

Investigated problems with the building of lsof on
PA-RISC HP-UX 11.23, based on a report from John
Orndorff <John.Orndorff@sungard.com>. Found that
neither the HP bundled C compiler nor gcc would build
lsof, but the the HP unbundled ANSI C compiler would.
Concluded that HP bundled C compiler can't handle
<gssapi/gssapi.h>. Devised a work-around to gcc's
omission of the rpcent structure definition of
<netdb.h> that allows it to compile lsof's print.c, but
the resulting binary doesn't run reliably. Documented
the situation in 00FAQ.

Changed reporting of unknown file types. The number of

an unknown type is now reported as four octets. The change was made in response to a Linux lsof bug report from Karel Zak <kzak@redhat.com>.

Dropped the *claim* that lsof works on BSDI BSD/OS since my last test system has been removed. The last tested distribution of lsof for BSDI BSD/OS was revision 4.76. It has
been archived on
lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

As a result of discussing the lsof source tar's MD5 checksum with Andrew Bell <andrew.bell.ia@gmail.com>, changed the description of a suitable MD5 tool in the lsof distribution's documentation to name the openssl "dgst" command.

Enabled compilation on Solaris 10 1/06 with a fix sent by Jason Fortezzo <fortezza@mechanicalism.net>. Made the fix available as a patch to 4.76.

Adjusted to FreeBSD 5.5-PRERELEASE.

Corrected a bug in the lsof library's process_file() function to enable the locating of AIX XTI sockets by their TCP/IP address values. The bug was reported by Michel Dubois <Dubois@sears.ca>.

Based on a bug report from Karel Zak <kzak@redhat.com> added command name length checking to as many dialects as possible (Linux for Karel) for the "-c c" option.

Updated for OpenBSD 3.[89]. Tested the 3.9 update on a system provided by David Mazieres. I have not tested on OpenBSD
3.8, but David reports lsof 4.76 worked
there.

Ended regression testing of lsof on 32 bit Solaris 8 with the ending of access to a test system. Lsof continues to be tested on 64 bit Solaris 8.

4.78 April 24, 2007
Added more information to the lsof FAQ about missing link counts and sizes on Linux files.

Simplified Linux stat() and lstat() usage.

Relocated #define's that prevent OpenBSD compilation on
systems without a /proc file system. Pieter Bowman
<bowman@math.utah.edu> reported the problem.

Added code to avoid processing Linux /proc/<PID>/maps
file entries with zero device and node numbers. Some
such entries now have names associated with them that
are not path names -- e.g., "[heap]", "[stack]" or
"[vdso]". Scott Worley <sworley@chkno.net> reported
lsof's mishandling of such entries.

Added SELinux security context support, provided by
James Antill <james.antill@redhat.com>. I have not
tested this, but James and Karel Zak <kzak@redhat.com>
have.

Added
the #include of <sys/types.h> to Solaris lsof to
enabled compilation on Solaris 10 6/06. Peter Harvey
Peter.Harvey@Sun.COM diagnosed the problem and supplied
a patch.

Added better support for JFS2 on AIX 5.2 and 5.3, based
on bug reports and help from Thomas Braunbeck
<BRAUNBEC@de.ibm.com> and Tom Whitty <TWHITTY@cerner.com>.

Documented that lsof supports AIX 5.3 only up through
maintenance level 1 (ML1).

Enabled Solaris lsof to locate the AFS vnode operation
address for OpenAFS 1.4.1. The fix was supplied by
Robert Jelinek <Robert.Jelinek@MorganStanley.com>.

Enabled support for Solaris 10 ZFS. If the necessary
ZFS header files aren't found, lsof offers the option
to drop ZFS support, to use internal, possibly
inaccurate structure definitions, or to supply a path
to the missing header files. Horst Scheuermann
<Horst.Scheuermann@uni-trier.de> provided a development
system and helped test the support.

Corrected
a typo in the man page, reported by Eric S.
Raymond <esr@thyrsus.com>.

Changed the spelling of macroes to macros in lsof
source and documentations files, based on a suggestion
from Josh Soref <timeless@gmail.com> and verification

with the OED.

The following dialects are no longer supported: 32 bit AIX 5.2, HP-UX 11, OpenStep 4.2, Solaris 2.6, Solaris 8, True Unix 64 and UnixWare 7.1.4. Lsof may work on them, but I no longer have test systems for them. Support for OpenBSD ends at its version 3.9 for lack of interest in the port.

4.79 April 15, 2008

********** IMPORTANT NOTE **********
*
* Lsof support has been reduced to the following *
* dialects: AIX, FreeBSD, Linux and Solaris, and *
* only in selected versions of those dialects. *
* The selected versions are listed in this file *
* and in other lsof documentation. *
*
*
* I have made this move because of retirement *
* and because I no longer have many test systems *
* available to me. *
*
* Vic Abell *
*
**********

Fixed a Solaris VXFS permission problem when accessing the VXFS inode offsets. The bug was reported by Gregory A. Ivanov <ivga@mts.ru>. Gregory tested the fix.

Moved an #include <string.h> later in FreeBSD dlsof.h to enable compilation on recent FreeBSD releases. The change was supplied by Roy Marples <uberlord@gentoo.org>.

Improved Linux /proc file stream reading speed by applying an expanded version of a patch from Eric Dumazet <dada1@cosmosbay.com> that allocates a page size buffer to each stream. Improved TCP, TCP6, UDP and UDP6 hashing by determining the hash bucket count from the /proc/net
sockstat and sockstat6 files. The improvement was suggested by Eric and he provided sample code. Eric also tested both improvements.

Modified Configure script to build lsof on FreeBSD

6.2. Tested it on a system provided by Larry Rosenman
<ler@lerctr.org>.

Fixed a Linux maps file processing bug that prevented path
names from having an embedded colon. James Lingard
<jchl@arastra.com> reported the bug and helped with its
fix.

Based on reports from Eric Dumazet and Samuel Thibault
<samuel.thibault@ens-lyon.org> added support for the
Linux 2.6.22 kernel's /proc/<PID>/fdinfo files -- i.e.,
file offset and flags. Samuel Thibault provided a test
system.

Fixed a Linux UNIX socket memory leak, reported by
Philip Shin <pshin@xceedium.com>. Phillip supplied the
fix.

With generous assistance from HP added support for an HP-UX
11.23 patch that makes TLI/XTI socket address information
available.

Fixed a header file problem for FreeBSD
6.2 on the Alpha
architecture. The problem was reported by Pekka Honkanen
<phonkane@cc.hut.fi>. Pekka tested the fix.

Based on a report and using suggested fixes from Karel Zak
<kzak@redhat.com>, made these changes to Linux lsof: corrected
a getpidcon() error message; insured that inode numbers are
handled correctly for their unsigned long long type; and
improved SELinux handling. At the request of Alon Bar-Lev
<alonbl@gentoo.org> added the LINUX_HASSELINUX environment
variable to enable or inhibit SElinux support unconditionally.

Updated Configure for FreeBSD 8.0-CURRENT and tested lsof on
AMD64 there.

Added a patch provided by Oles Hnatkevych
<don_oles@able.com.ua> for FreeBSD systems where the root
file system is on a CD9660 device.

Added compensation for the disappearance of FMARK and FDEFER
from the FreeBSD 8.0-CURRENT <sys/file.h>.

Updated FreeBSD lsof with ZFS support. Larry Rosenman
<ler@lerctr.org>, Erwin Lansing <erwin@FreeBSD.org>,

Wesley
Shields <wxs@atarininja.org> and Dmitry Morozovsky
<marck@rinet.ru> provided test systems.

Fixed a socket file identification problem reported by
Pavol Rusnak <stick@gk2.sk>. Pavol also reported the
cause of the problem.

Added the ability to format the repeat mode marker line
with strftime(3), where the dialect supports the
localtime(3) and strftime(3) C library functions. The
addition was suggested by Mike Depot <mdepot@comcast.net>,
who also tested it. The addition required creating a new
main lsof source module, util.c, that contains functions
whose compilation conflicts with the general header file
tree defined by lsof.h and dlsof.h.

Based on reports from Andrei V. Lavreniyuk
<andy.lavr@reactor-xg.kiev.ua> and Pav Lucistnik
<pav@FreeBSD.org> updated the FreeBSD 7.0 and above
file lock handling to use new locking structures. The
update requires a terrible hack to get a definition for
the lock owner structure from a kernel source
module
into a local lsof header file.

4.80 May 12, 2008
Updated for a FreeBSD 7.0 and above byte level locking
change. The problem was reported by Conrad J. Sabatier
<conrads@cox.net>, who helped test the update. Wesley
Shields <wxs@FreeBSD.org> provided an 8.0-CURRENT test
system.

Propagated the FreeBSD 7.0 and above locking changes to
FreeBSD 6.x, based on a report from Edwin Groothuis
<edwin@FreeBSD.org>.

Added warnings for unsupported dialects or versions.

Added Linux support for the UDPLITE protocol. Eric
Dumazet <dada1@cosmosbay.com> supplied a patch.

Added a missing quote to the Configure script's
FreeBSD stanza.

Added a usage.o rule to the HP-UX PSTAT-based
Makefile. I mistakenly deleted the rule at revision
4.79. The missing rule was reported by Kawaljeet Kaur

<kawaljeet.malviya@gmail.com> who tested the corrected
Makefile.

4.81 October 21, 2008
Updated the Darwin libproc sources with changes from
Allan Nathanson <ajn@apple.com>.
Tested them on a iMac
mini, provided by Apple Inc.

Changed dummy declarations in library source files to
eliminate complaints about unused variables and empty
object files. This change may not work on dialects I
can no longer test; it has been tested on some versions
of AIX, Darwin, FreeBSD, Linux and Solaris.

At the request of Hal Brooks <hal@uga.edu> added support
for Linux /proc/net/packet files. Hal tested it.

Added socket file only performance enhancements to Linux
and PSTAT-based HPUX lsof.

Added htonl call around improper usage of INADDR_LOOPBACK;
report from an Apple engineer forwarded by Allan Nathanson
<ajn@apple.com>.

Adjusted for FreeBSD-8.0 change in device number handling.
The adjustment should work for FreeBSD 5 and above, should
the 8.0 change be propagated downward. The problem was
reported by Pav Lucistnik <pav@FreeBSD.org>. An updated
test system was provided by Erwin Lansing <erwin@FreeBSD.org>.

Reduced AIX
support to version 5.3, since test systems with
older versions are no longer available to me.

At the request of Marjo F. Mercado <mmercado@xceedium.com>
and Phil Shin <pshin@xceedium.com> applied some speed
improvements to lsof, particularly when the files of
interest are /Internet files -- i.e., selected with lsof's
-i" option. Added a two new options to assist the
improvements: 1) "-c^<command>" to tell lsof to exclude the
named command(s); and 2) "-stcp|ud>:[^]state' to tell lsof
to include in its reporting or exclude ('^') from its
reporting Internet files in the named states (e.g., LISTEN,
^CLOSE_WAIT, IDLE, etc.) For the most part these changes
apply only to AIX, Darwin, FreeBSD, PSTAT-based HP-UX, Linux
and Solaris, since those are the only places I could test
them. They are controlled by the HASTCPUDPSTATE definition

in each dialect's machine.h header file. Marjo and Phil
provided HP-UX 11.23 and 11.31 test systems.

Fixed a stat(2) problem
on HP-UX 11.31 while testing the
speed improvements.

Adjusted for kernel header file changes in FreeBSD
8.0-CURRENT. Larry Rosenman <ler@lerctr.org> provided
a test system.

Added a warning for Solaris systems where VxFS node info
can't be obtained from the VxFS utility library. The
warning was requested by Tom Matthews <Tom.MATTHEWS@rbs.com>.

Corrected mishandling of file system path name arguments
that have trailing slashes, except, of course, the root
file system, "/". Allan Nathanson <ajn@apple.com> reported
the bug.

4.82 March 25, 2009
Corrected an over-zealous exclusion test that caused
lsof to report nothing when it was given no arguments
and built with HASSECURITY and HASNOSOCKSECURITY enabled.
Joshua Kinard <kumba@gentoo.org> reported the bug and
supplied information for reproducing it.

Based on a report from Dan Trinkle <trinkle@cs.purdue.edu>
corrected use of <sys/utsname.h> for 32 bit Solaris 10
and above compilations. Simultaneously
eliminated a
casting complaint in arg.c and updated Configure to use
the appropriate 64 bit compilation option (-xarch=v9 or
-m64) with the Solaris Sun C compiler.

Updated for FreeBSD 7.1-PRERELEASE with information
supplied by Larry Rosenman <ler@lerctr.org>.

Updated the Darwin libproc sources with changes from
Allan Nathanson <ajn@apple.com>. Tested them on a iMac
mini, provided by Apple Inc. Allan also provided man
page corrections.

Updated the FreeBSD Makefile to use the ${MAKE} variable
for ZFS dnode2.c module compilation, based on a suggestion
from Alexis Ballier <aballier@gentoo.org>.

Improved the Solaris VxFS library location test, based on a

suggestion from Jason Fortezzo <fortezza@mechanicalism.net>.
Jason tested the change.

Updated Solaris 10 ZFS support for ZFS version 4 and ZFS
pool version 10, using a test system kindly provided by
Vladislav Nespor <vladislav.nespor@id.ethz.ch>. Renata
Maria Dart <renata@slac.stanford.edu>
tested on ZFS
version 4, verifying that the update works there, too.
(ZFS pool version 10 is apparently the ZFS version shipped
with the 10/08 update to Solaris. The original ZFS
support targeted ZFS version 3.)

I still consider ZFS support in Solaris lsof a hack,
because it depends on a znode structure definition that
I developed using dbx. Sun is remiss in not distributing
the ZFS header files used to build the distributed kernel.

Because of the znode structure definition hack, I can't
guarantee that lsof ZFS support will work for any other
versions of ZFS.

Solaris 10: adjusted to a change in the way devices are
stored in the kernel; fixed a problem in zone handling;
and added rudimentary sharedfs support. Carson Gaspar
<carson@taltos.org> reported the device number problem,
provided a test system, and tested the changes. Peter
Vines <psv2b@eservices.virginia.edu> reported the zone
handling problem and tested the fix.

Adapted to FreeBSD
8.0-CURRENT changes in device number
computation. Problem was reported by Erwin Lansing
<erwin@FreeBSD.org>. Larry Rosenman <ler@lerctr.org>
provided a test system.

Corrected Solaris Configure test for appropriate VxFS
library when using gcc to compile lsof.

Updated for loss of KAME IPv6 FreeBSD accommodations.

Adapted to FreeBSD 7.2. Made Configure script recognized
FreeBSD 6.3.

4.83 January 18, 2010
Converted Solaris 10 and above ZFS support to use the CTF
debugger library, libctf. Code was supplied by Robert
Byrnes <Robert.Byrnes@deshaw.com>.

Corrected a typo in the testing of the LINUX_HASSELINUX
environment variable in the Configure script. The error
was reported by Mike Frysinger <vapier@gentoo.org>.
At Mike's request made Configure script accept LSOF_RANLIB
(ranlib command), LSOF_CFGF (additional configuration flags)
and LSOF_CFGL (additional library specifications) from the
environment.

Enabled complilation of Solaris 10
lsof after a recent Sun
patch which changed the PC file system's structure. Peter
Vernam <pvernam@draper.com> reported the problem and helped
with the fix.

Made the sort of configuration CFLAGS in the CkTestDB
script impervious to locale settings.

Ported to Solaris 11, using a test system kindly provided
by David Day <dday76@gmail.com>.

Adjusted to the disappearance of <nfs/rpcv2.h> in FreeBSD
8.0-BETA1.

Changed Solaris node type lookup to a hashed method and
added some ability for it to handle duplicate vnodeop names
in /dev/ksyms.

Updated for FreeBSD 9.0-CURRENT. Andrzej Tobola
<ato@iem.pw.edu.pl> provided a test system. Extends the
fix to FreeBSD 6.0 and above via a Configure test and a
compile-time definition. The need for the extension was
reported by Erik Trulsson <ertr1013@student.uu.se>>

Made corrections to FAQ typographical errors, suggested
by Josh Soref <timeless@gmail.com>.

Added __UCLIBC__ test to Linux dlsof.h so lsof would
compile
on an Intel ARM XScale processor. The addition was provided
by Doug Kehn <rdkehn@yahoo.com>.

Added test for <utmpx.h> to FreeBSD configuration. Improved
its use in lsof.h. The changes were supplied by Martin Wilke
<miwi@FreeBSD.org>.

Vic Abell <abe@purdue.edu>

January 18, 2010

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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/libproc/dlsof.h
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/darwin/libproc/dfile.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/libproc/dproc.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/tests/LsofTest.h
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*
 /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/du/ddev.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/uw/uw7/fs/nsc_cfs/cnode.h
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/darwin/libproc/dsock.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/darwin/libproc/dstore.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/libproc/dmnt.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/darwin/libproc/dmnt.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/dialects/darwin/libproc/dsock.c
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*/
/*
* GetOpt() -- Local get option
*
* Borrowed from lsof's main.c source file.
*
* Liberally adapted from the public domain AT&T getopt() source,
* distributed at the 1985 UNIFORM conference in Dallas
*
* The modifications allow `?' to be an option character and allow
* the caller to decide that an option that may be followed by a
* value doesn't have one -- e.g., has a default instead.
*/
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* @(#)cdefs.h 8.2 (Berkeley) 10/4/93
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/tests/LTsock.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/tests/LTnfs.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/tests/LTdnlc.c
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/tests/LTszoff.c
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/dialects/aix/dnode2.c
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* GetOpt() -- Local get option

*
* Liberally adapted from the public domain AT&T getopt() source,
* distributed at the 1985 UNIFORM conference in Dallas
*
* The modifications allow `?' to be an option character and allow
* the caller to decide that an option that may be followed by a
* value doesn't have one -- e.g., has a default instead.
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* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/scripts/sort_res.perl5
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* $Id: pfsnode.h,v 1.1 1993/12/12 12:26:39 davidg Exp $
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Frequently Asked Questions about lsof

**********
| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu. Look in pub/lsof.README for its |
| location. |
**********

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This file contains frequently asked questions about lsof and answers
to them.

Vic Abell <abe@purdue.edu>
January 18, 2010

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## 1.0 General Concepts

### 1.1 Lsof -- what is it?

Lsof is a UNIX-specific tool. Its name stands for LiSt

Open Files, and it does just that. It lists information
about files that are open by the processes running on a
UNIX system.

See the lsof man page, the 00DIST file, the 00QUICKSTART
file, and the 00README file of the lsof distribution for
more information.

1.2 Where do I get lsof?

Lsof is available via anonymous ftp from lsof.itap.purdue.edu.
Look in the pub/tools/unix/lsof sub-directory.

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof

Bzip2'd,
compressed and gzip'd tar files with GPG certificates
are available.

1.2.1 Are there mirror sites?

On April 28, 2009 these sites appeared to have the lastest
lsof revision:

ftp://ftp.fu-berlin.de/pub/unix/tools/lsof
ftp://sunsite.ualberta.ca/pub/Mirror/lsof

1.2.2 Are lsof executables available?

Some lsof executables are available in the subdirectory
tree pub/tools/unix/lsof/binaries These are neither guaranteed
to be current nor cover every dialect and machine architecture.

I don't recommend you use pre-compiled lsof binaries; I
recommend you obtain the sources and build your own binary.
Even if you're a Sun user without a Sun C compiler, you
can use gcc to compile lsof.

If you must use a binary file, please be conscious of the
security and configuration implications in using an executable
of unknown or different origin. The lsof binaries are
accompanied by GPG certificates. Please use them!

Three additional cautions apply to executables:

1. Don't try to
use an lsof executable, compiled for one
version of a UNIX dialect, on another. Patches can

make the dialect version different.

2. If you want to use an lsof binary on multiple systems, they must be running the same dialect OS version and have the same patches and feature support.

### 1.2.3 How do I check the validity of an lsof distribution?

There are two ways to check the validity of an lsof distribution:

1. Follow the instructions in the CHECKSUMS_<revision> file found with the lsof distribution.

   Checking with GPG is the best method.

2. Follow the instructions in the "Security" section of the README.lsof_<revision> file found inside the lsof distribution.

   Again, checking with GPG is the best method.

### 1.2.4 Why can't I get the sum(1) result reported in README.lsof_<revision>?

The "Security" section of the README.lsof_<revision> file found inside the lsof distribution gives md5, sum, and GPG certificate information.

The simplest, the sum(1) signature, seems to be the trickiest. That's because there are different sum(1) methods, BSD systems usually have cksum(1) instead of sum(1), and different systems compute the block size value differently.

First, the lsof sum results are computed with the old, "alternate" algorithm. On newer systems, you can use sum's "-r" option to get that computation result.

Second, on BSD systems you usually must use cksum(1) instead of sum(1), because they have no sum(1). To tell cksum(1) to use the old, "alternate" algorithm, use its "-o1" option.

Third, the second value that sum reports, the block count, may be computed differently on different systems -- usually block size is considered to be 512 or 1,024. The lsof block counts were computed on a system with a sum(1) option that considers block size to be 512. The BSD system cksum(1) -o1 option

considers block size to be 1,024.  If your sum(1) or cksum(1)
doesn't report a block count that matches the
sum(1) signature
given in README.lsof_<revision>, check its man page to see what
block size it uses, then adjust its reported block count
appropriately.

1.2.5 Why won't gpg accept the lsof-signing PGP public key?

An older PGP key that once signed lsof distributions is
included in lsof revisions prior to 4.70.  The PGP key is
indeed my key, but is incompatible with GPG.  It was created
about ten years ago and is still acceptable to PGP versions
2.6.2 through 6.5.2.

Lsof revisions 4.70 and above are signed with a copy of my PGP
key that has been made acceptable for use with GPG by importing
it under GPG's "--allow-non-selfsigned-uid" option.

You can find my GPG compatible key in lsof revisions 4.70 and
above and at:

    ftp://lsof.itap.purdue.edu/pub/Victor_A_Abell.gpg

If you have an older lsof revision with my PGP key, there are
two possible ways to use it:

* Use it with a PGP version from 2.6.2 through 6.5.2.

* Use GPG's "--allow-non-selfsigned-uid" option when
you
  import my PGP key into your GPG key ring.

  $ gpg --allow-non-selfsigned-uid --import Victor_A_Abell.pgp

1.3 Where can I get more lsof documentation?

A significant set of documentation may be found in the lsof
distribution (See "Where can I get lsof?).  There is a
manual page, copious documentation in files whose names
begin with 00, and a copy of this FAQ in the file 00FAQ
(perhaps slightly less recent than this file if you're
reading it via a web browser.)

Two URLs provide some documentation that appears in the
lsof distribution:

FAQ: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

man page: ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/lsof_man

### 1.4 How do I report an lsof bug?

If you believe you have discovered a bug in lsof, you can report it via e-mail to <abe@purdue.edu>. Do NOT report lsof bugs to the UNIX dialect vendor. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

Before you send me a bug report, please read the "Bug Reports" section of the 00README file of the lsof distribution. It lists the steps you should take before and when reporting a suspected bug.

### 1.5 Where can I get the lsof FAQ?

This lsof FAQ is available in the file 00FAQ in the lsof distribution and at the URL:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/FAQ

#### 1.5.1 How timely is the on-line FAQ?

The on-line FAQ is sometimes too timely. :-)

I update it as soon as new information is available. That may include information about support that won't appear in the lsof source distribution until the next revision. If you encounter something like that, please send me e-mail at <abe@purdue.edu>. I may be able to point you at a pre-release distribution that contains the support of interest. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

### 1.6 Is there a test suite?

Yes, as of lsof revision 4.63 there's an automated lsof test suite in the tests/ sub-directory of the lsof top-level directory.

More information on using the test suite, what it does, how to use it and how to configure it may be found in the 00TEST file of the lsof distribution. That file also explains where the test suite has been tested.

Frequently asked questions about the test suite will be asked and answered here in the FAQ. (See "Test Suite Problems.")

After lsof has been configured with the Configure script, lsof can be made and tested with:

```
$ make
$ cd tests
$ make
```

Under normal conditions -- i.e., unless the lsof tree has been cleaned or purged severely -- all tests or individual tests may be run by:

```
$ cd test
$ make
```

or

```
$ <run a single test> (See 00TEST.)
```

1.7 Is lsof vulnerable to the standard I/O descriptor attack?

Lsof revisions 4.63 and above are not vulnerable.

Lsof revisions 4.62 and below are vulnerable, but no damage scenarios have so far been demonstrated.

The standard I/O descriptor attack is a local programmed assault on setuid and setgid programs that tricks them into opening a sensitive file with write access on a standard descriptor, usually stderr (2), and writing error messages to stderr. If the attacker can control the content of the error message, the attacker may gain elevated privileges.

The attack was first described in Pine Internet Advisory PINE-CERT-20020401, available at:

http://www.pine.nl/advisories/pine-cert-20020401.txt

If you are using an lsof revision below 4.63, you should remove any setuid or setgid permissions you might have given its executable. Then you should upgrade to lsof revision 4.63.

1.8 Can I alter lsof's make(1) behavior?

Yes. There are at least two ways to do that.

You can put replacements for lsof Makefile strings in your
environment.  If you specify the -e make option, make will
give environment variable values precedence over strings
from the Makefile.  For example, to change
the compiler
string CC from the environment, you might do this with the
Bourne shell:

```
$ CC=foobar; export CC
$ make -e
```

You can also replace lsof Makefile strings in the make
command invocation.  Here's the previous example done that
way:

```
$ make CC=foobar
```

Changing the CFGF, CFGL, and DEBUG strings used in lsof
Makefiles, either from the environment or from the make
invocation, can significantly alter lsof make(1) behavior.
I commonly use DEBUG to change the -O option to -g so I
can build an lsof executable for debugging -- e.g.,

```
$ make DEBUG=-g
```

(Look for DEBUG in this FAQ for other examples of its use.)

Consult the Makefiles to see what CFGL, CFGL, and other
lsof Makefile strings contain, and to see what influence
their alteration might have on lsof make(1) behavior.

### 1.9 Is there an lsof license?

No.

The only restriction on the use or redistribution of lsof
is contained in this copyright statement, found in every
lsof source file.  (The
copyright year in or format of the
notice may vary slightly.)

```
/*
 * Copyright 2002 Purdue Research Foundation, West Lafayette,
 * Indiana 47907.  All rights reserved.
 *
 * Written by Victor A. Abell
 *
```

```
 * This software is not subject to any license of the American
 * Telephone and Telegraph Company or the Regents of the
 * University of California.
 *
 * Permission is granted to anyone to use this software for
 * any purpose on any computer system, and to alter it and
 * redistribute it freely, subject to the following
 * restrictions:
 *
 * 1. Neither the authors nor Purdue University are responsible
 *    for any consequences of the use of this software.
 *
 * 2. The origin of this software must not be misrepresented,
 *    either by explicit claim or by omission.  Credit to the
 *    authors and Purdue University must appear in documentation
 *    and sources.
 *
 * 3. Altered versions must be plainly marked as such, and must
 *    not be misrepresented
as being the original software.
 *
 * 4. This notice may not be removed or altered.
 */
```

1.10 Language locale support

1.10.1 Does lsof support language locales?  How do I use the support?

Most UNIX dialect versions of lsof support 8 bit language
locale characters -- e.g., the ability to print 8 bit
characters that have accents and other marks over them.

See the answer to the "Does lsof support wide characters in
language locales?" question for information on when lsof's
language locale support covers characters wider than 8 bits.

To see if lsof supports language locales for your dialect, look
in the dialect's machine.h header file for the HASSETLOCALE
definition.  If it is present and not disabled, then lsof has
language locale support for the dialect.

To enable lsof's language locale support, you must specify in a
locale environment variable (e.g., LANG) a language locale
known to your system that supports the printing of marked
characters -- e.g, en_US.  (On
some dialects locale(1) may be
used to list the known language locales.)

Note that LANG=C and LANG=POSIX are NOT language locales that support the printing of marked characters.

If the language locale doesn't support the printing of marked characters, lsof's OUTPUT of them follows the rules for non-printable characters described in the OUTPUT section of lsof(8).

Consult your dialect's setlocale(3) man page for the names of environment variables other than LANG -- e.g., LC_ALL, LC_TYPE, etc. -- which may be used to define language locales.

### 1.10.2 Does lsof support wide characters in language locales?

When lsof's language locale support is enabled with the HASSETLOCALE definition, for selected dialects lsof will also print wide characters (e.g., from UTF-8) when iswprint(3) reports them to be printable.

Wide character support is available when HASWIDECHAR is defined in a dialect's machine.h header file. As of this writing on July 22, 2004, the following dialect versions have wide character support:

AIX >= 4.3.2
Apple Darwin >= 7.3.0
FreeBSD >= 5.2
HP-UX >= 11.00
/proc-based Linux
NetBSD >= 1.6
SCO OpenServer >= 5.0.6
Solaris >= 2.6
Tru64 UNIX 5.1

## 1.11 Are any files in the lsof distribution copyrighted?

Yes. Most files carry the copyright of the Purdue Research Foundation and may be redistributed under the terms that accompany the copyright notice. Those terms may also be found in the answer to the question, "Is there an lsof license?")

A few files carry other copyright notices. Some are BSD notices and they explain the terms under which they are included in the lsof distribution.

Those that carry vendor copyright notices have been reproduced in their original or modified forms with permission from the

copyright owners.  That permission is indicated in the README
files that accompany the files.

1.12 Are there other lsof-related resources?

There are other resources available, connected
to lsof.  Among
them are FreeBSD and Linux packages whose products use lsof and
two particularly interesting resources.

The two interesting resources are a Gnome Tool Kit (GTK) GUI
for lsof and a Perl wrapper module.

The GTK GUI is called Glsof and was developed by Gnele.  It can
be found at:

    http://www.sourceforge.net

The Perl wrapper module by Marc Beyer can be found at:

    http://search.cpan.org/dist/Unix-Lsof/

1.13 What does the "WARNING: unsupported dialect or version" mean?

The lsof configure script issues that message for UNIX dialects
or their versions where I have been unable to test the current
revision of lsof.  The message doesn't mean that lsof won't
work, just that I have no direct evidence that it will.

If the COnfigure script succeeds, except for the warning, try
compiling) lsof.  If that succeeds, try the lsof test suite.

2.0 Lsof Ports

2.1 What ports exist?

The pub/lsof.README file carries the latest port information:

    AIX
5.[23] and 5.3
    FreeBSD 4.9 for x86-based systems
    FreeBSD 7.[012] and 8.0 for AMD64-based systems
    Linux 2.1.72 and above for x86-based systems
    Solaris 9, 10 and 11

In the above list the only UNIX dialects present are ones for
which I test the current lsof revision.  Lsof may still support
unlisted dialect versions -- e.g., HP-UX 10.20, Solaris 7, etc.

-- but I don't have access to systems where I could test lsof
on them, so I can't claim lsof works on them. If your dialect
isn't in the list, you should try building lsof on it anyway.

Lsof version 4 predecessors, versions 2 and 3, may support older
version of some dialects. Contact me via e-mail at <abe@purdue.edu>
if you're interested in their distributions. Make sure "lsof"
appears in the "Subject:" line so my e-mail filter won't classify
your letter as Spam.

2.2 What about a new port?

The 00PORTING file in the distribution gives hints on doing
a port. I will consider doing a port in exchange for
permanent
access to a test host. I require permanent access
so I can test new lsof revisions, because I will not offer
distributions of dialect ports I cannot upgrade and test.

2.2.1 User-contributed Ports

Sometimes I receive contributions of ports of lsof to
systems where I can't test future revisions of lsof. Hence,
I don't incorporate these contributions into my lsof
distribution.

However, I do make descriptions of these contributions
available. You can find them in the 00INDEX and README
files at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib

Consult the 00INDEX file in the contrib/ directory for a
list of the available contributions and consult README
there for information on how to obtain them.

2.3 Why isn't there an AT&T SVR4 port?

I haven't produced an AT&T SVR4 port because I haven't seen
a UNIX dialect that is strictly limited to the AT&T System
V, Release 4 source code. Every one I have seen is a
derivative with vendor additions.

The
vendor additions are significant to lsof because they
affect the internal kernel structures with which lsof does
business. While some vendor derivatives of SVR4 are similar,
each one I have encounted so far has been different enough

from its siblings to require special source code.

If you're interested in an SVR4 version of lsof, here are some existing ports you might consider:

DC/OSx (This obsolete port is only available upon special request.)
Reliant UNIX (This obsolete port is only available upon special request.)
SCO|Caldera UnixWare (This is the most likely choice.)
Solaris

2.4 Why isn't there an SGI IRIX port?

Lsof support for IRIX was terminated at lsof revision 4.36, because it had become increasingly difficult for me to obtain information on the IRIX kernel structures lsof needs to access.

At IRIX 6.5 I decided the obstacles were too large for me to overcome, and I stopped supporting lsof on IRIX. I have sources to the last revision of lsof (4.36) for IRIX, but that version of lsof does not work on IRIX 6.5 and is vulnerable to the standard I/O descriptor attack. (See the "Is lsof vulnerable to the standard I/O descriptor attack?" Q&A for more information.) Contact me to discuss obtaining those sources.

If you wish to pursue the issue, don't contact me, contact SGI. This case was opened with SGI on the subject:

Case ID: 0982584
Category: Unix
Priority: 30-Moderate Impact

Problem Summary:
kernel structure header files needed for continued lsof support

Problem Description:
Email In 07/17/98 19:09:23

2.5 Why does lsof's Configure script report "WARNING: unsupported dialect or version"?

Lsof's Configure script issues this message when it encounters a dialect or its version that lsof once supported, but no

longer does.  Usually I drop support for a dialect or version
when I can no longer test lsof on it.

However, it's worth trying to compile and
use lsof.  Be sure to
run the test suite.  (See the answer to the "Is there a test
suite?  question for information on the test suite.)

If you have problems with an unsupported dialect or version,
contact me via e-mail at <abe@purdue.edu> and I may be able to help.
Make sure "lsof" appears in the "Subject:" line so my e-mail filter
won't classify your letter as Spam.

## 3.0 Lsof Problems

### 3.1 Configuration Problems

#### 3.1.1 Why can't Configure determine the UNIX dialect version?

The lsof Configure script uses UNIX shell commands, often in a
command pipeline, to determine the UNIX dialect version.
(Consult the dialect stanza in Configure to determine which
commands are used.)  If Configure can't determine the dialect
version, probably one of the commands is not behaving as
Configure expects.

Symptoms of the failure include Configure warning messages and
incorrect version definitions in the Makefile CFLAGS.

If you suspect that the lsof Configure script is failing to
determine
the dialect version correctly, try running the
commands from Configure stanza one at a time.  That will
usually reveal the source of the problem.  Be particularly
mindful that the PATH environment variable can cause commands
to be executed from non-standard directories.

If you can't determine the source of the problem, there is a
work-around.  You can supply the UNIX dialect version in the
LSOF_VSTR environment variable.  Use Configure as a guide to
forming what it expects in LSOF_VSTR.  There is also some
information on  LSOF_VSTR in the 00XCONFIG documentation file
of the lsof distribution.

### 3.2 Compilation Problems

#### 3.2.1 Why does the compiler complain about missing header files?

When you use make to build lsof, the compiler may complain
that it can't find header files -- e.g.,

```
   $ make
   (cd lib; make DEBUG="-O" CFGF="-DAIXA=0 -DAIXV=4330 \
   -DLSOF_VSTR=\"4.3.3.0\"")
   gcc  -DAIXA=0 -DAIXV=4330 -DLSOF_VSTR="4.3.3.0" -O \
   -c ckkv.c
   In file
included from ckkv.c:33: ../machine.h:70: \
   sys/types.h: A file or directory in the path name \
   does not exist. \
```

That type of complaint doesn't represent an lsof problem.
It represents a problem with a missing system header file
that probably should be found in /usr/include or in the
system source tree.

As a first step try using find(1) to locate the problem
header file.  If it's a system header file and can't be
found, here are some possible causes:

1. The file set, RPM or package containing the header files
   has not been installed.  Instructions for doing that
   are specific to the UNIX dialect and beyond the scope
   of this document.

2. If the compiler is gcc, the private gcc header files:

   * May not have been installed;

   * May have been installed incorrectly;

   * May not have been updated properly after the last
     compiler or system update;

   * Ones from a previous installation
may not have been
     removed.

   A path leading to the gcc private header files can be
   found with `gcc -v`.  Consult the gcc documentation for
   instructions on proper installation of the private gcc
   header files.

3. On some dialects -- e.g., FreeBSD, NetBSD, OpenBSD --
   lsof may need to use header files that are located in

the system source tree -- /sys or /usr/src/sys, for
example. Make sure the system source tree has been
installed.

### 3.2.2 Why does gcc complain about the contents of header files distributed by the system's vendor?

When you use make to build lsof and gcc to compile it, gcc
may complain that it finds errors in system header files
-- e.g.,

```
$ make
(cd lib; make DEBUG="-O" CFGF="-Dsolaris=80000 \
 -DHASPR_GWINDOWS -m64 -DHASIPv6 -DHAS_VSOCK \
 -DLSOF_VSTR=\"5.8\"")
 gcc -Dsolaris=80000  -DHASPR_GWINDOWS -m64 -DHASIPv6 \
 -DHAS_VSOCK -DLSOF_VSTR="5.8"  -O  -c  dvch.c
In file included from
/usr/include/sys/proc.h:31, \
      from /homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/ \
 3.2.1/include/sys/user.h:267, from /usr/include/kvm.h:13, \
 from ../dlsof.h:53, from ../lsof.h:172, from dvch.c:43: \
 /homes/abe/gnu/gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/\
  3.2.1/include/sys/task.h:59: parse error before "uint_t"
```

Errors like the above are most likely not problems in the
system's header files, but in the private copies of them
that were created when gcc was made or installed. Note
the presense of
".../gcc-3.2.1/lib/gcc-lib/sparcv9-sun-solaris2/3.2.1/include/..."
in the paths for user.h and task.h. It indicates both
header files are gcc-specific.

To solve errors like this requires comparing the header
files in the vendor's /usr/include tree to the gcc-specific
ones in gcc's private gcc-lib/.../include tree. It may be
necessary to regenerate gcc-specific header files, correct
them or remove them. See the gcc distribution
for the
appropriate tools.

A possible temporary work-around is to direct gcc to use
the vendor's header files instead of its temporary ones by
declaring -I/usr/include in the compilation flags.

### 3.2.3 Other header file problems

Don't overlook any vendor tools that might validate the

vendor header files installed on the system -- e.g., the
Solaris pkgchk tool can be used to check the header files
that were installed from the SUNWhea package.

For other header file problems contact me at <abe@purdue.edu>.
Please follow the reporting guidelines in the "How do I
report an lsof bug?" section of this FAQ.

3.3 Why doesn't lsof report full path names?

Lsof reports the full path name when it is specified as a
search argument for open files that match the argument.
However, if the argument is a file system mounted-on
directory, and lsof finds additional path name components
from the kernel name cache, it will report them.

Lsof reports path name for file system types that
have path
name lookup features -- e.g., some versions of AdvFS for
Digital and Tru64 UNIX. The Linux /proc-based lsof reports
full path names, because the Linux /proc file system provides
them. Lsof on recent builds of Solaris 10 also report full
path names, because those Solaris kernels record the full path
name in the vnode structure.

Otherwise, lsof uses the kernel name cache, where it exists
and can be accessed, and reports some or all path name
components (e.g., the sys and proc.h components of
/usr/include/sys/proc.h) for these dialects:

Apple Darwin
DC/OSx
FreeBSD
HP-UX, /dev/kmem and PSTAT based
Linux, /dev/kmem-based
NetBSD
NEXTSTEP
OpenBSD
OPENSTEP
Reliant UNIX
SCO OpenServer
SCO|Caldera UnixWare
Solaris 2.x, 7, 8 and 9 (except for some VxFS versions;
see the "Why doesn't Solaris
lsof report VxFS path name
components?" section for more
information)
Solaris 10 (early builds) Tru64 UNIX

As far as I can determine,
AFS path lookups don't share in
kernel name cache operations, so lsof can't identify open AFS
path name components.  Apparently Solaris VxFS versions 4 and
above don't share in kernel name cache operations, either, so
lsof can't display path name components for those open files.

Since the size of the kernel name cache is limited and the
cache is in constant flux, it does not always contain the names
of all components in an open file's path; sometimes it contains
none of them.

Lsof reports the file system directory name and whatever
components of the file's path it finds in the cache, starting
with the last component and working backwards through the
directories that contain it.  If lsof finds no path
components, lsof reports the file system device name instead.

When lsof does report some path components in the NAME
column, it prefixes them with the file system directory
name, followed by " -- ", followed by the components --
e.g., /usr -- sys/path.h for /usr/include/sys/path.h.
 The
" -- " is omitted when lsof finds all the path name components
of a file's name.

The PSTAT-based HP-UX lsof relies on kernel name cache
contents, too, even though its information comes to lsof
via pstat() function calls.  Consequently, PSTAT-based
HP-UX lsof won't always report full paths, but may use the
" -- " partial path name notation, or may occasionally
report no path name at all but just the file system mounted-on
directory and device names.

Lsof can't obtain path name components from the kernel name
caches of the following dialects:

   AIX

Only the Linux kernel records full path names in the
structures it maintains about open files; instead, most
kernels convert path names to device and node number doublets
and use them for subsequent file references once files have
been opened.

To convert the device and node number doublet into a
complete path name, lsof would have to start at the root

node (root directory) of the file system on
which the node
resides, and search every branch for the node, building
possible path names along the way.  That would be a time
consuming operation and require access to the raw disk
device (usually implying setuid-root permission).

If the prospect of all that local disk activity doesn't
concern you, think about the cost when the device is
NFS-mounted.

Try using the file system mount point and node number lsof
reports as parameters to find -- e.g.,

    $ find <mount_point> -inum <node_number> -print

and you may get an appreciation of what a file system
directory tree search would cost.

### 3.3.1 Why do lsof -r reports show different path names?

When you run lsof with its repeat (``-r'') option, you may
notice that the extent to which it reports path names for
the same files may vary from cycle to cycle.  That happens
because other processes are making kernel calls affecting
the cache and causing entries to be removed from and added
to it.

### 3.3.2 Why does lsof report the wrong path names?

Under some circumstances lsof may report an incorrect path
name component, especially for files in a rapidly changing
directory like /tmp.

In a rapidly changing directory, like /tmp, if the kernel
doesn't clear the cache entry when it removes a file, a
new file may be given the same keys and lead lsof to believe
that the old cache entry with the same keys belongs to the
new file.

Lsof tries to avoid this error by purging duplicate entries
from its copy of the kernel name cache when they have the
same device and inode number, but different names.

This error is less likely to occur in UNIX dialects where the
keys to the name cache are node address and possibly a
capability ID.  The Apple Darwin, Digital UNIX, FreeBSD, HP-UX,

NEXTSTEP, OPENSTEP, Solaris, Tru64 UNIX, and UnixWare dialects use node address. Apple Darwin, FreeBSD, NetBSD, OpenBSD, Tru64 UNIX, and also use a capability ID to further identify name cache entries.

### 3.3.3 Why doesn't lsof report path names for unlinked (rm'd) files?

When lsof gets path name components from the kernel's name cache, it does not report the path names of a file that has been unlinked from its parent directory -- e.g., deleted via rm, or the unlink() system call -- even when some process may still hold the file open; lsof reports only the file system's mounted-on directory and device. That's because path name components are removed from the kernel name cache when the file is unlinked.

Unlinked open files are sometimes used by applications for temporary, but invisible storage (i.e., ls won't show them, and no other process can open them.) However, they may occasionally consume disk space to excess and cause concern for a system administrator, who will be unable to locate them with find, ls, du, or other tools that rely on finding files by examining the directory tree.

By using lsof's +L option you can see the link count of open files -- in the NLINK column. An unlinked file will have an NLINK value of zero. By using the option +L1 you can tell lsof to display only files whose link count is less than one (i.e., zero).

There are some UNIX dialect-specific exceptions to lsof's inability to report unlinked path names. They are described in the answer to the "When will lsof report path names for deleted files?" question.

### 3.3.4 Why doesn't lsof report the "correct" hard linked file path name?

When lsof reports a rightmost path name component for a file with hard links, the component may come from the kernel's name cache. Since the key which connects an open file to the kernel name cache may be the same for each differently named hard link, lsof may report only one name for all open hard-linked files. Sometimes that will be "correct" in the eye of the beholder; sometimes it will not. Remember, the file identification keys significant

to the kernel are the device and node numbers, and they're the same for all the hard linked names.

### 3.3.5 When will lsof report path names for deleted files?

Lsof will report path names for deleted files for two dialects: Linux and later builds of Solaris 10.

Deleted Linux path names are reported by default and have "(deleted)" at their ends.

The display of Solaris 10 deleted path names may be selected with the -X option. When selected they are also reported with "(deleted)" at their ends.

## 3.4 Why is lsof so slow?

Lsof may appear to be slow if network address to host name resolution is slow. This can happen, for example, when the name server is unreachable, or when a Solaris PPP cache daemon is malfunctioning.

To see if name lookup is causing lsof to be slow, turn it off with the ``-n'' option.

Port service name lookup or portmap registration lookup may also be causes of slow-down. To suppress port service name lookup, specify the ``-P'' option.

Lsof doesn't usually make direct portmap calls -- only when +M is specified, or when HASPMAPENABLED is defined during lsof construction. (The lsof help panel, produced with `lsof -h` will display the default portmap registration reporting state.) The quickest first step in checking if lsof is slow because of the portmapper is to use lsof's ``-M'' option.

Lsof may be slow if UID to login name lookups are slow. Suppress them with ``-l''.

On dialects where lsof uses the kernel name cache, try disabling its use with ``-C''. (You can tell if lsof uses the kernel name cache by looking for ``-C'' in lsof's ``-h'' output.) Of course, disabling kernel name cache use will mean that lsof won't report full or partial path names, just file system and character device names.

If you're just interested in the open files of one process, try using the ``-p <Process-ID>" option to limit lsof to that process. (The ``-p" option may also be followed with a list of Process-IDs.)

If you're interested in including or excluding certain commands, try lsof's "-c[^]cmd" option.

If you're interested in certain Internet TCP and UDP states (e.g., ESTABLISHED) or in excluding some (e.g., CLOSE_WAIT), try lsof's "-s p:s" option. More information on it may be found in the answer to the "How are protocol state name exclusion and inclusion used?" question.

Your UNIX dialect may not support "-s p:s" and its associated performance improvments to Internet-only file processing. You can find more information on those topics in the answer to the "Why doesn't my dialect support state name exclusion and inclusion?" question.

Older AIX lsof may be slow to start because of its oslevel identity comparison. (Newer AIX lsof uses uname(2).) See the "Why does AIX lsof start so slowly?" and "Why does lsof warn "compiled for x ... y; this is z.?" sections for more information.

### 3.5 Why doesn't lsof's setgid or setuid permission work?

If you install lsof on an NFS file system that has been mounted with the nosuid option, lsof may not be able to use the setgid or setuid permission you give it, complaining it can't open the kernel memory device -- e.g., /dev/kmem.

The only solution is to install lsof on a file system that doesn't inhibit setgid or setuid permission.

### 3.6 Does lsof have security problems?

I don't think so. However, lsof does usually start with setgid permission, and sometimes with setuid-root permission. Any program that has setgid or setuid-root permission, should always be regarded with suspicion.

Lsof drops setgid power, holding it only while it opens access to kernel memory devices (e.g., /dev/kmem, /dev/mem, /dev/swap). That allows lsof to bypass the weaker security

of access(2) in favor of the stronger checks the kernel
makes when it examines the right of the lsof process to
open files declared with -k and -m.  Lsof also restricts
some device cache file naming options when it senses the
process has setuid-root power.

On a few dialects lsof requires setuid-root permission
during its full execution in order
to access files in the
/proc file system.  These dialects include:

   DC/OSx 1.1 for Pyramid systems
   Reliant UNIX 5.4[34] for Pyramid systems

When lsof runs with setuid-root permission it severely
restricts all file accesses it might be asked to make with
its options.

The device cache file (typically .lsof_hostname in the home
directory of the real user ID that executes lsof) has 0600
modes.  (The suffix, hostname, is the first component of
the host's name returned by gethostname(2).)  However, even
when lsof runs setuid-root, it makes sure the file's
ownerships are changed to that of the real user and group.
In addition, lsof checks the file carefully before using
it (See the question "How do I disable the device cache
file feature or alter it's behavior?" for a description of
the checks.); discards the file if it fails the scrutiny;
complains about the condition of the file; then rebuilds
the file.

See the 00DCACHE file of the lsof distribution for more
information
about device cache file handling and the risks
associated with the file.

3.7 Will lsof show remote hosts using files via NFS?

No.  Remember, lsof displays open files for the processes
of the host on which it runs.  If the host on which lsof
is running is an NFS server, the remote NFS client processes
that are accessing files on the server leave no process
records on the server for lsof to examine.

3.8 Why doesn't lsof report locks held on NFS files?

Generally lock information held by local processes on remote
NFS files is not recorded by the UNIX dialect kernel.  Hence,

lsof can't report it.

One exception is some patch levels of Solaris 2.3, and all versions of Solaris 2.4 and above. Lsof for those dialects does report on locks held by local processes on remotely mounted NFS files.

3.8.1 Why does lsof report a one byte lock on byte zero as a full file lock?

When a process has a lock of length one, starting at byte zero, lsof can't distinguish it
from a full file lock.
That's because most UNIX dialects represent both locks the same way in their file lock (flock or eflock) structures.

3.9 Why does lsof report different values for open files on the same file system (the automounter phenomenon)?

On UNIX dialects where file systems may be mounted by an automounter with the ``direct'' type, lsof may sometimes report difference DEVICE, SIZE/OFF, INODE and NAME values when asked to report files open on the file system.

This happens because some files open on the file system -- e.g., the current directory of a shell that changed its directory to the file system as the file system's first reference -- may be characterized in the kernel with temporary automounter node information. The cd doesn't cause the file system to be mounted.

A subsequent reference to the file system -- e.g., an ls of any place in it -- will cause the file system to be mounted. Processes with files open to the mounted file system are characterized
in the kernel with data that
reflects the mounted file system's parameters.

Unfortunately some kernels (e.g., some versions of Solaris 2.x) don't revisit the process that did only a change-directory for the purpose of updating the data associated with the open directory file. The file continues to be characterized with temporary automounter information until it does another directory change, even a trivial ``cd .''.

Lsof will report on both reference types, when supplied the file system name as an argument, but the data lsof reports will reflect what it finds in the kernel. For the

different types lsof will display different data, including different major and minor device numbers in the DEVICE column, different lengths in the SIZE/OFF column, different node numbers in the INODE column, and slightly different file system names in the NAME column.

In contrast, fuser, where available, can only report on one reference type when supplied the file system name as an
argument. Usually it will report on the one that is associated with the mounted file system information. If the only reference type is the temporary automounter one, fuser will often be silent about it.

### 3.10 Why don't lsof and netstat output match?

Lsof and netstat output don't match because lsof reports the network information it finds in open file system objects -- e.g., socket files -- while netstat often gets its information from separate kernel tables.

The information available to netstat may describe network activities never or no longer associated with open files, but necessary for proper network state machine operation.

For example, a TCP connection in the FIN_WAIT_[12] state may no longer have an associated open file, because the connection has been closed at the application layer and is now being closed at the TCP/IP protocol layer.

#### 3.10.1 Why can't lsof find accesses to some TCP and UDP ports?

Lsof stands for LiSt Open Files. If there is no open file connected
to a TCP or UDP port, lsof won't find it. That's the most common reason why lsof doesn't find a port netstat might report open.

One reason I've found on some UNIX dialects is that their kernels set aside TCP and UDP ports for communicating with support activities, running in application layer servers -- the automounter daemons, and the NFS biod and nfsd daemons are examples. Netstat may report the ports are in use, but lsof doesn't.

Another reason is that netstat may also be able to report a port is open on a particular dialect, because it uses a source of data different from what lsof uses -- e.g.,

netstat might examine kernel tables or use streams messages
to MIB2, while lsof relies on the information it finds in
open file structures and their descendants.

Sometimes it's possible to search the data netstat and lsof
use.  For example, on Linux /proc/tcp and /proc/udp can be
examined.  There might an entry there for a particular
protocol and port,
but if the line on which the port appears
doesn't have an inode number that matches an inode number
of an open file, lsof won't be able to identify the process
using the port.

This is a tough question to which there is no easy answer.

3.11 Why does lsof update the device cache file?

At the end of the lsof output you may see the message:

    lsof: WARNING: /Homes/abe/.lsof_vic was updated.

In this message /Homes/abe/.lsof_vic is the path to the
private device cache file for login abe.  (See 00DCACHE.)

Lsof issues this message when it finds it necessary to
recheck the system device directory (e.g., /dev or /devices)
and rebuild the device cache file during the open file
scan.  Lsof may need to do these things it finds that a
device directory node has changed, or if it cannot find a
device in the cache.

3.12 Why doesn't lsof report state for UDP socket files?

Lsof reports UDP TPI connection state -- TS_IDLE (Idle),
TS_BOUND (Bound), etc. -- for some, but not all dialects.
TPI
state is stream-based TCP/IP information that isn't
available in many dialects.

A fairly weak general rule is if netstat(1) reports UDP
TPI state, lsof may be able to report it, too.  But don't
be surprised if lsof fails to report UDP TPI state for your
dialect.  Other factors influence lsof's ability to report
UDP TPI state, including the availability of state number
data in kernel structures, and state number to state name
conversion data.

3.13 I am editing a file with vi; why doesn't lsof find the file?

Classic implementations of vi usually don't keep open the file being edited. (Newer ones may do so in order to maintain an advisory lock.) Instead classic vi opens the file, makes a temporary copy (usually in /tmp or /usr/tmp), and does its work in that file. When you save the file being edited from a classic vi implementation, it reopens and rewrites the file.

During a classic vi session, except for the brief periods when vi is reading or rewriting
the file, lsof won't find an open
reference to the file from the vi process, because there is none.

3.14 Why doesn't lsof report TCP/TPI window and queue sizes for my dialect?

Lsof only reports TCP/TPI window sizes for Solaris, because only its netstat reports them. The intent of providing TCP/TPI information in lsof NAME column output is to make it easier to match netstat output to lsof output.

In general lsof only reports queue sizes for both TCP and UDP (TPI) connections on BSD-derived UNIX dialects, where both sets of values appear in kernel socket queue structures. SYSV-derived UNIX dialects whose TCP/IP implementations are based on streams generally provide only TCP queue sizes, not UDP (TPI) ones.

While you may find that netstat on some SYSV-derived UNIX dialects with streams TCP/IP may report UDP (TPI) queue sizes, you will probably also find that the sizes are always zero -- netstat supplies a constant zero for UDP (TPI) queue sizes to make its headers
align the same for TCP and
UDP (TPI) connections. Solaris seems to get it right -- i.e., its netstat does not report UDP (TPI) queue sizes.

When in doubt, I chose to avoid reporting UDP (TPI) queue sizes for UNIX dialects whose netstat-reported values I knew to be a constant zero or whose origin I couldn't determine. OSR is a dialect in this category.

3.14.1 Why doesn't lsof report socket options, socket states, and TCP flags and values for my dialect?

The lsof -T argument, 'f', that selects the reporting of socket options, socket states and TCP flags was implemented at lsof

revision 4.71 for the following UNIX dialects, providing the
indicated information:

AIX 4.3.2 and 5.1 and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
Apple Darwin 7.2 and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
Digital UNIX and Tru64 UNIX
4.0
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
FreeBSD 4.9 and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
HP-UX 11.00 (/dev/kmem-based lsof)
All socket options and values are reported. No socket
states are reported. Only the TF_NODELAY TCP flag and
the TF_MSS value are reported.
HP-UX 11.11 and iiiv2 (PSTAT-based lsof)
All socket options and values, and socket states are
reported. No TCP flags or values are reported.
Linux
No socket options and values, socket states, or TCP
flags and values are reported. The support for "-Tf"
could not be added to Linux, because socket options,
socket states, and TCP flags and values are not
available via the /proc file system.
NetBSD 1.6G and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
OpenBSD
3.4 and above
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
OPENSTEP 4.2
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
OpenUNIX 8
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
SCO OpenServer Release 5.0.6
All socket options and values, socket states, and TCP
flags and values described in lsof(8) are reported.
Solaris 2.6, 8 and above
The socket option display is limited to BROADCAST,
DEBUG, DGRAM_ERRIND, DONTROUTE and OOBINLINE. Socket

values are limited to KEEPALIVE and LINGER. No socket states are reported. The TCP DELACK, NODELAY and SENTFIN flags are reported. The TCP MSS value is reported.

UnixWare 7.1.[134]
All socket options and values, socket states, and TCP flags and values described in lsof(8) are reported.

### 3.14.2 Why doesn't lsof report the partial listen queue connection count for my dialect?

The reporting of partial listen queue connections was added to -Tf processing at lsof revision 4.76. Currently it is reported for these dialects:

AIX 4.3.2
This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

AIX 5.1 and above
Partial listen queue information is available.

Apple Darwin 7.2 and above
Partial listen queue information is available.

Digital UNIX 4.0
This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

FreeBSD 4.9 and above
Partial listen queue information is available.

HP-UX 11.00 (/dev/kmem-based lsof)
No partial listen queue information is available.

HP-UX 11.11 and iiiv2 (PSTAT-based lsof)
No partial listen queue information is available.

Linux
No partial listen queue information is available.

NetBSD 1.6G and above
Partial listen queue information is available.

OpenBSD 3.4 and above
Partial listen queue information is available.

OPENSTEP 4.2
Partial listen queue information is available.

OpenUNIX 8
This dialect is no longer supported, so no attempt was made to add partial listen queue length support for it.

SCO OpenServer Release 5.0.6

No partial listen queue information is available.
  Solaris 2.6, 8 and above
Partial listen queue information is available.
  Tru64 UNIX 5.0
This dialect is no longer supported, so no attempt
was made to add partial listen queue length support
for it.
  Tru64 UNIX 5.1
Partial listen queue information is available.
  UnixWare 7.1.[134]
Partial listen queue information is available.

### 3.15 What does "no more information" in the NAME column mean?

When lsof can find no successor structures -- a gnode,
inode, socket, or vnode -- connected to the file structure
of an open descriptor of a process, it reports "no more
information"
in the NAME column.  The TYPE, DEVICE, SIZE/OFF,
and INODE columns will be blank.

Because the file structure is supposed to contain a pointer
to the next structure of a file's processing support, if
the pointer is NUL, lsof can go no further.

Some UNIX dialects have file structures for system processes
-- e.g., the sched process -- that have no successor
structure pointers.  The "no more information" NAME will
commonly appear for these processes in lsof output.

It may also be the case that lsof has read the file structure
while it is being assembled and before a successor structure
pointer value has been set.  The "no more information" NAME
will again result.

Unless lsof output is filled with "no more information"
NAME column messages, the appearance of a few should be no
cause for alarm.

### 3.16 Why doesn't lsof find a process that ps finds?

If lsof fails to display open files for a process that ps
indicates exists, there may be several reasons for
the
difference.

The process may be a "zombie" for which ps displays the

"(defunct)" state.  In that case, the process has exited
and has no open file information lsof can display.  It does
still have a process structure, sufficient for the needs
of ps.

Another possible explanation is that kernel tables and
structures may have been changing when lsof looked for the
process, making lsof unable to find all relevant process
structures.  Try repeating the lsof request.

### 3.17 Why doesn't -V report a search failure?

The usual reason that -V won't report a search failure is
that lsof located the search item, but was prevented from
listing it by an option that doesn't participate in search
failure reporting.

For example, this lsof invocation:

```
$ lsof -V -i TCP@foobar -a -d 999
```

won't report it can't find the Internet address TCP@foobar,
even if there is an open file connected to that address,
unless the open file also has a file descriptor number of
999 (the ``-a -d
999" options).

Compile-time options can also affect -V results in much the
same way.  For example, if HASSECURITY and HASNOSOCKSECURITY
are defined at compile time, this lsof invocation, run by a
non-root user:

```
$ lsof -V -c inetd
```

won't report that it can't find the inetd command, even if
there is a process running the inetd command, because the
HASSECURITY and HASNOSOCKSECURITY options prevent the
listing of all but the socket files of another user, and
no socket file selector (e.g., "-i") was specified.

### 3.18 Portmap problems

#### 3.18.1 Why isn't a name displayed for the portmap registration?

When portmap registration reporting is enabled, any time
there is a registration for a local TCP or UDP port, lsof
displays it in square brackets, following the port number

or service name -- e.g., ``:1234[name]" or ``:name[100083]".

The TCP or UDP port number or service number (what follows
the `:') is displayed under the control of the lsof -P
option. The registration
identity is held by the portmapper
and may be a name or a number, depending on how the
registration's owner declared it. Lsof reports what the
port map holds and cannot derive a registration name from
a registration number.

Lsof can be compiled with registration reporting enabled
or disabled by default, under the control of the HASPMAPENABLED
#define (usually in machine.h). The lsof help panel (`lsof
-h`) will show the default. Lsof is distributed with
reporting disabled by default.

3.18.2 How can I display only portmap registrations?

Lsof doesn't have an option that will display only TCP or
UDP ports with portmap registrations. The +M option only
enables the reporting of registration information when
Internet socket files are displayed; +M doesn't select
the displaying of Internet socket files -- the -i option
does that.

This simple lsof pipe to grep will do the job:

```
 $ lsof -i +M | grep "\["
```

This works because -i selects Internet socket files, +M
enables
portmap registration reporting, and only output
lines with opening square brackets will have registrations.

When portmap registration reporting is enabled by default,
because the lsof builder constructed it that way, +M is
not necessary. (The lsof help panel, produced with `lsof
-h` will display the default portmapper registration
reporting state.) However, specifying +M when reporting
is already enabled is acceptable, as is specifying -M when
reporting is already disabled.

Digression: lsof will accept `+' or `-' as a prefix to most
options. (That isn't documented in the man page or help
panel to reduce confusion and complexity.) The -i option
is as acceptable as +i, so the above example could be
written a little more tersely as:

```
$ lsof +Mi | grep "\["
```

But be careful to use the ``Mi'' ordering, since ``iM''
implies M is an address argument to `i'.

### 3.18.3 Why doesn't lsof report portmap registrations for some ports?

Lsof reports portmap registrations for
local TCP and UDP
ports only. It identifies local ports this way:

* The port appears in the local address section of the
  kernel structure that contains it.

* The port appears in the foreign address section of a
  kernel structure whose local and foreign Internet
  addresses are the same.

* The port appears in the foreign address section of a
  kernel address structure whose Internet address is
  INADDR_LOOPBACK (127.0.0.1).

Following these rules, lsof ignores foreign portmapped
ports. That's done for reasons of efficiency and possible
security prohibitions. Contacting all remote portmappers
could take a long time and be blocked by network difficulties
(i.e., be inefficient). Many firewalls block portmapper
access for security reasons.

Lsof may occasionally ignore portmap registration information
for a legitimate local port by virtue of its local port
rules. This can happen when a port appears in the foreign
part of its kernel structure and the local
and foreign
Internet addresses don't match (perhaps because they're on
different interfaces), and the foreign Internet address
isn't INADDR_LOOPBACK (127.0.0.1).

## 3.19 Why is `lsof | wc` bigger than my system's open file limit?

There is a strong temptation to count open files by piping
lsof output to wc. If your purpose is to compare the number
you get to some Unix system parameter that defines the
number of open files your system can have, resist the
temptation.

One reason is that lsof reports a number of "files" that

don't occupy Unix file table space -- current working directories, root directories, jail directories, text files, library files, memory mapped files are some. Another reason is that lsof can report a file shared by more than one process that itself occupies only one file table slot.

If you want to know the number of open files that occupy file table slots, use the +ff option and process the lsof output's FILE_ADDR column information with standard Unix
tools like cut, grep, sed, and sort.

You might also consider using use lsof's field output with +ff, selecting the file struct address with -FF, and processing the output with an AWK or Perl script. See the list_fields.awk, list_fields.perl, and shared.perl5 scripts in the scripts/ subdirectory of the lsof distribution for hints on file struct post-processing filters.

### 3.20 Why doesn't lsof report file offset (position)?

Lsof won't report a file offset (position) value if the -s option has been specified, or if the dialect doesn't support the displaying of file offset (position).

That lsof is reporting only file size is indicated by the fact that the appropriate column header says SIZE instead of SIZE/OFF.

If lsof doesn't support the displaying of file offset (position) -- e.g., for Linux /proc-based lsof -- the -h or -? output panel won't list the -o option.

Sometimes the availability of file offset information depends on the dialect's kernel. This is
particularly true
for socket file offsets.

Maintenance of offsets for pseudo-terminal devices varies by UNIX dialect and is related to how the dialect kernel implements pseudo-terminal support. Kernels like AIX, for example, that short-circuit the transfer of data between socket and pseudo devices to reduce TCP/IP daemon interrupt rates won't advance offsets in the TCP/IP daemon socket files. Instead they will advance offsets in the open standard I/O files of the shell child precess where the pseudo-terminal devices are used.

When in doubt about the behavior of lsof in reporting file offset information, do some carefully measured experiments, consult the lsof sources, or contact me at <abe@purdue.edu> to discuss the matter. Please follow the reporting guidelines in the "How do I report an lsof bug?" section of this FAQ.

### 3.20.1 What does lsof report for size when the file doesn't really have one?

When a file has no true size -- e.g., it's a socket, a FIFO, or a pipe -- lsof tries to report the information it finds in the kernel that describes the contents of associated kernel buffers.

Thus, for example, size for most TCP/IP files is socket buffer size. The size of the socket read buffer is reported for read-only files; the size of the write buffer for write-only files; and the sum of the buffers sizes for read-write files.

## 3.21 Problems with path name arguments

### 3.21.1 How do I ask lsof to search a file system?

You can ask lsof to search for all open files on a file system by specifying its mounted path name as an lsof argument -- e.g.,

```
$ lsof /
```

Output of the mount command will show file system mounted path names. It will also show the mounted-on device path for the file system.

If the mounted-on device is a block device (the permission field in output of `ls -l <device>` starts with a `b/), you can specify it's name, too -- e.g.,

```
$ lsof /dev/sd0a
```

If the mounted-on device isn't a block device -- for example, some UNIX dialects call a CD-ROM device a character device (ls output starts with a `c') -- you can force lsof to assume that the specified device names a file system with the +f option -- e.g.,

```
$ lsof +f -- /dev/sd0a
```

(Note: you must use ``--" after +f or -f if a file name follows immediately, because +f and -f can be followed by characters that specify flag output selections.)

When you use +f and lsof can't match the device to a file system, lsof will issue a complaint.

The +f option may be used in some dialects to ask lsof to search for an NFS file system by its server name and server mount point. If the mount application reports an NFS file system mounted-on value that way, then this sample lsof request should work.

```
$ lsof +f -- fleet:/home/fleet/u5
```

Finally, you can use -f if you don't want a mounted file system path name to be considered a request to report all open files on the file system. This is useful when you want to know if anyone is
using the file system's mounted
path name. This example directs lsof to report on open access to the `/' directory, including when it's being used as a current working or root directory.

```
$ lsof -f -- /
```

The lsof -f option performs the same function as -f does in some fuser implementations. However, since the lsof -c option was chosen for another purpose before the `f' option was added to lsof, +f was selected as the analogue to the fuser -c option. (Sorry for the potential confusion.)

### 3.21.2 Why doesn't lsof find all the open files in a file system?

Lsof may not find all the open files in a file system for several reasons.

First, some processes with files open on the file system may have been changing status when lsof examined the process table, and lsof "missed" them. Remember, the kernel changes much faster than lsof can respond to the changes.

Second, be sure you have specified the file system correctly. Perhaps you specified a file instead. You can
use lsof's
-V option to have lsof report in detail on what it couldn't

find. Make sure the report for the file system you specified
says "file system." Here's some -V output:

```
$ /lsof -V /tmp ./lsof.h ./lsof
COMMAND  PID USER   FD   TYPE DEVICE SIZE/OFF  INODE NAME
lsof    2688  abe  txt   VREG 18,1,7  1428583 226641 ./lsof
lsof    2689  abe  txt   VREG 18,1,7  1428583 226641 ./lsof
lsof: no file use located: ./lsof.h
```

You can also use lsof's +f option to force it to consider
a path name as a file system. If lsof can't find a file
system by the specified name, it will issue a complaint --
e.g.,

```
$ lsof +f -- /usr
lsof: not a file system: /usr
```

(/usr is a directory in the / file system.)

3.21.3 Why does the lsof exit code report it didn't find open files
when some files were listed?

Sometimes lsof will list some open files, yet return a
non-zero exit code, suggesting it hasn't found all the
specified files.

The first thing you should
when you suspect lsof is incorrect
is to repeat the request, adding the -V option. In the
resulting report you may find that your file system
specification really wasn't a file system specification,
just a file specification.

Finally, if you specify two files or two file systems twice,
lsof will credit all matches to the first of the two and
believe that there were no matches for the second. It's
possible to specify a single file system twice with different
path names by using both its mounted directory path name
and mounted-one device name.

```
$ lsof +f -V spcuna:/sysprog /sysprog
COMMAND   PID USER   FD   TYPE DEVICE SIZE/OFF  INODE NAME
ksh     11092  abe  cwd   VDIR 39,0,1     1536 226562 /sysprog
(spcuna:/sysprog)
...
lsof: no file system use located: spcuna:/sysprog
```

All matches were credited to /sysprog; none to spcuna:/sysprog.

3.21.4 Why won't lsof find all the open files in a directory?

When you give lsof a simple directory path
name argument
(not a file system mounted-on name), you are asking it to
search for processes that have the directory open as a
file, or as a process-specific directory -- e.g., root or
current working directory.

If you want to list instances of open files inside the
directory, you need to specify the individual path names
of those files, or use the lsof +D and +d options.

See the answer to the question "Why are the +D and +d
options so slow?" before you use +D or +d casually.

See the answer to the question "Why do the +D and +d options
produce warning messages?" for an explanation of some
process authority limitations of +D and +d.

3.21.5 Why are the +D and +d options so slow?

The +D and +d options cause lsof to build a path name search
list for a specified directory. +D causes lsof to descend
the directory to its furthest subdirectory, while +d
restricts it to the top level. In both cases, the specified
directory itself is included in the search list. In both
symbolic
links are ignored.

Building such a search list can take considerable time,
especially when the specified directory contains many files
and subdirectories -- lsof must call the system readlink()
and stat() functions for each file and directory. Storing
the search list can cause lsof to use more than its normal
amount of dynamic memory -- each file recorded in the search
list consumes dynamic memory for its path name, characteristics,
and search linkages. Using the list means lsof must search
it for every open file in the system.

Building the search list for a directory specified on some
file systems can be slow -- e.g., for an NFS directory with
many files. Some file systems have special logging features
that can introduce additional delays to the building of
the search list -- e.g., NFS logging, or logging on a
Solaris UFS file system. The bottom line is that slow
search list construction may not be so much an lsof problem

as a file system problem. (Hint:
if you're using Solaris
UFS logging, consider specifying the "logging,noatime"
option pair to reduce the number of atime writes to the
UFS logging queue and disk.)

A somewhat risky way to speed up lsof's building of the
search list is to use lsof's ``-O" option. It forces lsof
to do all system calls needed to build the search list
directly, rather than in a child process. While direct
system calls are much faster, they can block in the kernel
-- e.g., when an NFS server stops responding -- stopping
lsof until the kernel operation unblocks.

As an example of the load +D can impose, consider that an
`lsof +D /` on a lightly loaded NeXT '040 cube with a 1GB
root file system disk took 4+ minutes of real time. It
also generated several hundred error messages about files
and directories the lsof process didn't have permission to
access with stat(2).

The bottom line is that +D and +d should be used cautiously.
+D is more costly than +d for deeply nested directory
trees,
because of the full directory descent it causes. So use
+d where possible. And you might need to consider the
performance of the file system that holds the directory
you name with +d or +D.

In view of these warnings, when is it appropriate to use
+D or +d? Probably the most appropriate time is when you
would specify the directory's contents to lsof with a shell
globbing construct -- e.g., `lsof *`. If that's what you
need to do, `lsof +d .` is probably more efficient than
having the shell produce a directory list, form it into an
argument vector, and pass the vector to lsof for it to
unravel.

See the answer to the question "Why do the +D and +d options
produce warning messages?" for an explanation of some
process authority limitations of +D and +d.

### 3.21.6 Why do the +D and +d options produce warning messages?

+D and +d option processing is limited by the authority of
the lsof process -- i.e., lsof can only examine (with
lstat(2) and stat(2)) files the owner

of the process can
access.

If the ownership, group membership, or permissions of the
specified directory, file within it, or directory within
it prevents the owner of the lsof process from using lstat(2)
or stat(2) on it, lsof will issue a warning message, naming
the path and giving the system's (lstat(2's or stat(2)'s)
reason (errno explanation text) for refusing access.

As an example, assume user abc has a subdirectory in /tmp,
owned by abc and readable, writable and searchable by only
its owner. If user def asks lsof to search for all /tmp
references with +D or +d, lsof will be unable to lstat(2)
or stat(2) anything in abc's private subdirectory, and will
issue an appropriate warning.

Lsof warnings can usually be suppressed with the -w option.
However, using -w with +D or +d means that there will be
no indication why lsof couldn't find an open reference to
a restricted directory or something contained in it.

Hint: if you need to use +D or +d and avoid authority
warnings,
and if you have super-user power, su and use lsof
with +D or +d as root.

3.22 Why can't my C compiler find the rpcent structure definition?

When you try to compile lsof your compiler may complain
that the rpcent structure is undefined. The complaints
may look like this:

```
>print.c: In function `fill_portmap':
>print.c:213: dereferencing pointer to incomplete type
>...
```

The most likely cause is that someone has allowed a BIND
installation to update /usr/include/netdb.h (or perhaps
/usr/include/rpc/netdb.h), removing the rpcent structure
definition that lsof expects to find there.

Only Solaris has an automatic work-around. (See dlsof.h
in dialects/sun.). The Solaris work-around succeeds because
there is another header file, <rpc/rpcent.h>, with the rpcent
structure definition, and there is a Solaris C pre-processor
test that can tell when the BIND <netdb.h> is in place and
hence <rpc/rpcent.h> must be included.

Doubtlessly there are
similar work-arounds possible in
other UNIX dialects whose header files have been "touched"
by BIND, but in general I recommend restoration of the
vendor's <netdb.h> and any other header files BIND might
have replaced. (I think BIND replaces <resolv.h>,
<sys/bitypes.h>, <sys/cdefs.h> -- and maybe others.)

3.23 Why doesn't lsof report fully on file "foo" on UNIX dialect
"bar?"

Lsof sometimes won't report much information on a given
file, or may even report an error message in its NAME
column. That's usually because the file is of a special
type -- e.g., in a file system specific to the UNIX dialect
-- and I haven't used a system where the file appeared
during my testing.

If you encounter such a situation, send me e-mail at
<abe@purdue.edu> and we may be able to devise an addition to
lsof that will report on the file in question. Please follow
the reporting guidelines in the "How do I report an lsof bug?"
section of this FAQ. Make sure "lsof" appears in the
"Subject:"
line so my e-mail filter won't classify your letter
as Spam.

3.24 Why do I get a complaint when I execute lsof that some library
file can't be found?

On systems where the LIBPATH (or the equivalent) environment
variable is used to record the library search path in
executable files when they are built, an incorrect value
may make it impossible for the system to find the shared
libraries needed to load lsof for execution.

This may be particularly true on systems like AIX >= 4.1.4,
where the lsof Makefile takes the precautionary step of
using the -bnolibpath loader flag to insure that the path
to the private static lsof library is not recorded in the
lsof binary. Should LIBPATH be invalid when lsof is built,
it will be recorded in the lsof binary as the default
library path search order and lead to an inability to find
libraries when lsof is executed.

So, if you get missing library complaints when you try to
execute lsof, check LIBPATH, or whatever environment

variable
is used on your system to define library search order in
executable files.  Use the tools at your disposal to look
at the library paths recorded in the lsof binary -- e.g.,
chatr on HP-UX, dump on AIX, ldd on Solaris.

Make sure, too, that when the correct library search path
has been recorded in the executable file, the required
library files exist at one or more of the search paths.

### 3.25 Why does lsof complain it can't open files?

When lsof begins execution, unless it has been asked to
report only help or version information, typically it will
attempt to access kernel memory and symbol files -- e.g.,
/unix, /dev/kmem.  Even though lsof needs only permission
to open these files for reading, read access to them might
be restricted by ownerships and permission modes.

So the first step to diagnosing lsof problems with opening
files is to use ls(1) to examine the ownerships and permission
modes of the files that lsof wants to open.  You may find
that lsof needs
to be installed with some type of special
ownership or permission modes to enable it to open the
necessary files for reading.  See the "Installing Lsof"
section of 00README for more information.

### 3.26 Why does lsof warn "compiled for x ... y; this is z."?

Unless warnings are suppressed (with -w) or the kernel
identity check symbol (HASKERNIDCK) definition has been
deleted, all but one lsof dialect version (exception:
/proc-based Linux lsof) compare the identity of the running
kernel to that of the one for which lsof was constructed.
If the identities don't match, lsof issues a warning like
this:

```
lsof: WARNING: compiled for Solaris release 5.7; this is 5.6.
```

Two kernel identity differences can generate this warning
-- the version number and the release number.

Build and running identity differences are usually significant,
because they usually indicate kernels whose structures are
different -- kernel structures commonly change at dialect
version releases.  Since

lsof reads data from the kernel
in the form of structures, it is sensitive to changes in
them. The general rule is that an lsof compiled for one
UNIX dialect version will not work correctly when run on
a different version.

There are three work-arounds: 1) use -w to suppress the
warning -- and risk missing other warnings; 2) permanently
disable the identity check by deleting the definition of
HASKERNIDCK in the dialect's machine.h header file -- with
the same risk; or 3) rebuild lsof on the system where it
is to be run. (Deleting HASKERNIDCK can be done with the
Customize script or by editing machine.h.)

Generally checking kernel identity is a quick operation
for lsof. However, it is potentially slow under AIX, where
lsof must run /usr/bin/oslevel. To speed up lsof, use -w
to suppress the /usr/bin/oslevel test. See "Why does AIX
lsof start so slowly?" for more information.

### 3.27 How can I disable the kernel identity check?

The kernel identity check is controlled
by the HASKERNIDCK
definition. When it is defined, most dialects (exclusion:
/proc-based Linux lsof) will compare the build-time kernel
identity with the run-time one.

To disable the kernel identity check, disable the HASKERNIDCK
definition in the dialect's machine.h header file. The
Customize script can be used to do that in its section
about the kernel identity check.

Caution: while disabling the kernel identity check may
result in smaller lsof startup overhead, it comes with the
risk of executing an lsof that may produce warning messages,
error messages, incorrect output, or no output at all.

### 3.28 Why don't ps(1) and lsof agree on the owner of a process?

Generally the user ID lsof reports in its USER column is
the process effective user ID, as found in the process
structure. Sometimes that may not agree with what ps(1)
reports for the same process.

There are sundry reasons for the difference. Sometimes
ps(1) uses a different source for process information,
e.g.,

the /proc file system or the psinfo structure.
Sometimes the kernel is lax or confused (e.g., Solaris
2.5.1) about what ID to report as the effective user ID.
Sometimes the system carries only one user ID in its process
structure (some BSD derivatives), leaving lsof no choice.

The differences between lsof and ps(1) user identifications
should be small and normally it will be apparent that the
confusion is over a process whose application has changed
to an effective user ID different from the real one.

3.29 Why doesn't lsof find an open socket file whose connection
state is past CLOSE_WAIT?

TCP/IP connections in states past CLOSE_WAIT -- e.g.,
FIN_WAIT_1, CLOSING, LAST_ACK, FIN_WAIT_2, and TIME_WAIT
-- don't always have open files associated with them. When
they don't, lsof can't identify them. When the connection
state advances from CLOSE_WAIT, sometimes the open file
associated with the connection is deleted.

3.30 Why don't machine.h definitions work when
the surrounding
comments are removed?

The machine.h header files in dialect subdirectories have
some commented-out definitions like:

```
/* #define HASSYSDC "/your/choice/of/path */
```

You can't simply remove the comments and expect the definition
to work. That's intended to make you think about what
value you are assigning to the symbol. The assigned value
might have a system-specific convention. HASSYSDC, for
example, might be /var/db/lsof.dc for FreeBSD, but it might
be /var/adm/lsof.dc for Solaris.

Symbols defined in the lsof documentation are described in
00PORTING, other machine.h comments, and other lsof
documentation files. HASSYSDC, for example, is discussed
in 00DCACHE. When comments and documentation don't suffice,
consult the source code for hints on how the symbol is
used.

3.31 What do "can't read inpcb at 0x...", "no protocol control
block", "no PCB, CANTSENDMORE, CANTRCVMORE", etc. mean?

Sometimes lsof will report "can't read inpcb at 0x00000000",

"no
protocol control block", "no PCB, CANTSENDMORE,
CANTRCVMORE" or a similar message in the NAME column for
open TCP socket files.  These messages mean the file's socket
structure lacks a pointer to the INternet Protocol Control
Block (inpcb) where lsof expects to find connection addresses
-- local and foreign ports, local and foreign IP addresses.
The socket file has probably been submitted to the shutdown(2)
function for processing.

In some implementations lsof issues the "no PCB, CANTSENDMORE,
CANTRCVMORE" message, which tries to explain the absence
of a protocol control block by showing the socket state
settings that have been made by the shutdown(2) function.

If a non-zero address follows the "0x" in the "can't read
inpcb" message, it means lsof couldn't read inpcb contents
from the indicated address in kernel memory.

3.32 What do the "unknown file system type" warnings mean?

Lsof may report a message similar to"

    unknown file system type, v_op: 0x10472f10

in
the NAME column for some files.

This means that lsof has encountered a vnode for the file
whose operation switch address (from v_op) references a
file system type for which there is no support in lsof.
After lsof identifies the file system type, it uses
pre-compiled code to locate the file system specific node
for the file where lsof finds information like file size,
device number, node number, etc.

To get some idea of what the file system type might be,
use nm on your kernel symbol file to locate the symbol name
that corresponds to the v_op address -- e.g., on Solaris
do:

    $ nm -x /dev/ksyms | grep 0x10472f10
    0x10472f10 ... |file_system_name_vnodeops

Where "file_system_name" is the clue to the unsupported
file system.

Lsof doesn't use the v_op address to identify file system

types on all dialects. Sometimes it uses an index number
it finds in the vnode. It will translate that symbol to
a short name in the warning message -- e.g., "nfs3" --
if
possible.

3.33 Installation

3.33.1 How do I install lsof?

There is no "standard" way to install lsof. Too much
depends on local conditions for me to be able to provide
working install rules in the lsof make files. (The skeleton
install rules you will find just give "hints.") See the
"Installing Lsof" section of 00README for a fuller explanation.

To install lsof you will need to consider these questions:

* Who should be able to use lsof? (See HASSECURITY and
  HASNOSOCKSECURITY in the "Security" section of 00README.)

* Where should lsof be installed? This is a decision
  mostly dictated by local conditions. Somewhere in
  /usr/local -- etc/ or sbin/ -- is a common choice.

* What permissions should I give the lsof executable?
  The answer to this varies by dialect. The make files
  have install rules that give hints. The "Installing
  Lsof" section of 00README gives information, too.

* What if I want to install lsof in a shared file system

  for machines that require different lsof configurations?
  See the next question and answer, "How do I install a
  common lsof when I have machines that need differently
  constructed lsof binaries?"

3.33.2 How do I install a common lsof when I have machines that
need differently constructed lsof binaries?

A dilemma that faces some system administrators when they
install lsof in a shared file system -- e.g., NFS -- is
that they must have different lsof executables for different
systems.

The answer is to build an lsof wrapper script that is
executed in place of lsof. The script can use system
commands to determine which lsof binary should be executed.

Consider this example. You have HP-UX machines with 32 and 64 bit kernels that share the /usr/local/sbin directory where you want to install lsof. Consequently, on each system you must use a different lsof executable, built for the system's bit size. (That's because lsof reads kernel structures, sized by the
kernel's bit size.)

One answer is to install three things in /usr/local/sbin: 1) a 32 bit lsof as lsof32; 2) a 64 bit lsof as lsof64; and 3) an lsof script. The script might look like this one, based on work by Amir J. Katz:

```
  #!/bin/sh
  x=`/usr/bin/getconf KERNEL_BITS`  # returns 32 or 64
  if /usr/bin/test "X$x" = "X32"
  then
    lsof32 $*
  else
    if /usr/bin/test "X$x" = "X64"
    then
lsof64 $*
    else
echo "Can't determine which lsof executable to use;"
echo "getconf KERNEL_BITS says: $x"
exit 1
    fi
  fi
```

Solaris users should consult "How do I install lsof for Solaris 7, 8 or 9?" for information on a similar trick using the Solaris isaexec command.

Users of other dialects might be able to use a command like uname(1) that can identify a distinguishing feature of the system to be incorporated in pre-installed lsof executable names. For example, use `uname -r` and install binaries with suffixes that match `uname -r`
output.

### 3.34 Why do lsof 4.53 and above reject device cache files built by earlier lsof revisions?

When lsof revisions 4.53 run and encounter a device cache file built by an earlier revision, it will reject the file and build a new one. The rejection will be advertised with these messages:

lsof: WARNING: no /dev device in <name>: 2 sections
...
lsof: WARNING: created device cache file: <name>

This happens because the header line of the device cache file was changed at revision 4.53 to contain the number of the device on which the device directory resides. The old device cache file header line -- the "2 sections" line in the above warning message, node reads "2 sections, dev=600".

This is not a serious problem, since lsof automatically rebuilds the device cache file with the correct header line.

### 3.35 What do "like block special" and "like character special" mean in the NAME column?

When lsof comes across an open block or character file whose device, raw device and inode place it somewhere other than /dev (or /devices), lsof doesn't report the /dev (or /devices) name in the NAME column. Instead lsof reports the file system name and device or path name in the NAME column and parenthetically adds "like block special <path>" or "like character special <path>".

The value for <path> will point to a block or character device in /dev (or /devices) whose raw device number matches that of the open file being reported, but whose device number or node number (or both) don't match.

Such an open file is connected to a device node that has been created in a directory other than /dev (or /devices.) See mknod(8) for information on how such nodes are created. (Generally one needs root power to create device nodes with mknod.)

### 3.36 Why does an lsof make fail because of undefined symbols?

When lsof is compiled via the `make` step and the final load step fails because of missing symbols, the problem may not be lsof. The problem may be that ld, called by the compiler as part of the `make` step, can't find some library that lsof needs.

First check the last compiler line of the make operation

-- e.g., the last line with cc or gcc in it before the
undefined symbol report -- for loader arguments, i.e.,
ones beginning with "-l". Except for "-llsof" the rest
name system libraries. ("-L./lib" precedes "-llsof" to
tell the loader its location.)

Check that all the named system libraries exist. Look in
/lib and /usr/lib as a start, but that may not be the only
place system libraries live. Consult your dialect's
documentation, e.g., the compiler and loader man pages,
for other possible locations.

If some system library doesn't exist, that may mean it was
never installed or was removed. You'll have to re-install
the missing library.

You may find that all the system libraries lsof uses exist.
Your next step might be to use nm and grep to see if any
of them contain the undefined symbols.

```
 $ nm library | grep symbol
```

If the undefined symbol exists in some library named by
the lsof make step, then you might have a problem with some
environment variable that controls the load step. The most
common is LD_LIBRARY_PATH. It may have a setting that
causes ld to ignore a directory containing a library lsof
names. If this is the case, try unsetting LD_LIBRARY_PATH
in the environment of the ld process -- e.g., do:

```
   $ unset LD_LIBRARY_PATH
or
   % unsetenv LD_LIBRARY_PATH
```

Consult your ld man page for other environment variables
that might affect library searching -- e.g., LIBPATH, LPATH,
SHLIB_PATH, etc.

If the undefined function doesn't exist in any libraries
lsof names, check other libraries. See if the function
has a man page that names its library. If the latter is
true, please let me know, because that is an lsof problem
I need to fix.

If none of these solutions work for you, send me some
documentation via e-mail at <abe@purdue.edu>. Include

`uname
-a` output, the output of the lsof `Configure ...` and `make`
steps, and the contents of the environment in force when the
`make` step was executed -- e.g., `env` or `printenv` output.
If you've located the libraries lsof names, send me that
information, too.  Make sure "lsof" appears in the "Subject:"
line so my e-mail filter won't classify your letter as Spam.

### 3.37 Command Regular Expressions (REs)

#### 3.37.1 What are basic and extended regular expressions?

Lsof's ``-c'' option allows the specification of regular
expressions (REs), enclosed in two slash ('/') characters and
followed by these modifiers:

    b the RE is a basic RE.
    i ignore case.
    x the RE is an extended RE (the default).

Note: the characters of the regular expression may need to
be quoted to prevent their expansion by the shell.

Example: this RE is an extended RE that matches exactly
four characters, whose third may be an upper ('O') or lower
case ('o') oh:

    -c /^..o.$/i

For simplicity's
sake, an RE that is acceptable to egrep(1)
is usually called an extended RE.

REs suitable for the old line editor, ed(1), are often
called basic REs (and sometimes also called obsolete).

These are some ways basic REs usually differ from extended
REs.  (There are other differences.)

* `|', `+', `?', '{', and '}' are ordinary characters.

* `^' is an ordinary character except at the beginning of
  the RE.

* `$' is an ordinary character except at the end of the
  RE.

* `*' is an ordinary character if it appears at the

beginning of the RE.

For more information on REs and the distinction between basic and extended REs, consult your dialect's man pages for ed(1), egrep(1), sed(1), and possibly regex(5) or regex(7).

### 3.37.2 Why can't I put a slash in a command regular expression?

Since a UNIX command name is the last part of a path to the command's executable, the lsof command regular expression (RE) syntax uses slash ('/') to mark the beginning and end
of an RE. Slash may not appear in the RE and the `\' back-slash escape is ineffective for "hiding" it.

More likely than not, if you try to put a slash in an lsof command RE, you'll get this response:

```
$ lsof -s/.\// ...
lsof: invalid regexp modifier: /
```

Lsof is complaining the the first character it found after the second slash isn't an lsof command RE modifier -- 'b', 'i', or 'x'.

### 3.37.3 Why does lsof say my command regular expression wasn't found?

When you use both forms of lsof's -c option -- ``-c <command>" and ``-c /RE/[m]" -- and ask that lsof do a verbose search (``-V"), you may be surprised that lsof will say that the regular expression wasn't found.

This can happen if the ``-c <command>" form matches first, because then the ``-c/RE/[m]" test will never have been applied. For example:

```
$ ./lsof -clsof -c/^..o.$/ -V -adcwd
COMMAND  PID USER   FD   TYPE DEVICE SIZE/OFF  NODE NAME
lsof    7850  abe  cwd   VDIR    6,0     2048
96442 / (/dev/sd0a)
lsof: no command found for regex: ^..o.$
```

The ``-clsof" option matched first, so the ``-c/^..o.$/ option wasn't tested.

### 3.38 Why doesn't lsof report on shared memory segments?

Lsof reports on shared memory segments only if they're associated with an open file. That's consistent with lsof's mission -- to LiSt Open Files. Shared memory segments with no file associations aren't open files.

That's not to say that a report on shared memory segments and their associated processes wouldn't be useful. But it calls for a new tool, not more baggage for lsof.

3.39 Why does lsof report two instances of itself?

When you ask lsof to report all open files and it has permission to do so, you may see two lsof processes in the output. The processes are connected via pipes -- e.g., here's an HP-UX 11 example.

```
   COMMAND     PID USER   FD   TYPE     DEVICE ...
   ...
   lsof      29450  abe    7w  PIPE 0x48732408 ...
   lsof      29450  abe    8r
 PIPE 0x48970808 ...
   ...
   lsof      29451  abe    6r  PIPE 0x48732408 ...
   lsof      29451  abe    9w  PIPE 0x48970808 ...
```

The first process will usually be the lsof you initiated; the second, an lsof child process that is used to isolate its parent process from kernel functions that can block -- e.g., readlink() or stat().

Information to and from the kernel functions is exchanged via the two pipes. When the parent process detects that the child process has become blocked, it attempts to kill the child. Depending on the UNIX dialect that may succeed or fail, but the parent won't be blocked in any event.

See the "BLOCKS AND TIMEOUTS" and "AVOIDING KERNEL BLOCKS" sections of the lsof man page for more information on why the child process is used and how you can specify lsof options to avoid it. (Caution: that may be risky.)

3.40 Why does lsof report '\n' in device cache file error messages?

Lsof revisions prior to 4.58 may report '\n' in error messages
it delivers about problems in the device cache file -- e.g.,

lsof: WARNING: no ...: 4 sections\n

That's deliberately done to show the exact contents of the device cache file line about which lsof is complaining, including its terminating NL (New Line) '\n' character. In the above example the line in the device cache file causing the lsof complaint contains "4 sections" and ends with a '\n'.

At revision 4.58 and above, device cache error messages like the one in the above example have been changed to read:

lsof: WARNING: no ...: line "4 sections"

The terminal '\n' is no longer reported, the line contents are enclosed in double quote marks (""), and the word "line" has been added as a prefix to denote that what follows is a line from the device cache file.

## 3.41 Kernel Symbol and Address Problems

### 3.41.1 What does "lsof: WARNING: name cache hash size length error: 0" mean?

When run on some systems, lsof may issue this warning:

lsof: WARNING: name
cache hash size length error: 0

That is an example from a FreeBSD system where lsof reads the kernel's _nchash variable and finds its value is zero.

Similar warnings include:

WARNING: kernel name cache size:
WARNING: can't read kernel's name cache:
WARNING: no name cache address
WARNING: name cache hash size length error:
WARNING: unusable name cache size:

These warnings are issued when lsof is attempting to read the kernel's name cache information. They are usually the result of a mis-match between the addresses for kernel symbols lsof gets via nlist(2) and the addresses in use by the kernel.

Lsof usually gets kernel symbol addresses from what it

believes to be the kernel boot file. In FreeBSD, for example, that's the path returned by getbootfile(3), usually /kernel. The boot file can have other names in other UNIX dialects -- /unix, /vmunix, /bsd, /netbsd, /mach, /stand/vmunix, etc.

Lsof will get incorrect (mismatched) addresses from the boot
file if it has been replaced by a newer one which hasn't yet been booted -- e.g., if this is done in FreeBSD:

```
# mv /kernel /kernel.OLD
# mv /kernel.NEW /kernel
```

Until the FreeBSD system is rebooted, the booted kernel is /kernel.OLD, but getbootfile() says it is /kernel. If symbol addresses important to lsof in /kernel.OLD and /kernel don't match, the lsof WARNING messages result.

### 3.41.2 Why does lsof produce "garbage" output?

Kernel name cache warnings may not be the only sign that lsof is using incorrect symbol addresses to read kernel values. If there's no reasonable test lsof can make on what it reads from the kernel, it may issue other warnings or even report nonsensical results.

The warnings may appear on STDERR, such as:

```
lsof: can't read proc table info
```

Or the warnings may appear in the NAME column as messages saying lsof can't read or interpret some kernel structure -- e.g.,

```
... NAME
... can't read file struct from 0x12345
```

One
possible work-around is to point lsof's kernel symbol address gathering at the proper boot file. That can be done with lsof's -k option -- e.g.,

```
$ lsof -k /kernel.OLD
```

The best work-around is to make sure the standard boot file is properly sited -- e.g., if you've moved a new /kernel in place, boot it.

3.42 Why does lsof report open files when run as super user that it doesn't report when run with lesser privileges?

The most likely cause is that the HASSECURITY option was selected when the lsof executable was built.

If HASSECURITY is defined when lsof is built, and lsof is run with the privileges of a non-ROOT user, it will only list open files belonging to the user. The same lsof executable, when run with root user privileges, will list all open files.

However, if HASSECURITY and HASNOSOCKSECURITY are both defined when lsof is built, lsof will list open files belonging to the user and will also list anyone else's open socket files, provided their listing is selected with the "-i" option.

So first ask yourself if the process whose open files lsof won't list belong to a user other than the one under which you're running lsof, and are not open socket files. If either is true, use lsof's help (-h or -?) option and look for a line near the bottom of the help panel that says:

"... can list all files..."

If the leading "..." says "Only root" then HASSECURITY was defined when lsof was built. If the trailing "..." says ", but anyone can list socket files" then HASNOSOCKSECURITY was also defined.

Should you want an lsof not built with HASSECURITY defined, rerun the lsof Configure script. If you let Configure do customization, make sure you answer 'n' when it asks if you want to enable HASSECURITY and HASNOSOCKSECURITY. If you don't need to do customization, you can rebuild lsof with the "-n" option to Configure. Here's an example of such a rebuild sequence:

```
$ Configure -clean
$ Configure -n <dialect-abbreviation>

$ make
```

More information on the HASSECURITY and HASNOSOCKSECURITY options may be found in the "Security" section of the

00README file of the lsof distribution.

3.43 Test Suite Problems

3.43.1 Errors all tests can report:

3.43.1.1 Why do tests complain "ERROR!!! can't execute ../lsof"?

All tests in the test suite expect an executable lsof file
to exist in the tests parent directory, ../lsof.

If there's none there, the tests/Makefile has a rule to
make it, but there are probably circumstances where that
rule may fail.

The work-around is to re-Configure and re-make lsof, then
run the test suite.

3.43.1.2 Why do tests complain "ERROR!!! can't find ..." a file?

Many tests create (or use from a supplied environment
variable path) a test file and use lsof to find it. When
lsof can't file the file, the tests report the error with
messages of the form:

```
   ERROR!!!  can't find ... : <some file path>
 or
   ERROR!!!  lsof couldn't find ...
```

These
type of error messages mean that the lsof field output
delivered to the test didn't contain a file that the test
could identify as the one it intended lsof to find. It
might also mean that the process information -- command
name, PID or parent PID -- didn't match what the test
expected.

This could imply a bug in the test or a bug in lsof. Try
using lsof to find a known file that is open. For example,
while in the tests sub-directory, do this:

```
   $ sleep 30 < Makefile
   $ ../lsof Makefile
```

If lsof doesn't report that Makefile is open, then the
fault may be with lsof. If lsof reports the file is open,
search further in the test code for the failure cause.

3.43.1.3 Why do some tests fail to compile?

If a test suite program fails to compile, it may be because I've never had an opportunity to compile the test on the particular UNIX version you are using.

See Appendix B in 00TEST for a list of the UNIX dialects where the test suite has been validate.

3.43.1.4
Why do some tests always fail?

There are several tests in the optional group that have conflicting or special requirements:

LTbigf needs a dialect and file system that support large files.

LTlock won't work if the tests/ sub-directory is on an NFS file system.

LTnfs won't work if the tests/ sub-directory is not on an NFS file system.

So for two tests in particular, LTlock and LTnfs, one will generally fail.

Some failing tests can be run successfully by supplying to them a path to the appropriate type of file system with the -p option.

3.43.1.5 Why does the test suite say it hasn't been validated on my dialect?

When you use the default rule of the test suite's Makefile, it may issue this complaint:

```
$ cd tests
$ make
!!!WARNING!!!

This dialect or its particular version may not have
been validated with the lsof test suite.  Consequently
some tests may fail or may not even compile.

!!!WARNING!!!
```

You

are then given the opportunity to answer 'y' to have
the test suite operation continue.

This message means that the tests/TestDB file in the tests
sub-directory doesn't show that the test suite has been
run with the combination of compiler flags found in
tests/config.cflags.  The tests might nor run; they may
encounter compiler failures.

See 00TEST for more information on the UNIX dialects where
the test suite has been validated and on the workings of
TestDB and its supporting scripts.

When the tests/Makefile "auto" rule is used, the message
is more terse and the condition is fatal.

    This suite has not been validated on:

 <dialect_description>

No opportunity to continue is offered.

The tests/Makefile "silent" rule will skip checking for
the validation footprint.

3.43.1.6 Why do the tests complain they can't stat() or open()
 /dev/mem or /dev/kmem?

When the tests detect that lsof for the dialect reads its
information from kernel memory (i.e.,
the LT_KMEM definition
is present in tests/config.cflags), and when the lsof
executable path is ../lsof, the tests make sure they can
stat() and open() for read access the relevant kernel memory
devices, /dev/kmem and possibly /dev/mem.

If those stat() or open() operations fail, the tests issue
an error message and quit.  The message explains why the
system rejected the operation in terms of system "errno"
symbols and messages.  More often than not the explanation
will be that the process lacks permission to access the
indicated device node.

One work-around is to give the lsof executable being tested
the necessary permission -- e.g., via chgrp, chmod, etc.
-- and set its path in the LT_LSOF_PATH environment variable.
(See 00TEST.)

Another work-around is to make sure the process that runs
the tests has the necessary permissions -- e.g., run it as
root, or enable the process login to access the resources.
For example, I can run the tests on my personal work-station
because
/dev/kmem and /dev/mem are readable by the "kmem"
group and my login is in that group.

3.43.2 LTbigf test issues

3.43.2.1 Why does the LTbigf test say that the dialect doesn't
support large files?

Large file support is defined dialect by dialect in the
lsof source files and Configure script. If large file
support isn't defined there, it isn't defined in the LTbigf
test.

If you think that's wrong for a particular dialect, contact me
via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the
"Subject:" line so my e-mail filter won't classify your letter
as Spam.

3.43.2.2 Why does LTbigf complain about operations on its config.LTbigf*
file?

The LTbigf must be able to write a large file test (size
> 32 bits) and seek within it and the process file ulimit
size must permit the operation. If the default location
for the test file, tests/, isn't on a file system enabled
for large file operations or if the process ulimit file
block size is too small, lsof
will get file operation
errors, particularly when seeking

There may be a work-around. Specify the path to a file
LTbigf can write in a file system enabled for large file
operations a the -poption. Make sure that the ulimit file
block size permits writing a large file. For example,
presuming /scratch23 is large-file-enabled, and presuming
you have permission to raise the ulimit file block size,
this shell commands will allow the LTbigf test to run on
AIX:

```
$ ./LTbigf -p /scratch23/abe/bigfile
```

(Note: syntax for the ulimit command varies by dialect and

by shell.  Discovering the proper variant is left to the
reader.)

More information on this subject can be found in the LTbigf
description in the 00TEST file.  If course, the LTbigf.c
source file in tests/ is the ultimate source of information,

3.43.2.3 Why does LTbigf warn that lsof doesn't return file offsets?

On some dialects (e.g., Linux) lsof can't report file
offsets, because the data access method underlying
lsof
doesn't provide them.  If LTbigf knows that lsof can't
report file offsets for the dialect, it issues this warning:

    LTbigf ... WARNING!!!  lsof can't return file offsets
    for this dialect, so offset tests have
    been disabled.

LTbigf then performs the size test and skips the offset
tests.

For more information see 00TEST and the "Why doesn't
/proc-based lsof report file offsets (positions)?" Q&A of
this file.

3.43.3 Why does the LTbasic test complain "ERROR!!! lsof this ..."
and "ERROR!!!  lsof that ..."?

The LTbasic test program uses lsof to examine a running
lsof process.  It looks for the lsof current working
directory, executable (if possible), and kernel memory file
(if applicable).

Failures to find those things result in the LTbasic error
messages.  More information on how LTbasic produces the error
messages may be found in the LTbasic.c source file.

On HP-UX 11.11 and higher, for example, if the test's current
working directory is on a
loopback (LOFS) file system, LTbasic
won't be able to find the current working directory of the lsof
process because of a bug in the HP-UX kernel.

The solution for that HP-UX problem is to install an HP-UX
patch.  See the answer to the "Why doesn't PSTAT-based lsof
report a CWD that is on a loopback (LOFS) file system?"
question for more information on the patch.

3.43.4 NFS test issues

3.43.4.1 Why does the LTnfs test complain "couldn't find NFS file ..."?

The LTnfs test must work with an NFS test file. After it opens the file it asks lsof to find it on an NFS file system. If the file isn't on an NFS file system, lsof won't find it, and the NFS test script complains and fails.

The work-around is to use -p option to supply a path to a regular NFS file (not a directory) that is on an NFS file system that LTnfs can read. Presuming /share/bin/file is such a file and can be opened for reading by the LTnfs test, this sample shell command could be used to run the LTnfs
test successfully:

```
$ ./LTnfs -p /share/bin/file
```

(If the NFS file system is enabled for large files, the NFS test will produce the error message described in the following Q&A.)

3.43.5 LTnlink test issues

3.43.5.1 Why does the LTnlink test complain that its test file is on an NFS file system?

The LTnlink test may complain:

```
LTnlink ... WARNING!!! test file <path> is NFS mounted.
```

and then issue an explanation and a hint about using the -p option.

The LTnlist test does this because of the way NFS file links are managed when an NFS file is unlinked and the unlinking process still has the file open. Unlike with files on a local file system, when an NFS file that is still open is unlinked, its link count is not reduced.

The file name is changed to a name of the form .nfsxxxx and the link count is left unchanged until the process holding the file open closes it. That's done by NFS so it can keep proper track of the file on NFS clients and servers.

Since

the link count isn't reduced when the LTnlink test
program closes the NFS test file it still has open, lsof
won't find it for LTnlink with a link count of zero.
Consequently, LTnlink disables that test section and issues
its warning.

The warning suggests that the unlink test section can be
run by giving LTnlink a path to a test file with the -p
option. That path must name a file LTnlink can write and
unlink. Presuming /scratch23/abe/nlinkfile is on a local
file system and the LTnlink test can write to it and unlink
it, this sample shell command can be used to run the complete
LTnlink test successfully:

```
$ LTnlink -p /scratch23/abe/nlinkfile
```

3.43.5.2 Why does LTnlink delay and report "waiting for link count update: ..."?

On some UNIX dialects and file system combinations the
updating of link count after a file has been unlinked can
be delayed. Consequently, lsof won't be able to report
the updated link count to LTnlink for a while.

When lsof doesn't report
the proper link count to LTnlink,
it sleeps and repeats the lsof call, using the "waiting
for link count update: ..." message as a signal that it is
waiting for the expected lsof response. The wait cycle
duration is limited to approximately one minute.

3.43.6 LTdnlc test issues

3.43.6.1 Why won't the LTdnlc test run?

Lsof is unable to access the DNLC cache on AIX, because the
kernel symbols for the DNLC aren't exported. Contact IBM
to learn why that decision was made.

The LTdnlc test won't work on Apple Darwin because lsof
can't obtain reliable DNLC information.

The LTdnlc test may fail on other dialects. Failure causes
include: a busy system with a DNLC that is changing rapidly;
path name components too large for the DNLC; a file system
-- e.g., NFS, /tmp, loopback -- which doesn't fully
participate in the DNLC; or DNLC limitations (Many DNLC
implementations will only store path name components if

they are 31 characters or less.)

If you suspect the file system
doesn't fully participate
in kernel DNLC processing, as a work-around rebuild and
test lsof on one that does.

3.43.6.2 What does the LTdnlc test mean by "... <path> found: 100.00%"?

Even when it succeeds the LTdnlc test will report:

```
LTdnlc ... /export/home/abe/src/lsof4/tests found: 100.00%
```

This message means that the LTdnlc test asked lsof to find
the file at the indicated path five times and lsof found
the full path name in the indicated percentage of calls.
The LTdnlc test considers it a failure if the percentage
falls below 50.0%

3.43.6.3 Why does the DNLC test fail?

The DNLC test may fail when some component of the lsof
tests/ sub-directory can't be cached by the kernel DNLC.
Some kernels have a limit on the length of individual
components (typically) 32.

3.43.7 Why hasn't the test suite been qualified for 64 bit HP-UX
11 when lsof is compiled with gcc?

When I attempted to qualify lsof for HP-UX 11, compiled
with gcc 3.0, the LTsock test failed. I traced
the failure
to a gcc compilation error. Because LTsock is an important
test, I didn't feel that the test suite was qualified if
it failed.

LTsock compiles and runs correctly on 64 bit HP-UX 11 when
compiled with HP's ANSI-C.

3.43.8 LTszoff test issues

3.43.8.1 Why does LTszoff warn that lsof doesn't return file offsets?

On some dialects (e.g., Linux) lsof can't report file
offsets, because the data access method underlying lsof
doesn't provide them. If LTszoff knows that lsof can't
report file offsets for the dialect, it issues this warning:

LTszoff ... WARNING!!! lsof can't return file offsets
for this dialect, so offset tests have
been disabled.

LTszoff then performs the size test and skips the offset tests.

For more information see 00TEST and the "Why doesn't /proc-based lsof report file offsets (positions)?" Q&A of this file.

3.43.9 LTlock test issues

3.44 File descriptor list (the ``-d'' option) problems

3.44.1 Why does lsof reject a ``-d'' FD list?

Lsof rejects ``-d'' FD lists that contain both exclusions and inclusions with messages like:

lsof: exclude in an include list: ^1
lsof: include in an exclude list: 2

That's because ``-d'' FD lists are processed as ORed lists, so it makes no sense for them to contain both exclusions and inclusions.

I.e.,, if a ``-d'' FD list were to contain ``^cwd,1'', the ``^cwd'' member is useless, because the ``1'' member dominates by saying "include only FD 1". That effectively excludes ``cwd'' FD.

Note that lists may have multiple members of the same type, exclude or include. They are processed as an ORed set. If an FD isn't excluded by any member of an exclude list, it is selected. If an FD is included by any member of an include list, it is selected.

3.44.2 Why are file descriptors other than those in my FD list reported?

The FD list that follows ``-d'' excludes or includes file descriptors, but unless the ``-a'' (AND) option is specified, the
FD list selections are ORed to the other selections.

For example, the following lsof command will cause all file

descriptors to be listed for the lsof command, and all but the cwd descriptor for all other commands, probably not what was intended.

```
$ lsof -clsof -d^cwd
```

Hint: use ``-a'' -- e.g.,

```
$ lsof -clsof -a -d^cwd
```

### 3.45 How can I supply device numbers for inaccessible NFS file systems?

When lsof can't get device numbers for inaccessible NFS file systems via stat(2) or lstat(2), it attempts to get them from the mount table's dev=xxx options. Successes are reported with a warning message that indicates the source of the device number and that output might be incomplete as a consequence of the warnings.

Some system mount tables -- e.g., Linux /proc/mounts -- don't have a dev=xxx option. In that case, and provided lsof for the dialect supports them, you can use the +m option to create a mount table supplement file and the "+m m" option to use it.

First check the lsof -h (help) output to see if the +m and "+m m" options are supported. If they are, use +m to create a mount table supplement file when all mounted file systems are accessible. Use "+m m" later to make the supplement available when some mounted file systems might not be available.

Here's an example that creates a mount supplement file in $HOME/mnt-sup and later makes it available to lsof.

```
$ rm -f $HOME/mnt-sup
$ lsof +m > $HOME/mnt-sup
...
$ lsof +m $HOME/mnt-sup <other lsof options>
```

If lsof has to get the device number from the supplement, it will issue an informative warning message. The warning can be suppressed with lsof's -w option.

Caution! Since the mount table supplement file is static, it is its supplier's responsibility to update it as file system mounts change.

For more information, consult the lsof man page. The
"ALTERNATE DEVICE NUMBERS" section has useful information on
how lsof acquires device numbers when stat(2)
or lstat(2)
fail.

### 3.46 Why won't lsof find open files on over-mounted file systems?

When a file system, /xyz for example, is mounted on the same
mount point as another file system, /abc for example, running
lsof with an argument of the path of the first file system's
mount point -- the over-mounted one, /abc -- probably will not
reveal any files open on /abc.

That's because lsof looks for open files on a file system by
looking for files with the file system's device number. The
two file systems usually have different device numbers and lsof
determines the device number search key from the supplied name
of the second file system.

A general work-around exists only for Linux. On that UNIX
dialect, when you know the over-mounted file system's mount
point path, you can ask lsof to report on all open files and
grep that output for the path of the over-mounted file system
mount point.

### 3.47 What can be done when lsof reports no more space?

Many lsof methods cache
information in memory, using the
dialects malloc() library function. When malloc() can't
allocate the requested amount of memory, lsof exits with
warning messages similar to this AIX message:

```
lsof: no more dev-ch space at pid 2257750: 0x82a8e600
```

Lsof then exits immediately and produces no more output.

A possible work-around is to increase the memory foot print
of the shell that runs lsof. That is often done with the
ulimit(1) shell command.

### 3.48 What if the lsof build encounters ar and ld problems?

The lsof main and library Makefiles use the library archiver,
ar, and the system loader, ld, applications. Improperly
located, installed or configured versions of them may cause the
lsof build to encounter errors with them.

The application producing the error should identify itself in its error messages.

The first thing to check the path of the application that is being used. Try `which ar` or `which ld` to see if perhaps the PATH used during the build might be causing the wrong archiver or loader to be used.

If the problem is with the use of the wrong archiver, and it's not possible to correct the PATH to it, try using the LSOF_AR environment variable to specify the path to and arguments for the correct archiver. See 00XCONFIG for more information and note that LSOF_AR must specify the path to the archive application and the arguments for it, less the terminating library and module name arguments.

If the problem is with the loader, there is no lsof work-around. That's because lsof calls the loader via the C compiler, so the problem must be fixed at the compiler (system) level.

## 4.0 AIX Problems

### 4.1 What is the Stale Segment ID bug and why is -X needed?

Kevin Ruderman reports that he has been informed by IBM that processes using the AIX 3.2.x, 4.1[.12345]], 4.2[.1], and 4.3.x kernel's readx() function can cause other AIX processes to hang because of what appears to be file system corruption.

This failure, known as the Stale Segment ID bug, is caused by an error in the AIX kernel's journaled segment memory handler that causes the kernel's dir_search() function erroneously to believe directory entries contain zeroes. The process using the readx() call need not be doing anything wrong. Usually the system must be under such heavy load that the segment ID being used in the readx() call has been freed and then reallocated to another process since it was obtained from kernel memory.

Lsof uses the readx() function to access library entry structures, based on the segment ID it finds in the proc structure of a process. Since IBM probably will never fix

the kernel bug, I've added an AIX-specific option to lsof
that controls its use of the readx() function.

By default lsof readx() use is disabled; specifying the
``-X" option enables readx() use.

If you want to change the default readx() behavior of AIX
lsof, change the HASXOPT, HASXOPT_ROOT, and HASXOPT_VALUE
definitions in dialects/aix/machine.h.
 You can also use
these definitions to enable or disable readx() -- consult
the comments in machine.h.  You may want to disable readx()
use permanently if you plan to make lsof publicly executable.

When HASXOPT_ROOT is defined, lsof will restrict use of
the -X option to processes whose real UID is root; if
HASXOPT_ROOT isn't defined, any user may specify the -X
option.  The Customize script offers the option to change
HASXOPT_ROOT when HASXOPT is defined and HASXOPT_ROOT is
named in any dialect's machine.h header file.

I have never seen lsof cause a problem with its use of
readx(), but I believe there is some chance it could, given
the right circumstances.

4.1.1 Stale Segment ID APAR

Here are the details of the Stale Segment ID bug and IBM's
response, provided by Kevin Ruderman.

AIX V3
  APAR=ix49183
     user process hangs forever in kernel due to file
     system corruption
  STAT=closed prs  TID=tx2527 ISEV=2 SEV=2
      (A "closed prs" is
one closed with a Permanent
       ReStriction.)
  RCOMP=575603001 aix v3 for rs/6 RREL=r320

AIX V4  (internal defect, no apar #)
  prefix       p
  name         175671
  abstract     KERMP: loop for ever in dir_search()

Problem description:

1. Some user application -- e.g., lsof -- gets the segment

ID (SID) for the process private segment of a target process from the process table.

2. The target process exits, deleting the process private segment.

3. The SID is reallocated for use as a persistent segment.

4. The user application runs again and tries to read the user area structure from /dev/mem, using the SID it read from the process table.

5. The loads done by the driver for /dev/mem cause faults in the directory; new blocks are allocated; the size changed; and zero pages created.

6. The next application that looks for a file in the affected directory hangs in the kernel's dir_search() function because of the zero pages.

This occurs because the kernel's dir_search() function loops through the variable length entries one at a time, moving from one to the next by adding the length of the current entry to its address to get the address of the next entry. This process should end when the current pointer passes the end of the known directory length.

However, while the directory length has increased, the entry length data has not, so when dir_search() reaches the zero pages, it loops forever, adding a length of zero to the current pointer, never passing the end of the directory length. The application process is hung; it can't be killed or stopped.

IBM closed the problem with a PRS code (Permanent ReStriction) under AIX Version 3 and had targeted a fix for AIX 4.2. They have recently (I became aware of it September 10, 1996) cancelled the defect report altogether and have indicated they are not going to fix the defect.

4.2 Gcc Work-around for AIX 4.1x

When gcc is used to compile lsof for AIX 4.1x, it doesn't align one element of the user structure correctly. Xlc sees the U_irss element as a type "long long" and aligns it on an 8 byte boundary. That's because the default mode of xlc is -qlonglong; when -qlonglong is enabled, the

_LONG_LONG symbol is also defined.

Gcc sees U_irss as a two element array of type long, because _LONG_LONG isn't defined. Hence gcc aligns the U_irss element array on a 4 byte boundary, rather than an 8 byte one, making the gcc incantation of the user structure 4 bytes shorter than xlc's.

When the length of gcc's user structure is supplied as argument 4 to the undocumented getuser() function of the AIX kernel, getuser() rejects it as an incorrect size and returns EINVAL.

Lsof has a work-around for this problem. It involves a special test in the Configure script when the "aixgcc" Configure abbreviation is used -- e.g.,

$ Configure -n aixgcc

The test is to compile a small program
with gcc and check
the alignment of U_irss. If it's not aligned on an 8 byte boundary, the Configure script makes a special copy of <sys/user.h> in ./dialects/aix/aix<AIX_version> whose U_irss will align properly, and generates compile time options to use it.

While I have tested this work-around only with 4.1.4, it should work with earlier versions of AIX 4.1. It does not work for AIX 4.2; a different work-around is employed there. (See the next section.)

If you want to use this technique to compile other AIX 4.1x programs with gcc for using getuser(), check the Configure script.

Stuart D. Gathman identified this gcc AIX alignment problem.

4.3 Gcc and AIX 4.2[.1]

Alignment problems with gcc and AIX 4.2[.1] inside the user structure are more severe, because there are some new 64 bit types in AIX that gcc doesn't yet (as of 2.7.x) support. The <sys/user.h> U_irss element problem, discussed in 4.3 above, doesn't exist in 4.2[.1].

The AIX lsof machine.h header file

has a work-around,
provided by Henry Grebler, that bypasses gcc alignment
problems. Later versions of gcc (e.g., 2.8.x) will probably
bypass the problems as well.

4.4 Why won't lsof's Configure allow the use of gcc for AIX
below 4.1?

Gcc can't reliably be used to compile lsof for AIX versions
below AIX 4.1 because of possible kernel structure element
alignment differences between it and xlc.

4.5 What is an AIX SMT file type?

When you run AIX X clients with the DISPLAY environment
variable set to ``:0.0'' they communicate with the AIX X
server via files whose kernel file structure has an undefined
type (f_type == 0xf) -- at least there's no definition for
it in <sys/file.h>.

These are Shared Memory Transport (SMT) sockets, an artifact
of AIXWindows, designed for more efficient data transfers
between the X server and its clients.

Henry Grebler and David J. Wilson alerted me to the existence
of these files. Mike Feldman and others helped me identify
them as SMT
sockets.

The curious reader can find more about SMT sockets in
/usr/lpp/X11/README.SMT.

4.6 Why does AIX lsof start so slowly?

When AIX lsof starts it compares the running kernel's
identity to the one for which it was built, using
/usr/bin/oslevel. That comparison can sometimes take a
long time to complete, depending on the system's maintenance
level and how recently it was examined with oslevel.

AIX revisions 4.67 and above for AIX 5 and above don't use
oslevel to determine the kernel identity. They use uname(2)
instead, and it is much faster.

You can skip the oslevel test by suppressing warning messages
with lsof's -w option. Doing that carries with it the risk
of missing other warning messages, however.

You can also disable the kernel identity check by disabling the definition of the HASKERNIDCK symbol by editing AIX machine.h header file or by using the Customize script to disable it.

See the "Why does lsof warn "compiled for x ... y; this is z.?" section
for more information.

4.7 Why does exec complain it can't find libc.a[shr.o]?

When you try to execute lsof you may get this complaint:

```
    exec(): 0509-036 Cannot load program ./lsof because of
        the following errors:
     0509-022 Cannot load library libc.a[shr.o].
     0509-026 System error: A file or directory in
  the path name does not exist.
```

This is probably the result of making lsof when the LIBPATH environment variable contained a directory path that doesn't contain libc.a. You can see what LIBPATH contained when lsof was made by using the dump application on lsof. For example, if LIBPATH contained /foo/bar when lsof was made, you will see this (partial) dump output:

```
    $ dump -H lsof
    ...
  ***Import File Strings***
    INDEX  PATH                    BASE        ...
    0      /foo/bar
```

To correct the problem, revisit the lsof source directory and remake lsof this way:

```
    $ unset LIBPATH; make  (sh or ksh)
or
    % unsetenv
LIBPATH; make  (csh or tcsh)
```

4.8 What does lsof mean when it says, "no PCB, CANTSENDMORE, CANTRCVMORE" in a socket file's NAME column?

When an AIX application calls shutdown(2) on an open socket file, but hasn't called close(2) on the file, the file will remain visible to lsof as an open socket file without any extended protocol information.

Lsof reports that state in the NAME column by saying that
there is "no PCB" (Protocol Control Block) for the protocol
(e.g., TCP in the NODE column). If the open socket file
has the state variables SO_CANTSENDMORE and SO_CANTRCVMORE
set -- i.e., from the shutdown(2) call -- lsof reports them
with the CANTSENDMORE and CANTRCVMORE notes in the NAME
column.

4.9 When the -X option is used on AIX 4.3.3, why does lsof disable
it, saying "WARNING: user struct mismatch; -X option disabled?"

The -X option causes lsof to read the loader information
of the user structure from virtual memory via the readx()
system call. It does that with
the user structure definition
from <sys/user.h> that was compiled into the lsof executable.

On AIX 4.3.3 there are two different user structure
definitions in two separate <sys/user.h> header files,
distributed at different times by IBM. If lsof was compiled
with one and the kernel on which lsof is being run was
compiled with the other, lsof normally won't get correct
loader information when it calls readx().

In an attempt to compensate for that difference, lsof makes
an independent check of the loader information by getting
the user structure's open file count via readx() and
comparing it to the open file count obtained independently
via getprocs(). When the two counts don't match, lsof
tries to read the count (and re-read the loader information)
with two offsets, based on observed differences between
the two user structures.

When one of the three attempts produces a correct open file
count, lsof uses its corresponding offset on subsequent
readings of the loader
information.

When none of the three attempts produces a correct open
file count, lsof issues the WARNING message and disables
-X processing.

To eliminate this problem, obtain an lsof binary that
matches the kernel of the AIX 4.3.3 system where you want
to run lsof. Compiling lsof on the target system is the
preferred way to get a matching binary.

4.10 Why doesn't the -X option work on my AIX 5L or 5.[123] system?

If your AIX 5L or 5.[123] system uses the ia64 architecture,
lsof needs setuid-root permission to be able to do the
processing that -X requires.

Check the output of `uname -a` to determine the architecture
type.

The work-around is to give lsof setuid-root permission.

4.11 Why doesn't /usr/bin/oslevel report the correct AIX version?

The oslevel man page says, "The oslevel command reports
the level of the operating system using a subset of all
filesets installed on your system."

You can see which fileset is below the expected level with
oslevel's
-l option.  For example, if you believe your
system is at AIX level 4.3.3, but oslevel reports 4.3.2,
use this oslevel command to find the filesets below 4.3.3:

```
$ /usr/bin/oslevel -l 4.3.3.0
```

If you don't know what level argument to supply to oslevel's
-l option, use oslevel's -q option first.

4.11.1 Why doesn't /usr/bin/oslevel report the correct AIX version
on AIX 5.1?

The subset list for oslevel on AIX 5.1 seems to include at
least two filesets, xlsmp.msg.en_US.rte and xlsmp.rte, that
do not install from AIX 5.1 media with a 5.1.0.0 level.
Hence, oslevel reports 5.0.0.0 instead of the expected
5.1.0.0.

If either xlsmp.msg.en_US.rte or xlsmp.rte is installed,
lsof's Configure script and run-time tests will identify
the AIX version incorrectly.  The run-time test will
issue a complaint message of this form:

```
lsof: WARNING: compiled for AIX version xxx; this is yyy.
```

You can correct the Configure test by pre-defining the
oslevel value, setting the correct
value in the LSOF_VSTR
environment variable before running the Configure script
-- e.g., to pre-define AIX 5.1 when using ksh, do this:

```
$ LSOF_VSTR=5.1.0.0 Configure -n aix
```

You can't affect oslevel output without uninstalling xlsmp.msg.en_US.rte and xlsmp.rte. If you can't do that, you'll have to put up with the run-time complaint.

### 4.12 Why does lsof for AIX 5.1 or above Power architecture complain about kernel bit size?

When you run an lsof binary on an AIX 5.1 or above Power system, it might complain:

```
lsof: FATAL: compiled for a 32 bit kernel.
The bit size of this kernel is 64.
```

or

```
exec: 0509-036 Cannot load program ./lsof because of
the following errors:
    0509-032 Cannot run a 64-bit program on a 32-bit
machine.
```

Starting at lsof revision 4.61, lsof binaries for Power architecture systems running AIX 5.1 or above are closely tied to the kernel bit size. Lsof must do that so it can read and understand kernel structures.

Lsof's Configure script tunes the lsof configuration so that the binary built in the make(1) step is adjusted to the kernel bit size.

An lsof binary knows the bit size for which it was constructed, tests the bit size of the kernel under which it is running, and objects if the two sizes don't match. To see the bit size for which lsof was constructed, run it with its -v option and look for these lines in the output:

```
configuration info: 32 bit kernel
```

or

```
configuration info: 64 bit kernel
```

(Note: these lines will appear only in -v output for AIX 5.1 and above lsof binaries, built for Power architecture.)

You can see the kernel bit size test method in the aix stanza of the lsof Configure script and in the get_kernel_access() function of the lsof .../dialects/aix/dproc.c source file.

There is more information on pre-defining the kernel bit
size when building lsof in Configure, 00PORTING, and
00XCONFIG.

The only work-around is to use an lsof binary built to
match
the running kernel bit size.

4.13 What can't gcc be used to compile lsof on the ia64 architecture
for AIX 5 and above?

Gcc can't be used to compile lsof on the ia64 architecture
for AIX 5 and above because I haven't had access to a system
that has a working gcc compiler. The gcc compiler on my
one and only ia64 AIX 5.1 test system, provided by IBM,
didn't work at all.

4.14 Why does lsof get a segmentation fault when compiled with gcc
for a 64 bit Power architecture AIX 5.1 kernel?

When lsof is configured with the lsof "aixgcc" Configure
abbreviation, the resulting lsof executable may cause a
segmentation violation when it is run. I've observed this
with gcc version 2.9-aix43-010414-7.

As far as I have been able to tell, the segmentation fault
is the result of a gcc compilation, loading, or library
error. Watching lsof run with gcc's companion debugger,
gdb, shows no error in the lsof source code that might
explain the fault.

The only work-around I know is
to use the IBM C compiler
in place of gcc -- i.e., use the "aix" lsof Configure
abbreviation.

4.15 Why does lsof ignore AFS on my AIX system?

The lsof Configure script quits on AIX when AFS is present,
the AIX version is greater than 4.3.3.0 or the AFS version
is greater than 3.5. That's because I have no test systems
available for those AIX and AFS version combinations.

When the lsof Configure script detects an AIX and AFS
version combination that is unsupported, it will report:

!!!FATAL: Lsof does not support AFS on this combination of
AIX and AFS versions. To disable AFS, set the

value of the AIX_HAS_AFS environment variable to
"no".

The only work-around is to set the AIX_HAS_AFS environment
variable as explained in the error message:

```
$ AIX_HAS_NSF=no; export AIX_HAS_NFS
$ ./Configure -n aix
```

4.16 Why does lsof report "system paging space is low" and exit?

When AIX paging space runs low, the AIX kernel sends a SIGDANGER signal to
processes, warning them that they should reduce their
memory usage.

When lsof receives that signal, it issues the following fatal
error message and exits:

```
lsof: FATAL: system paging space is low.
```

A possible work-around is to limit the amount of information
lsof must cache in its process memory with the "-c", "-g", "-l"
and "-p" options.

Also see the answer to the "What can be done when lsof reports
no more space?" question.

4.17 Why does lsof have a compilation problem on AIX 5.3 above
maintenance level 1?

On some AIX 5.3 systems with maintenance levels 2 and higher
installed, lsof 4.77 and below may not compile properly. The
compiler complains the snapshotObject structure definition,
needed by <j2/j2_inode.h>, is missing.

That problem is fixed in the 4.78 revision.

5.0 Apple Darwin Problems

5.1 What do /dev/kmem-based and libproc-based mean?

Lsof for Apple Darwin currently uses /dev/kmem to read kernel
data structures from which it gathers and reports
open file
information. That version of lsof is called /dev/kmem-based
lsof.

At an upcoming release lsof will use a library called libproc
to obtain information about open files.  That version of lsof
wil be called libproc-based lsof.

The /dev/kmem-based lsof sources may be found in the kmem
subdirectory of the dialects/darwin branch of the lsof source
tree.  When the supporting version of Apple Darwin is released,
the libproc-based lsof sources will be found in
.../dialects/darwin/libproc.

5.2 /dev/kmem-based Apple Darwin Questions

5.2.1 Why does Configure ask for a path to the Darwin XNU kernel
header files?

When lsof was ported to Apple Darwin by Allan Nathanson at
revision 4.53, some kernel header files needed by lsof
weren't being exported by the developers.  (That's still
true at lsof revision 4.76.)

At first a shell script that Allan provided would get the
missing header files by checking them out from the CVS
root.  Although the script was updated from
time to time,
eventually the re-organization of Darwin sources has made
it impossible to update the script to do an automatic
download of the missing header files.

At lsof revision 4.69 and above it is necessary for the Darwin
lsof builder to download the Darwin XNU kernel headers before
attempting to build lsof.  The download my be done via a web
browser, starting at this URL:

    http://www.opensource.apple.com/darwinsource/index.html

Once there, select the link to the Mac OS X version that
matches the one on the system where lsof is to be built.

Follow that link's "[ Source ]" link.  Once there, select the
tar.gz link of the xnu* entry near the bottom of the page.
That entry should have a name that matches the xnu* name shown
by `uname -a` -- e.g., if uname reports:

    $ uname -a
    ... root:xnu/xnu-517.7.21 ...

Then the appropriate xnu* entry is xnu-517.7.21.  Clicking

its link should lead to an "Apple Open Source" page requesting
an Apple ID and password.

Enter
them if they're available.  If an Apple ID and password
are not available, get them by following the instructions on
the page -- i.e., follow the signin.apple.com link.

Once a valid Apple ID and its password have been entered,
the download will begin.  Select the saving of the downloaded
xnu*.tar.gz file in an appropriate place on the Mac OS X
system.

Once the download completes, install it.  Use gunzip to
decompress the download and tar to extract the archive -- e.g.,

```
$ gunzip -c xnu-517.7.21.tar.gz | tar xf -
```

Remember the absolute path to the extracted archive.  That is
its installed place.  E.g., if the xnu-517.7.21.tar archive was
extracted to the lsof builder's home directory, its full
installation path will be something like:

```
~/xnu-517.7.21
```

Now run the lsof Configure script.  When it asks for the path
to the installed Darwin XNU kernel header files, supply the
path to the gunzip'd and extracted xnu* archive -- e.g.,
~/xnu-517.7.21.

The
path to the Darwin XNU kernel headers may also be
supplied to the Configure script in the DARWIN_XNUDIR
environment variable, eliminating the need to enter it
interactively -- e.g.,

```
$ DARWIN_XNUDIR=~/xnu-344.49 ./Configure -n darwin
```

5.2.1.1 Why does Configure complain that Darwin XNU kernel header
files are missing?

These are some reasons why the lsof Configure script might
claim that Darwin XNU header files are missing:

* The wrong path to them was specified.

* The files and directories in the path are not readable
  and searchable -- i.e., check the modes and ownerships.

* The downloaded archive doesn't match the Mac OS X
version of the system.

If in doubt, revisit the Darwin XNU kernel header file
download instructions in the answer to the question "Why
does Configure ask for a path to the Darwin XNU kernel
header files?"

If Configure still can't find Darwin XNU kernel header
files, contact me via e-mail at <abe@purdue.edu> for
help.
Make sure "lsof" appears in the "Subject:" line so my e-mail
filter won't classify your letter as Spam.

5.2.2 Why doesn't Apple Darwin lsof report text file information?

At the first port of lsof to Apple Darwin, revision 4.53,
insufficient information was available -- logic and header
files -- to permit the installation of VM space scanning
for text files. As of lsof 4.70 it is sill not available.

Text file support will be added to Apple Darwin lsof after
the necessary information becomes available.

5.2.3 Why doesn't Apple Darwin lsof support IPv6?

At the first port of lsof to Apple Darwin, revision 4.53,
Apple Darwin lacked IPv6 support. IPv6 became available
in Apple Darwin version 1.5 and support for it was added
to lsof then.

5.2.4 Why does lsof complain about a mismatch between the release
for which lsof was compiled and the booted Mac OS X release?

When lsof is started on the "Gold Master" Darwin release
(aka Mac OS X), it complains:

lsof: compiled
for 1.0 release; this is 1.3.2.

This happens because the lsof binary released with Mac OS
X was built on a system whose release number (1.0) doesn't
match that of the released system -- usually 1.3.x Lsof
makes this check because UNIX dialect OS changes are often
accompanied by header file changes that affect lsof.

In this specific case, this error can be ignored. If you

don't want to do that, get the lsof distribution and build
lsof so its built-on and running-on Mac OS X release numbers
match.

5.2.5 Why does lsof for Apple Darwin 8 and higher report
"stat(...): ..." in the NAME column?

Lsof for Apple Darwin 8 may report messages like these in the
NAME column:

    stat(/private/var/run/asl_prune): No such file or directory
 or
    stat(/private/var/db/netinfo/local.nidb/Config): Permission denied

Those messages indicate that lsof was unable to collect open
file information for the paths enclosed in "stat(...)" with the
stat(2) function, because the function
encountered the reported
error.

A work-around for the "Permission denied" error is to run lsof
with elevated privileges -- e.g., when logged on as the super
user.

If the stat(2) error message is "No such file or directory",
the file probably has been unlinked (removed) and there is no
lsof work-around.

5.2.6 What are the limitations of Apple Darwin lsof link count
reporting?

Lsof for Apple Darwin cannot report link count information
reliably.

For Apple Darwin below 8 link count information is not always
available in the kernel node structures available to lsof.
When link count information is available, however, it includes
link counts of zero.  Thus, using lsof's +L1 option may result
in the finding of some files whose link counts are zero.

Lsof can report only some link count information for Apple
Darwin 8 and above.  Link count information is only available
for files where lsof can assemble the full file path and has
permission to apply stat(2) to it.
 (See the answer to the "Why
does lsof for Apple Darwin 8 and higher report "stat(...): ..."
in the NAME column?" question for more information on stat(2)
failures.)

Apple Darwin 8 and above files that have been unlinked and thus have a link count of zero cannot be found by stat(2) -- i.e., stat(2) returns a "No such file or directory" error. As a result lsof never displays link counts of zero and the use of lsof's +L1 option to find them always fails.

5.3 Libproc-based Apple Darwin Questions

6.0 BSD/OS BSDI Problems

6.0.5 Statement of deprecation

As of lsof revision 4.76 support for BSDI BSD/OS has been dropped. The 4.76 distribution of lsof for BSDI BSD/OS may be found on lsof.itap.purdue.edu in pub/tools/unix/lsof/OLD/src.

7.0 DEC OSF/1, Digital UNIX, and Tru64 UNIX Problems

7.1 Why does lsof complain about non-existent /dev/fd entries?

When you run lsof for Digital UNIX 3.2, lsof may complain:

lsof: can't lstat /dev/fd/xxx: No such file or directory

lsof: can't lstat /dev/fd/yyy: No such file or directory

(Or it may warn about other missing /dev/fd paths.) When you do an ``ls /dev/fd" none of the missing paths are listed.

This is caused by a bug in the DEC library function getdirentries(). For some reason, when /dev/fd is a file system mount point, getdirentries() returns an incorrect size for it to readdir(). (Lsof calls readdir() in its ddev.c readdev() function.) Because of the incorrect size, readdir() goes past the end of the /dev/fd directory buffer, encounters random paths and returns them to lsof. Lsof then attempts to lstat(2) the random paths, gets error replies from lstat(2), and complains about the paths.

Duncan McEwan discovered this error and has reported it to DEC. Duncan also supplied an alternate readdir() function as a work-around. I've incorporated his readdir() in dialects/osf/ddev.c (as the static ReadDir() function) with some slight modifications, and enabled its use when the USELOCALREADDIR

symbol is defined.

The Configure script defines USELOCALREADDIR for Digital UNIX version and 3.2. If you don't want to use Duncan's local readdir() function, edit the Makefile and remove -DUSELOCALREADDIR from the CFGF string. When DEC releases a corrected getdirentries() function, I'll modify the Configure script to stop defining USELOCALREADDIR.

### 7.2 Why does the Digital UNIX V3.2 ld complain about Ots* symbols?

When you compile lsof on your Digital UNIX V3.2 system, ld may complain:

```
ld:
Unresolved:
knlist
_OtsRemainder32Unsigned
_OtsDivide64Unsigned
_OtsRemainder64Unsigned
_OtsDivide32Unsigned
_OtsMove
_OtsDivide32
_OtsRemainder32
*** Exit 1
```

Chris Eleveld reports this happens on Digital UNIX V3.2 systems after the Fortran compiler has been installed.

The best work-around seems to be to remove -lmld from the CFGL string in the Makefile produced by Configure -- i.e., change:

```
CFGL=    -lmld
```

to

```
CFGL=
```

According to the V3.2 man page for nlist(3), this shouldn't work, but my testing shows that it does. Although I haven't been able to test this second work-around, you might try adding -lots to CFGL, rather than removing -lmld -- i.e., change:

```
CFGL=    -lmld
```

to

```
CFGL=    -lmld -lots
```

WARNING: my testing also shows that the V2.0 nlist(3) man
page means what it says when it calls for -lmld -- lsof
loaded without -mld under V2.0 can't locate the proc
(process) table address.

DON'T REMOVE -lmld FROM THE DIGITAL UNIX V2.0 MAKEFILE.

If you run into this problem, please let me know what
problem you encountered and how you solved it.

7.3 Why can't lsof locate named pipes (FIFOs) under V3.2?

While lsof for V3.2 can report on named pipes (FIFOs), it
can't find them by name. That appears to happen because
of the way the V3.2 kernel lstat(2) function reports named
pipe device numbers.

The V3.2 kernel reports the device number as 0xffffffff,
while
the kernel structures for named pipes that lsof
examines contain the device number of the file system on
which the named pipe resides.

Consequently, lsof can't match the device and inode number
pair it receives from applying lstat(2) to the named pipe
with any device and inode number pair it finds when scanning
kernel structures.

I don't have a work-around. You can, of course, ask for
full lsof output and use a post-processing filer (e.g.,
grep) to locate the named pipe of interest.

This problem doesn't exist under V2.0.

7.4 Why does lsof use the wrong configuration header files?
For example, why can't the lsof compilation find cpus.h?

DEC OSF/1, Digital UNIX, and Tru64 UNIX configuration header
files describe the hardware and software environment for
which your kernel boot file was constructed. For example,
/sys/<name>/cpus.h defines the number of CPUs in its NCPUS
#define.

Lsof searches for the configuration header file subdirectory
in /sys (/usr/sys for
Digital UNIX version 4.0 and Tru64
UNIX) by converting the first host name component to capital
letters -- e.g., TOMIS is derived from tomis.bio.purdue.edu.

If that subdirectory exists, lsof uses header files from it. (Configure reports what subdirectory is being used.)

If Configure doesn't find a host-name derived subdirectory, it prompts you for the entry of a subdirectory name. If you can't find one, quit Configure and run the kernel generation process to create a proper configuration sub-directory. If you don't identify a proper configuration subdirectory and you try to compile lsof, the compiler will complain about missing header files -- e.g., a missing cpus.h.

Once you have located or generated a proper configuration subdirectory, rerun Configure. If you have generated a configuration subdirectory whose name is derived from the host name, Configure will find and use it. If not, you will have to specify its name to Configure.

### 7.5 Why does lsof indicate incomplete paths with " -- " for Tru64 UNIX 5.1 files?

When lsof can't find a component of a path in the kernel's name cache (aka DNLC), or can't determine that the left-most component has as its parent the file system root, it uses an "incomplete path" notation. That notation begins with the file system root name, followed by " -- ", followed by the consecutive path name components lsof was able to find in the DNLC -- e.g., "/ -- init".

Because the DNLC was significantly redesigned in Tru64 UNIX 5.1, lsof's handling of the cache had to be completely redone. As part of the DNLC redesign a name cache entry parameter lsof formerly used to locate the file system root of a path was removed. With help from Chang Song I've been able to implement an alternate method for detecting the root of these file system types: AdvFS (MSFS), CDFS, DVDFS, FDFS, NFS, NFS3, and UFS.

When lsof doesn't know how to identify the root for a file system type, it will resort to the " -- " incomplete path
notation.

### 7.6 Why doesn't lsof report link count, node number, and size for some Tru64 5.x CFS files?

Lsof reports link count, node number, and size for open

CFS files as recorded in their kernel node structure's
cached attributes.  Sometimes not all attributes are cached
on the system where lsof runs, so lsof cannot report them.

7.7  Why does lsof say it can't read the kernel name list or
proc table on Digital UNIX 4.x or Tru64 UNIX?

By default on Digital UNIX 4 and Tru64 UNIX lsof reads the
addresses for kernel symbols with the knlist(3) function.
That function can fail, for example, when the kloadsrv
daemon isn't running or is malfunctioning.  When that
happens, lsof may abort with one of these error messages:

```
  lsof: can't read kernel name list from knlist(3): ...
or
  lsof: can't read proc table info
```

The first message suggests a complete knlist(3) or kloadsrv
failure; the second, a partial one.

If you know the name of the file from
which the running
system was booted, e.g., /vmunix, you can use lsof's -k
option to direct it to read kernel symbol addresses from
the name list of that file --

```
  $ lsof -k /vmunix ...
```

If that works, then knlist(3) is malfunctioning and you
need to fix it.

8.0 FreeBSD Problems

8.1 Why doesn't lsof report on open kernfs files?

Lsof doesn't report on open FreeBSD kernfs files because
the structures lsof needs aren't defined in the kernfs.h
header file in /sys/misc/kernfs.

8.2 Why doesn't lsof work on my FreeBSD system?

If lsof doesn't work on your FreeBSD system, first make
sure you have the latest lsof revision.  See the answer to
the "Where do I get lsof?" question for information on how
to get the latest lsof revision.

Once you have gotten the latest lsof revision, Configure

and make it. If Configure fails -- e.g., it complains about an unknown FreeBSD version -- then lsof probably hasn't been ported to your FreeBSD version yet, and there's no need to go any further. Follow the answer to the "How do I report an lsof bug" to report the Configure complaint to me.

If you are able to Configure and make lsof, run its test suite. (See the answer to the "Is there a test suite?" question for more information on how to use lsof's test suite.)

If lsof still fails, make sure your kernel sources, kernel header files, kernel boot file, standard header files and libraries are synchronized. They should all be built from the same CVS refresh. (Don't forget to do a "make buildworld" followed by a "make installworld".) If they aren't, then the KVM library or lsof may be using kernel structure definitions that don't match the booted kernel; or lsof may fail to compile properly because of header files in /usr/src/sys/sys and /usr/include/sys that don't match.

If you have synchronized your kernel, header files and libraries, and still can't get lsof to work, follow the steps in the answer to the "How do I report an lsof bug" question to report the problem to me.

### 8.3 Why doesn't lsof work on the RELEASE version of CURRENT?

Lsof tracks the CURRENT release of the current leading edge FreeBSD version, because my access to leading edge FreeBSD is limited to FreeBDSD.org reference systems, all running the CURRENT release.

Sometimes that tracking leads to changes in lsof that won't work on an earlier RELEASE version of the current leading edge version.

When that happens, please send e-mail to me <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

### 8.4 Why does kvm_open() complain it can't find some file?

If lsof issues this complaint:

lsof: kvm_open(execfile=/boot/kernel/kernel,
corefile=/dev/mem: No such file or directory

Your FreeBSD system might not have a /dev/mem device. If
not, create one -- e.g., as root do:

```
# mknod /dev/mem c <major> 0
# chmod 440 /dev/mem
# chgrp kmem /dev/mem
```

For <major> use
/dev/kmem's major device number.

You may have to run kldload, too -- again as root do:

```
# kldload mem
```

## 8.5 FreeBSD ZFS Problems

### 8.5.1 Why does FreeBSD lsof report "WARNING: no ZFS support has been defined."?

Lsof issues that message when it detects a file on a ZFS file
system, but has not been built with support for ZFS. Lsof's
Configure script detects support can be added for ZFS when it
finds this file:

/usr/src/sys/contrib/opensolaris/uts/common/fs/zfs/sys/zfs_znode.h

That header file and others in the OpenSolaris files in
/usr/src enable lsof to extract information about ZFS files
from the kernel structures associated with them.

## 8.6 Why can't Configure create lsof_owner.h for FreeBSD 6 and above?

Lsof may report:

```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
FATAL ERROR: ./lockf_owner.h creation failed (see 00FAQ)
```
or
```
Creating ./lockf_owner.h from /usr/src/sys/kern/kern_lockf.c

FATAL ERROR: ./lockf_owner.h creation failed (see 00FAQ)
```

Those messages mean that lsof's Configure script failed to
create a local header file, ./lockf_owner.h, needed to use the
new kernel file locking code of some versions of FreeBSD 6 and

above.

The changes that implement that new locking code alter the lockf structure in <sys/lockf.h> and introduce a new structure, lockf_entry, to that header file. When Configure detects the presence of the lockf_entry definition in <sys/lockf.h>, it tries to construct the local header file, ./lockf_owner.h.

Configure has to do that because an unfortunate side effect of the new kernel file locking code is that <sys/lockf.h> doesn't contain the lockf_owner structure definition referenced in its own lockf structure. Lsof needs to access elements of that lockf_owner structure to determine if a lock belongs to the process that has a file open.

The missing lockf_owner structure definition is in the kernel source file,
typically /usr/src/sys/kern/kern_lockf.c.
Configure tries to extract the lockf_owner structure definition from kern_lockf.c into lsof's local header file, ./lockf_owner.h.
If Configure can't do that, it reports:

```
FATAL ERROR: ./lockf_owner.h creation failed
```

If Configure can't even read kern_lockf.c, it first reports:

```
FATAL ERROR: can't read /usr/src/sys/kern/kern_lockf.c
```

The work-around for this problem is to update the FreeBSD kernel /usr/src tree (e.g., do a CVSup or csup) on the system where lsof is to be built and then do a "make buildworld" followed by a "make installworld".

8.6.1 Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?

If, when compiling lsof, the compiler complains with error messages like:

```
dnode.c: In function 'get_lock_state':
dnode.c:113: error: 'struct lockf' has no member named 'lf_flags'
dnode.c:115: error: 'struct lockf' has no member named 'lf_id'
...
```

Then lsof is being built
on a system that has new kernel file
locking code and lsof's Configure script failed to build a
local lockf_owner.h header file with a structure definition

lsof needs.

See the "Why can't Configure create lsof_owner.h for FreeBSD 6 and above?" section for more information and a work-around.

8.6.2 Why don't /usr/src/sys/sys/lockf.h and /usr/include/sys/lockf.h match?

This mismatch can cause the errors explained in the answer to the "Why are there lockf structure compiler errors for FreeBSD 6.0 and higher lsof?" question.

If /usr/src/sys/sys/lockf.h has been updated with a CVSup or csup, the new lockf.h won't be propagated to /usr/include/sys until the "make buildworld" and "make installworld" steps have been completed.

9.0 HP-UX Problems

9.1 What do /dev/kmem-based and PSTAT-based mean?

Lsof for HP-UX 11.0 and below uses /dev/kmem to read kernel data structures from which it gathers and reports open file information. That version of lsof is called /dev/kmem-based lsof.

Starting
with HP-UX 10.10, finding definitions for the
necessary kernel structures became more difficult as HP no longer distributed header files in /usr/include that defined all kernel structures. So I started "inventing" structure definitions by using Q4 to display them.

By HP-UX 11, the process of invention became extremely intensive to support. Following a patch to the ipc_s structure in early 1999, my invented definition of that structure became incorrect. Although I was able to devise a work-around test for the patch with Q4, it was clear that my inventions were bound to cause more problems.

Discussion with HP about the patch led to my proposing that an lsof API in the HP-UX kernel was the proper solution. Much to my surprise, HP agreed. I believe Carl Davidson was the prime mover behind that decision, but I know others participated, among them Louis Huemiller, Rich Rauenzahn, and Sailu Yallapragada. I am indebted to these folks and HP for their

willingness to do this work.

The API was added to the PSTAT interface in a project named PEGL, Pstat Enhancements for Glance and Lsof. Louis and Sailu did the bulk of the design and implementation work and testing began in March, 2000

HP-UX 11.11 is the first version that provides PSTAT support for lsof. HP-UX versions in between 11.0 and 11.11 -- all Beta versions as far as I can determine -- have no lsof support.

See the "PSTAT-based HP-UX lsof Questions" section for questions and answers specific to PSTAT-based HP-UX lsof. The next section, "Why doesn't a /dev/kmem-based HP-UX lsof compilation use -O?" covers /dev/kmem-based HP-UX lsof.

The /dev/kmem-based lsof sources may be found in the kmem subdirectory of the dialects/hpux branch of the lsof source tree. The PSTAT-based lsof sources may be found in .../dialects/hpux/pstat.

### 9.2 /dev/kmem-based HP-UX lsof Questions

The sources for /dev/kmem-based lsof for HP-UX may be found in lsof_<revision>/dialects/hpux/kmem.

Lsof's
Configure shell script decides to use these sources when it finds that the /usr/include/sys/pstat subdirectory doesn't exist.

Lsof can be forced to use the /dev/kmem sources by setting "/dev/kmem" in the HPUX_BASE environment variable. Consult the Configure shell script and 00XPORTING for more information.

#### 9.2.1 Why doesn't a /dev/kmem-based HP-UX lsof compilation use -O?

If you only have the standard (bundled) HP-UX C compiler and haven't purchased and installed the optional one, then you can't use cc's -O option. The HP-UX cc(1) man page says this:

"Options
Note that in the following list, the cc and c89 options -A , -G , -g , -O , -p , -v , -y , +z , and +Z are not supported by the C compiler provided as part of the standard HP-UX operating system. They are supported

by the C compiler sold as an optional separate product."

Lsof's Configure script tries to detect what C compiler product you have installed by examining your compiler. If that examination reveals a standard (bundled) compiler, lsof avoids using -O.

If the Configure compiler test fails, the C compiler will complain that it doesn't support -O. You can suppress that complaint with this make invocation:

```
$ make DEBUG=""
```

### 9.2.2 Why doesn't the /dev/kmem-based CCITT support work under 10.x?

Pasi Kaara, who originally provided the HP-UX CCITT support, reports that it no longer works under HP-UX 10.x. Consequently, at lsof revision 4.02 it has been disabled.

### 9.2.3 Why can't /dev/kmem-based lsof be compiled with `cc -Aa` or `gcc -ansi` under HP-UX 10.x?

Some HP-UX 10.x header files, needed by lsof, can't be compiled properly in ANSI_C mode; structure element definition and alignment problems result. The f_offset member of the file structure, for example, is incorrect.

This ANSI-C obstacle extends to using the -Aa option of the HP C compiler and the -ansi option of gcc.

### 9.2.4 Why does /dev/kmem-based lsof complain about no C compiler?

Lsof's Configure script looks in /bin and /usr/ccs/bin for an HP C compiler, because it needs to know if the compiler is the standard (bundled) one or the optional separate product. If it finds no compiler in either place, Configure quits after complaining:

```
No executable cc in /bin or /usr/ccs/bin
```

If you don't have a C compiler in either of these standard places, you should consider installing it. If you have gcc installed, you can use it by declaring the ``hpuxgcc'' abbreviation to lsof's Configure script.

If you have a C compiler in a non-standard location, you

can use the HPUX_CCDIR[12] environment variables to name
the path to it.  Consult the 00XCONFIG file of the lsof
distribution for more information.

9.2.5 Why does Configure complain about q4 for /dev/kmem-based lsof for HP-UX 11?

When you run Configure on an HP-UX 11 system, it may complain:

```
  !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!
  Configure can't
use /usr/contrib/bin/q4 to examine the ipis_s
  structure.  You must do that yourself, report the result in
  the HPUX_IPC_S_PATCH environment variable, then repeat the
  Configure step.  Consult the Configure script's use of
  /usr/contrib/bin/q4 and the 00XCONFIG file for information
  on ipis_s testing and the setting of HPUX_IPC_S_PATCH.
  !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!    !!!ERROR!!!
```

This message states that Configure cannot use q4 from
/usr/contrib/bin to examine the kernel's boot image for
the ipis_s structure.  Maybe q4 hasn't been installed, or
perhaps Configure can't execute it.

Lsof needs to gather information about ipis_s to determine
if the ipis_s structure is defined in the kernel boot image,
if the ipis_s structure of the kernel boot image has an
ipis_msgsqueued member, and if the ipc_s structure of the
kernel boot image uses has an ipc_ipis member.

The ipis_s structure isn't described in any header file
HP-UX releases with HP-UX 11.  It
appears in the private
lsof header file .../dialects/hpux/kmem/hpux11/ipc_s.h.
Lsof gets local and remote connection addresses (IP and
port numbers) from ipc_s, so an incorrect ipc_s definition
may cause incorrect reporting of TCP/IP connection addresses.
It definitely will cause incorrect reporting on 32 bit
kernels.  In any case lsof should be compiled with a correct
ipc_s definition no matter the kernel bit size, so the
Configure script always tests for it when the HP-UX version
is 11.

For lsof's Configure script to gather the necessary ipis_s
information q4 needs to be installed in /usr/contrib/bin
and the kernel boot image, /stand/vmunix, needs to have
been processed with pxdb.  If either is untrue, lsof issues
the above error message, perhaps preceded by q4 messages.

(Note: lsof's use of q4 may also fail if q4 can't execute
nm -- e.g., it can't find /usr/bin/nm, or there is a
conflicting, private version of nm earlier in the path.)

If /stand/vmunix hasn't been
processed by pxdb, the q4
messages will include:

```
   q4: (error) vmunix not pxdb'd
or
   q4: (warning) /stand/vmunix has not been processed by pxdb.
```

It's possible to make a suitable private copy of /stand/vmunix
for configuring lsof.  That requires /opt/langtools/bin/pxdb
or the q4 version of pxdb from /usr/contrib/bin/q4pxdb.
The path to the result is supplied to the lsof Configure
script in the HPUX_BOOTFILE environment variable.  Configure
still requires /usr/contrib/bin/q4.

The following sample Bourne shell commands make a private
copy of /stand/vmunix in /tmp, process it with pxdb or
q4pxdb, and supply its path to lsof's Configure script in
HPUX_BOOTFILE.

```
   $ cp /stand/vmunix /tmp/vmunix.lsof

   $ /opt/langtools/bin/pxdb /tmp/vmunix.lsof
  or
   $ /usr/contrib/bin/q4pxdb /tmp/vmunix.lsof

   ... pxdb messages ...
   $ HPUX_BOOTFILE=/tmp/vmunix.lsof Configure -n hpux
```

It may also be necessary to use q4 outside the lsof Configure
script.  In that
case q4 can be to determine the state of
ipis_s and ipc_s with these q4 commands:

```
   $ /usr/contrib/bin/q4 /stand/vmunix
   ...
   q4> fields -c struct ipc_s
   ...
   q4> fields -c struct ipis_s
```

Look in the q4 output for the ipc_ipis member of the ipc_s
structure, and look in the q4 output for the ipis_s structure
for the ipis_msgsqueued member.  If ipc_s has ipc_ipis but
ipis_s lacks ipis_msgsqueued, set HPUX_IPC_S_PATCH environment

variable to "1". If ipc_s has ipc_ipis and ipis_s has
ipis_msgsqueued, set HPUX_IPC_S_PATCH to "2" -- e.g.,

```
  $ HPUX_IPC_S_PATCH=1 Configure -n hpux
or
  $ HPUX_IPC_S_PATCH=2 Configure -n hpux
```

If ipc_s has no ipc_ipis member, set HPUX_IPC_S_PATCH to
"N" -- e.g., use this Configure step:

```
  $ HPUX_IPC_S_PATCH=N Configure -n hpux
```

9.2.6 When compiling /dev/kmem-based lsof for HP-UX 11 what do the
"aCC runtime: ERROR..." messages mean?

When the lsof Makefile asks the HP-UX unbundled compiler
to load lsof, it may complain:

```
  /bin/cc -o lsof  -DHPUXV=1100 -DHASVXFS -DHPUXKERNBITS=64 \
-I/home/abe/src/lsof4/dialects/hpux/kmem/hpux11 +DD64 \
-DHAS_IPC_S_PATCH=2 -I/home/abe/src/lsof4/dialects/hpux/kmem \
-DLSOF_VSTR=\"B.11.00\"  -g dfile.o dmnt.o dnode.o dnode1.o \
dnode2.o dproc.o dsock.o  dstore.o  arg.o main.o misc.o \
node.o print.o proc.o store.o usage.o -L./lib -llsof  -lelf \
-lnsl
   aCC runtime: ERROR: Unexpected use of shared libraries
   aCC runtime: ERROR: Read aCC manpage, +A option
   /usr/lib/nls/loc/locales.1//is_IS.iso88591
```

This is a bug in the HP-UX national language support.
(Notice the last message with "locales" in it?) Complain
to HP -- then use this work-around before executing make:

```
  $ unset LANG
  $ make
```

9.2.7 Why doesn't /dev/kmem-based lsof for HP-UX 11 report VxFS file
link counts, node numbers, and sizes correctly?

This is usually the result of running an lsof binary whose
revision number is less than 4.57 on a system that has
OnlineJFS
support installed. It can also happen with lsof
4.57 binaries when the OnlineJFS support with which they
were built doesn't match the OnlineJFS status of the system
on which they are run.

The OnlineJFS status of lsof 4.57 and higher binaries can
be determined by running:

```
$ lsof -v 2>&1 | grep HASONLINEJFS
```

If that shell pipe produces output, lsof was compiled with
OnlineJFS support enabled; no output, disabled.

If OnlineJFS is installed on an HP-UX 11 system the
/sbin/fs/vxfs/subtype executable exists and outputs "vxfs3.3"
when run.

The problem occurs because the optional OnlineJFS support
installation doesn't update <sys/fs/vx_inode.h>. Consequently
lsof can be compiled with an incorrect definition of the
vx_inode structure and look for for link counts, node
numbers, and sizes in the wrong places in the structure.

The current response I have gotten from HP is that no
<sys/fs/vx_inode.h> update will be provided for OnlineJFS.

I've addressed this problem
temporarily with a work-around
(hack) in lsof revision 4.57.

9.2.8 Why can't /dev/kmem-based lsof be built with gcc for 64 bit
HP-UX 11?

When Configure is given the "hpuxgcc" abbreviation, the
HP-UX version is 11, and the kernel bit size is 64, the
lsof Configure script may abort with the messages:

```
!!!!!!!!!!!!!!!! FATAL ERROR !!!!!!!!!!!!!!!!!!

APPARENTLY GCC CANNOT BUILD 64 BIT EXECUTABLES.
A COMPILER MUST BE USED THAT CAN.  SEE 00FAQ
FOR MORE INFORMATION.
```

(This is the "more information" in 00FAQ.)

This means the Configure script compiled a test program
with gcc the result wasn't an ELF-64 binary. Lsof tries
two gcc modes, one with no options and another with the
-mlp64 option, before it concludes gcc can't be used.

See the "How can I acquire a gcc for building lsof for 64
bit HP-UX 11?" answer for information on where you might
be able to get a gcc for HP-UX 11 that can produce ELF-64

executables.

9.2.8.1 How can I acquire a gcc for building lsof for 64 bit HP-UX 11?

Check this HP URL:

http://h21007.www2.hp.com/dspp/tech/tech_TechSoftwareDetailPage_IDX/1,1703,547,00.html

(That's one very long link; be careful you cut 'n paste it all.)

In November 2001 that URL led to a web page whose title was "gcc for hp-ux 11." The page offered a link for downloading a 64 bit gcc 3.0 compiler for HP-UX 11.0 and 11i. Rich Rauenzahn of HP installed that compiler on an HP test system he allows me to use and I successfully built a 64 bit lsof with it.

The HP package may install the 64 bit capable gcc in /usr/local/pa20_64/bin/gcc, so you may have to adjust your path or set the LSOF_CC environment variable to compensate.

9.2.9 Why does /dev/kmem-based lsof for HP-UX 11 report "unknown file system type" for some open files?

The lsof binary being used probably doesn't have support for the VxFS file system.

To confirm that, check `lsof -v` output for "-DHASVXFS". If it's not present, lsof doesn't have VxFS support.

You also need to establish that lsof really is complaining about VxFS files by checking the kernel boot file for the symbol associated with the hexadecimal address reported in the "unknown file system type" message -- e.g., "v_op: 0x8711c8." Use nm(1) to do that:

```
$ nm -x /stand/vmunix | grep 8711c8
```

If nm reports the symbol associated with the address is vx_vnodeops, then lsof is complaining about an open VxFS file.

The solution in that case is to build lsof yourself (The bundled C compiler will do it.), making sure that lsof's Configure script detects the presence of VxFS. Configure does that by finding these two header files:

/usr/include/sys/fs/vx_hpux.h
/usr/include/sys/fs/vx_inode.h

If the system where you are building lsof doesn't have those header files, but does have VxFS, you might be able to install the header files by installing the HP JournalFS package from the CoreOS CD -- in particular the file set JournalFS.VXFS-PRG and its associated patch, PHKL_18543. (My thanks to Steve Bonds for that information.)

Finally, if you find that lsof isn't complaining about VxFS when it complains about an unknown file system type, send e-mail to me <abe@purdue.edu> for further assistance. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

9.2.10 Why does the ANSI-C compiler complain about comments in HP-UX 11 header files?

When compiling lsof on HP-UX 11, the HP ANSI-C compiler's pre-processor, cpp, may complain about comments in HP-UX header files -- e.g.,

```
    cpp: "/usr/include/sys/cdfs.h", line 232: warning 2028:
 Found comment inside comment started on line 232.
    cpp: "/usr/include/sys/cdnode.h", line 196: warning 2028:
 Found comment inside comment started on line 196.
    cpp: "/usr/include/nfs/snode.h", line 30: warning 2028:
 Found comment inside comment started on line 30
```

This is not a problem with lsof. It is a problem with the HP-UX header files; they have non-compliant ANSI-C comment sequences in them -- e.g.,

```
    <sys/cdfs.h>: 232
 /* struct  cdfs *cdfs_link;  /* linked list of file systems */
```

The initial "/*" is not terminated by an ending "*/" before the appearance of a second "/*".

9.2.11 Why does dnode1.c cause the HP-UX 11 compiler to complain that <sys/fs/vx_inode.h> is missing or incorrect?

If CFLAGS in the lsof Makefile for an HP-UX 11 compilation includes HASONLINEJFS, indicating the system has OnlineJFS

support, lsof needs the <sys/fs/vx_inode.h> header file.
Sometimes it is missing from /usr/include/sys/fs.

<sys/fs/vx_inode.h> is a header file that must be obtained from
Veritas. If that proves impossible, please contact me via
e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the
"Subject:" line so my e-mail filter won't classify your letter
as Spam.

### 9.3 PSTAT-based HP-UX lsof Questions

The sources for PSTAT-based lsof for HP-UX may be found in
lsof_<revision>/dialects/hpux/pstat.

Lsof's
Configure shell script decides to use these sources
when it finds that the /usr/include/sys/pstat subdirectory
exists.

Lsof can be forced to use the PSTAT-based sources by setting
"pstat" in the HPUX_BASE environment variable. Consult
the Configure shell script and 00XPORTING for more information.

#### 9.3.1 Why does PSTAT-based lsof complain about pst_static and other PSTAT structures?

When lsof starts it may issue one of these fatal error
messages:

```
lsof: FATAL: can't determine PSTAT static size
lsof: FATAL: can't read <n> bytes of pst_static
lsof: FATAL: pst_static doesn't contain <name>_size
lsof: FATAL: <name>_size should be <n>
```

These messages indicate that lsof's tests for the proper
level of PSTAT support have failed. The structure names,
given in <name>, and sizes, given in <n>, identify the
support deficiency more precisely.

You may need to upgrade the PSTAT support in your kernel
to be able to use PSTAT-based lsof.

#### 9.3.2 Why does PSTAT-based lsof complain it can't read pst_* structures?

Lsof may put messages like the following in the NAME

column of its output.

```
can't read cwd pst_filedetails: Permission denied
can't read mem pst_filedetails: Permission denied
can't read rtd pst_filedetails: Permission denied
can't read txt pst_filedetails: Permission denied
can't read pst_filedetails: Permission denied
can't read 3 stream structures: Permission denied
can't read pst_socket: Permission denied
```

These messages indicate that the lsof binary lacks the authority to read the name structures for processes other than ones belonging to the UID under which lsof is running. Authority to read the structures of other processes is limited to root processes -- i.e., lsof must have setuid-root permission if it is to list open files for arbitrary processes.

If you want to eliminate these errors, you must run lsof as root or install it with setuid-root permission.

### 9.3.3 Why does PSTAT-based lsof rebuild the device cache file after each reboot?

After each HP-UX rebuild, the first time a user runs lsof it will report:

```
lsof: WARNING: device cache mismatch: /dev/tun...
lsof: WARNING: created device cache file: /<user_path>
```

This happens because the device numbers on /dev/tun* device nodes are recalculated at each reboot. When lsof detects a change in the device number of a /dev/tun* file, it rebuilds its local device cache file.

### 9.3.4 Why doesn't PSTAT-based lsof report TCP addresses for telnetd's open socket files?

When lsof can't report TCP addresses for telnetd's open socket files it is because an unpatched PSTAT kernel interface doesn't report the addresses to lsof.

This has been addressed in PSTAT kernel patch PHKL_24047. It is available from the HP IT Resource Center at:

```
http://itrc.hp.com
```

In the page's "maintenance / support" box select the
"individual patches" link. Once at its page, select the
"hp-ux" link.
On that page select the "Series 800" or
"Series 700" radio button and select "11.11" from the
pull-down list to the right of the button. Under "search
or browse the path list" select "Search by Patch IDs" from
the pull down list, enter PHKL_24047 in the following text
box, and select search. That should lead to information
about PHKL_24047 and a link for downloading it. (You may
have to log in first and you may have to create a login
identity by registering before you can log in.)

Some time in March 2006 the PHKL_24047 patch was "lost"
by the HP-UX networking lab. It has been "found" again
in August 2006 and will be re-released as a GRO patch
"some time." I don't yet know when that will be. You
must contact HP to learn about the availability of the
GRO patch.

9.3.5 Why does PSTAT-based lsof cause an HP-UX 11.11 kernel panic?

When PSTAT-based lsof runs on some HP-UX 11.11 kernels,
the kernel may panic. Symptoms include:

Console message:
0xFBE000301100EF00
00000000 0000EF00 -
type 31 = legacy PA HEX chassis-code

/var/adm/syslog:
... vmunix: Trap Type 15 (Data page fault)
... vmunix: Instruction Address (pcsq.pcoq) = 0x...

The panic is caused by a bug in the way PSTAT's pstat_getstream()
function obtains module names from streams managed by the
otsam stream driver (part of OSI Transport Services). Lsof
calls pstat_getstream() when it encounters an open otsam
stream file. An HP-UX 11.11 system uses otsam if otsam
appears in /stand/system.

HP-UX 11.11 patch PHKL_24507 (available some time after
July 15, 2001) fixes the pstat_getstream() bug. See the
information in the answer to the "Why doesn't PSTAT-based
lsof report TCP addresses for telnetd's open socket files?"
question for information on how to obtain the patch.

9.3.6 Why doesn't PSTAT-based lsof report a CWD that is on a loopback

(LOFS) file system?

When PSTAT-based lsof reports on processes whose current working directory (CWD) is on
a loopback file system, lsof
can't report the open CWD file. The reason is that the HP-UX 11.11 and above kernel's loopback file system code is not passing the CWD file ID to the kernel's pstat(2) code. Hence lsof is given no information on the lofs CWD.

The problem was first reported to me by Ermin Borovac and an internal bug report was filed with the HP-UX file system group on October 26, 2004. That report has now been answered by the patch PHKL_33200 -- s700_800 11.11 lofs cumulative patch. The HP IT Resource Center (http://itrc.hp.com) is a source for the patch.

9.3.7 Why do some swinstall packages for PSTAT-based HP-UX 11.11 packages complain about setgid and setuid bits?

First, let me explain that I do not provide lsof swinstall packages for lsof. Others provide them and they should be contacted about problems with their packages.

However, I have become aware of a problem with one package about which I have some information I can share. The problem shows
up in these swinstall messages:

```
ERROR:   Unknown owner and/or group for file
  "/usr/local/bin/lsof". SUID and/or SGID bit was
  not set.
ERROR:   Failed installing fileset "lsof.lsof-RUN,r=4.73".
  Check the above output for details.
```

The swpackage SUID/SGID functionality was restricted by changes for POSIX compliance, breaking backward compatibility. The patch PHCO_27671 allows SUID/SGID for uid/gid of 0 only, as a compromise between backward compatibility and POSIX conformance.

If the setuid bit is to be set on the executable, the UID and GID of the executable must be 0 (zero).

9.3.8 Why won't the bundled C compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?

A PA-RISC HP-UX 11.23 bundled C compiler dated May 2005 or later will not build PSTAT-based lsof. It will deliver error

messages related to the system's <gssapi/gssapi.h> header
file.

There is nothing wrong with that header file or lsof. The
problem is that the bundled C compiler
can't cope with the
gssapi.h header file.

The work-around is to use the HP ANSI C compiler. Using gcc
is not a satisfactory work-around. See the answer to the "Why
won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?"
question for more information.

9.3.9 Why won't gcc build PSTAT-based lsof for PA-RISC HP-UX 11.23?

Gcc will not even compile PSTAT-based lsof revisions below 4.77
for PA-RISC HP-UX 11.23 dated May 2005 or later. It reports
errors in lsof's print.c fill_portmap() function about missing
members of the rpcent structure. That happens because gcc
defines _XOPEN_SOURCE_EXTENDED which disables the definition of
the rpcent structure in <netdb.h>.

Using the HP bundled C compiler is not a viable work-around.
That is explained in the answer to the "Why won't the bundled C
compiler build PSTAT-based lsof for PA-RISC HP-UX 11.23?"

While an lsof revision 4.77 or higher can be compiled with gcc,
the results are unreliable. Lsof will compile, but it
occasionally
produces segment faults when it runs. I have not
been able to reproduce the failure reliably or locate a
debugger that will work with the gcc-compiled lsof.

The only reliable work-around is to use the HP ANSI C
compiler.

9.3.10 Why does PSTAT-based lsof complain, "FATAL: pst_stream_size
should be: 672; is 72" on HP-UX 11.11 and above?

This message indicates a mismatch between the PSTAT header
files used to build lsof (<sys/pstat.h> and those in the
/usr/include/sys/pstat subdirectory), and those that built the
running kernel.

Unfortunately the June 2008 patch set for HP-UX 11.23 creates
this inconsistency, because it does not contain all the patches
needed to match the kernel with the PSTAT header files. Even
more serious is that the missing patches update the kernel's

PSTAT support to provide TCP/UDP endpoint information to lsof
from TCP/TLI streams.

The patch inconsistency comes about because, while the following
patch is installed,

    PHKL_36577
 1.0  PM-PSTAT section 2 manpage changes

other kernel patches are not.

The PHKL_36577 patch updates the PSTAT header files and manual
pages to match kernel changes that other patches with the
following numbers (or patches that contain or supersede them)
contain:

    PHNE_36575  1.0  Cumulative STREAMS Patch
    PHNE_37670  1.0  cumulative ARPA Transport patch
    PHNE_37851  1.0  NFS cumulative patch

Those patches implement the kernel changes that support the
delivery of information promised in patch PHKL_36577.

The work-around is to install the missing patches.

9.4 Why won't the HP-UX depot install?

I don't distribute lsof depts, so I can't support them.

From time to time depots prepared by various sites -- e.g.,
usually HP-UX software collection sites -- will contain errors
that cause installation of the depot to fail.

Do not contact me when this happens.  Instead, contact the
administrator of the site that prepared the depot.

As should be clear from
the bulk of the lsof documentation, I
do not recommend you use pre-built lsof binaries in any form.
Instead, I recommend you obtain the lsof source distribution
and build lsof yourself.

10.0 Linux

10.1 What do /dev/kmem-based and /proc-based lsof mean?

At approximately Linux 2.1.72 and exactly at lsof revision

4.23 support for Linux forks. The first fork, containing
the oldest lsof form is based on access to kernel memory
structures, and is called /dev/kmem-based lsof. A
/dev/kmem-based lsof is heavily intertwined with the Linux
kernel version, its header files, and its system map file.
Typically a /dev/kmem-based lsof needs only setgid permission
to local all open file information.

After approximately Linux 2.1.72 and at revision 4.23 lsof
obtains all its information from the /proc file system.
That lsof is called the /proc-based lsof. A /proc-based
lsof does not read kernel memory, needs neither kernel
header files nor the system map file, and is less likely
to
be affected by Linux kernel changes. However, it does
require setuid-root permission to list all open files, and
it can't report file offsets (positions).

After revision 4.52 the /dev/kmem-based Linux sources for
lsof are no longer distributed. Information about them
may be found in the 00INDEX and README files at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/src

10.2 /proc-based Linux lsof Questions

10.2.1 Why doesn't /proc-based lsof report file offsets (positions)?

/proc-based lsof revisions 4.79 and above can only report file
offsets (positions) for the files of Linux kernels 2.6.22 and
above.

During its initialization /proc-based lsof tests to see if
offset information can be obtained. If it cannot, lsof
disables offset reporting. If the -o option was selected, lsof
also issues this warning:

lsof: WARNING: can't report offset; disregarding -o.

10.2.2 Why does /proc-based lsof report "can't identify protocol" for
some socket files?

/proc-based
lsof may report:

```
COMMAND PID ... TYPE ... NODE NAME
pump    226 ... sock ...  309 can't identify protocol
```

This means that it can't identify the protocol (i.e., the AF_* designation) being used by the open socket file. Lsof identifies protocols by matching the node number associated with the /proc/<PID>/fd entry to the node numbers found in selected files of the /proc/net sub-directory. Currently /proc-based lsof examines these protocol files:

```
/proc/net/ax25  (untested)
/proc/net/ipx  (needs kernel patch)
/proc/net/raw
/proc/net/raw6
/proc/net/tcp
/proc/net/tcp6
/proc/net/udp
/proc/net/udp6
/proc/net/unix
```

If /proc-based lsof says it can't identify the protocol for an open socket file, you may be able to identify the protocol yourself by using grep to look for the specific node number in the files of /proc/net -- e.g.,

```
$ grep <node_number> /proc/net/*
```

You may not be able to find the desired node number, because
not all kernel protocol modules fully support /proc/net information.

If you find a matching node number in a /proc/net file that is not currently being processed by lsof, contact me via e-mail at <abe@purdue.edu>. I'll discuss adding support to /proc-based lsof for the protocol of the /proc/net file with you. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

The code that matches node numbers of open IPX protocol socket files to those in /proc/net/ipx requires Jonathan Sergent's Linux 2.1.79 patch to /usr/src/linux/net/ipx/af_ipx.c. The patch, suitable for input to Larry Wall's patch program, may be found in the lsof distribution file:

```
.../dialects/linux/proc/patches/net_ipx_af_ipx.c.patch
```

### 10.2.3 Why does /proc-based lsof warn about unsupported formats?

Lsof may issue the following warning:

lsof: WARNING: unsupported format: /proc/net/<file>

if the header line of the indicated <file> in
/proc/net --
ax25, ipx, raw, tcp, udp, or unix -- doesn't match what
lsof expects to find.

When the header line of a /proc/net file isn't what lsof
expects, lsof probably can't parse the rest of the file
correctly and doesn't try. As a result, lsof can't report
any NAME column information (e.g., local and remote addresses)
for socket files bound to the indicated network protocol.

If you get this warning, please send me e-mail at <abe@purdue.edu>.
Include the contents of the file lsof claims has an unsupported
format. Make sure "lsof" appears in the "Subject:" line so my
e-mail filter won't classify your letter as Spam.

10.2.4 Why does /proc-based lsof report "(deleted)" after a path name?

The "(deleted)" notation following a path name in /proc-based
lsof's NAME column comes from the /proc/<PID>/fd/<FD> entry
for the open file. It's the Linux kernel's way of indicating
the file is open but has been unlinked (rm'd).

10.2.5 Why doesn't /proc-based lsof report full
open file information
for all processes?

/proc-based lsof can only report on processes whose /proc
files it has permission to read. /proc normally grants
permission to read all its files only to root or to the
owning user ID.

Without permission to read most /proc files, lsof can only
report full information for processes belonging to the user
who is running lsof. /proc-based lsof may be able to report
some information for all processes, depending on the
permissions of their associated /proc files, but usually
/proc-based lsof won't be able to access the files in
/proc/<PID>/fd/ that describe regular open files.

If you want /proc-based lsof to report on all processes, you
must install it with setuid-root permission.

10.2.6 Why won't Customize offer to change HASDCACHE or WARNDEVACCESS
for /proc-based lsof?

/proc-based lsof doesn't read device information from /dev
or the device cache file, so it makes no sense to change
the state of device cache processing or /dev
node accessibility
warnings.

10.2.7 /proc-based lsof Linux NFS questions

10.2.7.1 Why can't lsof find files on an accessible NFS file system?

On occasion lsof may be unable to identify that an open
file is on an NFS file system.  This is most likely the
result of a bug in the way the Linux kernel supplies
information to the reader of /proc/mounts (lsof) -- sometimes
that pseudo-file is truncated by the kernel.

One way to see if this is the case is to search for the
NFS file system in /proc/mounts -- e.g.,

    $ grep <NFS_file_system_mount_point> /proc/mounts

If you get no output or the third word of the output isn't
"nfs", then lsof won't consider the file system an NFS file
system.

A second test is to look at the end of /proc/mounts --
e.g.,

    $ tail /proc/mounts

If tail reports "# truncated" then /proc/mounts is incomplete
because of a Linux kernel bug.  The bug is documented at:

    http://www.xss.co.at/sysinfo/mounts.html

The bug is fixed in Linux
kernel 2.4.18, and possibly in
some earlier Linux kernel versions.

10.2.7.2 Why can't lsof find files on an inaccessible NFS file system?

If lsof issues this message about a Linux file system,
mounted from an NFS server:

    lsof: WARNING: can't stat() nfs file system /xxx/yyy

Then lsof won't be able to find any open files on the file

system.

That's because of an inadequacy in the Linux /proc file
system. Its /proc/mounts file doesn't give the device
doublet (major and minor numbers) of the file system as do
many UNIX systems (e.g., Solaris). The only way lsof can
get the device doublet for a Linux file system is to call
stat(2) on the file system path, which fails if the NFS
server isn't accessible.

When lsof doesn't know the device doublet of a file system,
it can't find open files on the inaccessible file system,
because it can't match the doublets of open files to the
doublet of the inaccessible file system.

This topic is covered extensively in lsof(8)
it its ALTERNATE
DEVICE NUMBERS and BLOCKS AND TIMEOUTS sections.

10.2.8 Why doesn't /proc-based Linux lsof report socket options and
values, socket state flags, and TCP options and values?

The Linux /proc file system doesn't report socket options
and values, socket states, and TCP options and values to
lsof.

10.2.9 Does /proc-based Linux lsof use a device cache?

No. The Linux /proc/<PID>/fd/* entries provide device names to
lsof via readlink(2). It is not necessary to enable device
cache processing for /proc-based Linux lsof via the Customize
script or modifications to the Linux machine.h header file.

10.2.10 Why doesn't /proc-based Linux lsof report any or all file structure
values for its +fcfgGn option?

/proc-based lsof revisions 4.79 and above can only report some
file structure values for Linux kernels below 2.6.22.

When running on Linux kernels at 2.6.22 and above lsof 4.79 can
report some file flag values -- i.e., in response to the +fg or
+fG options.
The flag values are obtained from the
/proc/<PID>/fdinfo/ files introduced at Linux kernel 2.6.22.

/proc-based Linux lsof tests its availability to obtain file
flag values at initialization. If values are not available,
lsof disables file flag reporting. If the flags were requested

with +fg or +fG, lsof displays this warning:

    lsof: WARNING: can't report file flags; disregarding +f.

As a special note, when Linux lsof can report flag bits, it
will not report 'R' for a read-only file.  There is no
read-only flag bit O_* symbol in <fcntl.h> (or <bits/fcntl.h>)
and lsof reports only bits that are set.  The absence of O_RDWR
and O_WRONLY flag bits implies the file is read-only.

## 10.3 Special Linux file types

### 10.3.1 Why is ``DEL'' reported as a Linux file type?

Lsof usually reports entries from the Linux /proc/<PID>/maps
file with ``mem'' in the TYPE column.  However, when lsof can't
stat(2) a path in the process' ``maps'' file and the ``maps''
file entry contains ``(deleted)'',
indicating the file was
deleted after it had been opened, lsof reports the file type as
``DEL''.

### 10.3.2 Why is ``unknown'' reported as a Linux file type?

Lsof may report a Linux file's type as ``unknown'' in the TYPE
column when lsof can't obtain complete stat(2) results for the
file.

Usually the NAME column will contain a ``(stat: xxx)'' error
message, but that could have been suppressed with the lsof
``-w'' option.

## 10.4 Linux ``mem'' Entry Problems

### 10.4.1  What do ``path dev=xxx'' and ``path inode=yyy'' mean in the NAME column of Linux ``mem'' file types?

When the device or inode number in the process' ``maps'' file
entry doesn't match the stat(2) results from the file path,
lsof reports the inconsistent information from the stat(2) of
the path parenthetically after the path in the NAME column
in one of these forms:

    (path dev=xxx)            only the device number,
    ``xxx'', from a stat(2) of the
    ``maps'' file entry path
    differs

from the ``maps'' file
entry value reported in the
DEVICE column.

(path inode=yyy) only the inode number,
``yyy'', from a stat(2) of the
``maps'' file entry path
differs from the ``maps'' file
entry value reported in the
NODE column.

(path dev=xxx inode=yyy) Both device and inode numbers
differ.

Lsof reports the ``maps'' file device number in the DEVICE column and the inode number in the NODE column.

When device and inode mismatches occur, lsof suppresses the reporting of link count and size. See the answer to the "Why is neither link count nor size reported for some Linux ``DEL'' and ``mem'' file types?" question for more information.

Device and inode inconsistencies can occur when a file at a ``maps'' path is replaced after the process has started, or when a different file system with similar path names is mounted on top of the original file system.

The device inconsistency parenthetical messages can be suppressed
with lsof's ``-w'' option.

10.4.2 Why is neither link count nor size reported for some Linux ``DEL'' and ``mem'' file types?

Link count and size are not reported for some entries from the process' ``maps'' file because a stat(2) of the entry file path failed or stat(2) delivered device or inode numbers that don't match the ones in the ``maps'' entry.

When the stat(2) device or inode numbers don't match those in the ``maps'' file entry, it is likely that the stat(2) results don't apply to the file that was originally mapped by the process and whose path appears in the ``maps'' file entry, so lsof tries to avoid reporting possibly incorrect information.

See the answer to the "What do ``path dev=xxx'' and ``path inode=yyy'' mean in the NAME column of Linux ``mem'' file types?" for more information on how mismatched stat(2) device

and inode numbers are reported.

## 10.5 Special Linux NAME column messages

### 10.5.1 What does ``(stat: xxx)" mean in the NAME column of Linux files?

When
lsof tried to stat(2) the path in the NAME column, the
stat(2) system call failed and produced an error message of
``xxx".

This situation usually occurs if the lsof process lacks
permission to stat(2) the path -- e.g., the lsof executable
lacks root permission, or lsof is attempting to stat(2) a path
on an NFS device mounted with the root_squash option.

The message can be suppressed with lsof's ``-w" option.

### 10.5.2 What does ``(readlink: xxx)" mean in the NAME column of Linux files?

When lsof tried to convert the /proc/<PID>/fd path, reported in
the NAME column, to its full and more meaningful path, the
readlink(2) system call used to do the conversion failed. The
readlink(2) failure message is ``xxx".

This situation usually occurs if the lsof process lacks
permission to readlink(2) some part of the path -- e.g., the
lsof executable lacks root permission, or lsof is attempting to
stat(2) a path on an NFS device mounted with the root_squash
option.

The
message can be suppressed with lsof's ``-w" option.

## 10.6 Why is ``NOFD" reported as a Linux file type?

When lsof lacks permission to use opendir() on the fd/
subdirectory of a process' /proc/<PID> directory, it reports a
single file of the type ``NOFD" (for no file descriptors).

Lsof reports the the /proc/<PID>/path in the NAME column,
followed by "(opendir: xxx)", where ``xxx" is the error
message returned by opendir().

The ``NOFD" entry can be suppressed with lsof's ``-w" option.

10.7 Why does Linux lsof report a NAME column value that begins with ``/proc"?

When lsof has problems processing a ``/proc/<PID>" entry -- e.g., it can't convert the entry to a full and more meaningful path name, or it can't access the /proc/<PID>/fd subdirectory with opendir() -- it will report the /proc/<PID> path in the NAME column.

10.8 Linux /proc/net/tcp* and /proc/net/udp* issues

10.8.1 Why use the Linux -X option?

If you're not interested in TCP/IP socket information for a particular use of lsof, adding the -X option will make lsof run more quickly, because -X inhibits the reading of the /proc/net/tcp* and /proc/net/udp* files. For example, you may only be interested in knowing what process has a particular file open.

When the Linux system has a large number of open TCP/IP socket files, the time savings provided by -X can be significant.

10.8.2 Why does lsof say ``-i is useless when -X is specified"?

If -X is specified, lsof can't report much information on open TCP/IP socket files. However, lsof's -i option requests that information. Hence, the two options conflict and can't be used together.

10.8.3 Why does lsof say ``can't identify protocol (-X specified)"?

If the Linux lsof -X option is specified and an open socket file can't be identified without accessing the /proc/net/tcp* and /proc/net/udp* files, lsof will report that it can't identify the socket's protocol and that the failure may be caused by the -X specification

11.0 NetBSD Problems

11.1 Why doesn't lsof report on open kernfs files?

Lsof doesn't report on open NetBSD kernfs files because the structures lsof needs aren't defined in the kernfs.h header file in /sys/misc/kernfs.

11.2 Why doesn't lsof report on open files on: file descriptor file systems; /proc file systems; 9660 (CD-ROM) file systems; MS-DOS (floppy disk) file systems; or kernel file systems?

Lsof is not able to report on open files on certain file system if /usr/src/sys/msdosfs didn't exist when the lsof Configure script ran and lsof was made. /usr/src/sys/msdosfs contains header files lsof needs for collecting data on certain file system files.

You can tell if an lsof executable above) lacks support for a file system if the following test of `lsof -v` produces nothing:

```
$ lsof -v 2>&1 | grep <support_enabled_definition>
```

The <support-enabled_definition> will be:

| File System Type | Definition | Note |
|---|---|---|
| File descriptor | HASFDESCFS | |
| /proc | HASPROCFS | |
| 9660 | HAS9660FS | |
| MS-DOS | HASMSDOSFS | (lsof 4.61 and above) |
| Kernel | HASKERNFS | |

The work-around is to install /usr/src/sys, rerun the lsof Configure script, and remake lsof.

11.3 Why does lsof produce confusing results for nullfs file systems?

Consider this report from /sbin/mount:

```
/usr/home on /home type null (local)
```

(According to /sbin/mount /usr/home is the mounted-on device and /home is the mounted-on directory.)

When lsof is asked to report on open files on /home, it will report them as files on /usr/home instead. That's an artifact of the NetBSD kernel's dynamic name lookup cache (DNLC) and the way the kernel handles nullfs mounted-on directories.

While lsof will report all open files on /home when given

/home as a file system directory argument, even though
reporting them as located on /usr/home, lsof will not find
the same files when asked to report on all open files on
/usr/home
when given /usr/home as a file system device
argument.  That's because from the mount perspective
/usr/home is equivalent to a device, but from the device
perspective it is still a directory.

So, what this lsof command reports:

```
$ lsof /home
... NAME
... /usr/home/...
```

Won't be duplicated by this lsof command:

```
$ lsof /usr/home
```

Another way to look at this confusing /home and /usr/home
example is to consider what stat(2) reports.  For /home
stat(2) reports a device doublet that matches what lsof
finds in open file node structures, while the device doublet
stat(2) reports for /usr/home won't match what lsof finds.
Nor does the mode reported by stat(2) indicate a block
devices, as is the expected case.

There is no simple answer to this confusion, nor is there
even a simple explanation.  Simply be aware that when
supplying file system arguments to lsof on NetBSD, use the
mounted-on directory name for a nullfs as the lsof argument,
and don't be surprised
when the NAME column reports the
mounted-on device name.

### 11.4 NetBSD header file problems

#### 11.4.1 Why can't the compiler find some NetBSD header files?

If the compiler's pre-processor complains it can't find some
header files when it compiles lsof source files, /usr/include
and /usr/src may not have all the header files lsof needs.

As a work-around use the NETBSD_SYS environment variable
to specify to lsof the location of the additional header
files -- e.g.,

```
% setenv NETBSD_SYS /my_source
```

```
% ./Configure -n netbsd
```

or

```
$ NETBSD_SYS=/mys_source ./Configure -n netbsd
```

Caution: using this work-around may cause the lsof Configure script to activate or omit different features, depending on where it finds the header files that determine the state of the features.

### 11.4.2 Why does NetBSD lsof produce incorrect output?

If the NetBSD system's kernel was built from header files that don't match those in /usr/include -- e.g., //usr/src has the ones from which the kernel was built -- lsof may build, but won't produce correct output.

As a possible work-around, try directing the C compiler to select header files from /usr/src before it selects them from /usr/include. That can be done with the DEBUG make string -- e.g.,

```
$ make DEBUG="-I/usr/src -I/usr/include"
```

If that work-around fails, try using the LSOF_INCLUDE and NETBSD_SYS environment variables to swap /usr/include and /usr/src when running the Configure script, then use the make DEBUG string when running make -- e.g.,

```
$ LSOF_INCLUDE=/usr/src; export LSOF_INCLUDE
$ NETBSD_SYS=/usr/include; export NETBSD_SYS
$ ./Configure -n netbsd
$ make DEBUG="-I/usr/src -I/usr/include"
```

## 11.5 Why isn't lsof feature xxx enabled for NetBSD?

Lsof's Configure script enables NetBSD features by locating and examining header files associated with the features, and based on what it finds, setting compile-time definitions in Makefiles. (See 00PORTING for a list of the definitions.)

When Configure doesn't find header files or doesn't find appropriate values in header files, that may mean the header file tree lsof is searching is incomplete or out of date.

Lsof normally looks for NetBSD header files in /usr/include.

It can also be directed to look in other directories --
e.g., /sys -- if told to do so with the contents of the
LSOF_INCLUDE and NETBSD_SYS environment variables.

To determine what header file enables a missing feature,
check the NetBSD stanza in the Configure script. Then
check the locations it checks for the indicated header
files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and
and NETBSD_SYS.

## 12.0 NEXTSTEP and OPENSTEP Problems

### 12.1 Why can't lsof report on 3.1 lockf() or fcntl(F_SETLK) locks?

Lsof has code to test for locks defined with lockf() or
fcntl(F_SETLK) under NEXTSTEP 3.1, but that code has never
been tested. I couldn't test it, because my NEXTSTEP 3.1
lockf() and fcntl(F_SETLK)
functions return "Invalid
argument" every way I have tried to invoke them.

If your NEXTSTEP 3.1 system does allow you to use lockf()
and fcntl(F_SETLK) and lsof doesn't report locks set with
them, then the code in .../dialects/next/dnode.c probably
isn't correct. Please contact me via e-mail at <abe@purdue.edu>
and tell me how you got your lockf() and fcntl(F_SETLK) system
calls to work. Make sure "lsof" appears in the "Subject:" line
so my e-mail filter won't classify your letter as Spam.

### 12.2 Why doesn't lsof compile for NEXTSTEP with AFS?

I no longer have a NEXTSTEP test system that has AFS.
Changes to lsof since I once had a test system have caused
me to change the AFS code in NEXTSTEP without being able
to test the changes.

If you need AFS support for NEXTSTEP and can't get it to
compile, please contact me. Perhaps we can jointly fix
the problems.

## 13.0 OpenBSD Problems

### 13.1 Why doesn't lsof support kernfs on my OpenBSD system?

Lsof supports the kernel
file system on OpenBSD versions
whose /sys/miscfs/kernfs/kernfs.h (or <miscfs/kernfs/kernfs.h>
header file correctly defines the kern_target structure.
The lsof Configure script's openbsd stanza checks for the
presence of the structure's kt_name element and activates
kernfs support for the CFLAGS -DHASKERNFS definition only
when it finds kt_name.

The kernfs.h header file is scheduled to be updated in the
OpenBSD 2.1 release, according to Kenneth Stailey, who
authored its changes.

13.2 Will lsof work on OpenBSD on non-x86-based architectures?

I've not tested lsof on an OpenBSD system that uses a
non-x86-based architecture, but I've had one report that
lsof 4.33 compiles and works on OpenBSD for the pmax
architecture (decstation 3100).

13.3 <sys/pipe.h> problems

13.3.1 Why does the compiler claim nbpg isn't defined?

When compiling lsof on some (older) OpenBSD SPARC versions,
the compiler may complain:

```
In file included from ../dlsof.h:191,
     from ../lsof.h:166,

    from fino.c:52:
/usr/include/sys/pipe.h:83: `nbpg' undeclared here
(not in a function)
/usr/include/sys/pipe.h:83: size of array `ms' has
non-integer type
```

This happens because <sys/pipe.h> uses NBPG from
<machine/param.h> to size the `ms' array, and some OpenBSD
systems define NBPG in terms of a kernel integer variable,
nbpg.

Lsof revisions 4.46 and above have a hack to dlsof.h,
developed by Volker Borchert that avoids the compiler
problem for SPARC OpenBSD 2.3.  The hack might work for
other OpenBSD SPARC versions, but hasn't been tested there.

If you want to enable the hack for your OpenBSD SPARC

version, modify this code in .../dialects/n+obsd/dlsof.h:

```
   # if    defined(OPENBSDV)
   #  if   OPENBSDV==2030 && defined(__sparc__)
   #   if  defined(nbpg)
   #undef  nbpg
   #   endif       /* defined(nbpg) */
   #define nbpg    4096           /* WARNING!!!  ... */
   #  endif       /* OPENBSDV==2030 && defined(__sparc__)
*/
   #include <sys/pipe.h>
   #endif  /* defined(OPENBSDV) */
```

You will probably want to change the second #if test to match your OpenBSD version. You may also want to change what value is assigned to nbpg. See the next section, "What value should I assign to nbpg?"

### 13.3.2 What value should I assign to nbpg?

If you need to enable the nbpg hack, described in "Why does the compiler claim nbpg isn't defined?", you may also need to assign a value other than 4096 to nbpg. 4096 works for the sun4c processor and should work for sun4m, but 8192 may be needed for sun4.

Check <machine/param.h> and other OpenBSD documentation to determine the correct nbpg assignment.

## 13.4 Why doesn't lsof report on open MS-DOS file system (floppy disk) files?

Lsof is not able to report on open MS-DOS file system files if /usr/src/sys/msdosfs didn't exist when the lsof Configure script ran and lsof was made. /usr/src/sys/msdosfs contains header files lsof needs for collecting data on MS-DOS file system files.

You can tell if an lsof executable (revisions 4.61 and above) lacks MS-DOS file system support if the following command reports nothing:

```
   $ lsof -v 2>&1 | grep HASMSDOSFS
```

The work-around is to install /usr/src/sys, rerun the lsof Configure script, and remake lsof.

13.5 Why isn't lsof feature xxx enabled for OpenBSD?

Lsof's Configure script enables OpenBSD features by locating
and examining header files associated with the features,
and based on what if finds, setting compile-time definitions
in Makefiles.  (See 00PORTING for a list of the definitions.)

When Configure doesn't find header files or doesn't find
appropriate values in header files, that may mean the header
file tree lsof is searching is incomplete or out of date.

Lsof normally looks for OpenBSD header files in /usr/include
and /sys.  It can also be directed to look in other
directories if told to do so with the contents of the
LSOF_INCLUDE and NETBSD_SYS environment
variables.

To determine what header file enables a missing feature,
check the OpenBSD stanza in the Configure script.  Then
check the locations it checks for the indicated header
files and contents.

See 00XCONFIG for more information on LSOF_INCLUDE and
and NETBSD_SYS.

14.0 Output Problems

14.1 Why do the lsof column sizes change?

Lsof dynamically sizes its output columns each time it runs
to make sure that each column takes the minimum space.
Column parsing -- e.g., with awk -- is possible, because
each column is guaranteed to be separated from the preceding
one by at lease one space, and no column except the last
(NAME) contains embedded spaces.

14.2 Why does the offset have ``0t' and ``0x" prefixes?

The offset value that appears in the SIZE/OFF column has
``0t' and ``0x" prefixes to distinguish it from size values
that may appear in the same column.

Normally if the offset value is less than 100,000,000 (8
digits), it appears in decimal with a ``0t' prefix;
over
99,999,999, in hexadecimal with a ``0x" prefix.

A decimal offset is handy, for example, when tracking the progress of an outbound ftp transfer. When lsof reports on the ftp process, it will report the size of the file being sent with its open descriptor; it will report the progress of the transfer via the offset of the outbound open ftp data socket descriptor.

The ``-o [n]" option may be used to specify the maximum number of decimal digits to be printed after ``0t" before lsof switches to the hexadecimal digits after `0x". As already noted, the default decimal digit count is 8.

14.3 What are the values printed in the FILE_FLAG column and why is 0x<value> sometimes included?

The two comma separated lists, separated by a semicolon, printed in the FILE-FLAG column (when the "+fg" option is specified), are short-hand names or hexadecimal values for the bits lsof finds in the f_flag or f_flags member of file structures for files (the first list, the one before
the
semicolon), and process open files flags found in various kernel structures, often named "pofile" (the second list, the one after the semicolon).

Lsof determines the short-hand names from symbols in the <fcntl.h>, <linux/fs.h>, <sys/fcntl.h>, <sys/fcntlcom.h>, o<sys/file.h>, and <sys/user.h> header files.

See the discussion of FILE-FLAG in the OUTPUT section of the lsof man page, and the FF_* and POF_* symbols in lsof.h for a list of the names.

Bits with no names defined for them are represented by an 0x<value> member of the comma-separated list -- a hexadecimal integer. When "+fG" is specified (instead of "+fg"), lsof will list all flag values as two hexadecimal integers, separated by a semicolon.

When "-FG" is specified to get the flags in an output field, the format defaults to hexadecimal. You can get names instead by following "-FG" with "+fg" -- e.g.,

```
$ lsof -FG +fg ...
```

However, when you precede "-FG" with "+fg" -- e.g.,

```
$ lsof +fg -FG
```

the format will be hexadecimal; order is important.

14.3.1 Why doesn't lsof display FILE_FLAG values for my dialect?

All versions of lsof except the /proc-based Linux lsof report FILE-FLAG values. Lsof can't obtain FILE-FLAG information from the Linux /proc interface.

14.4 Network Addresses

14.4.1 Why does lsof's -n option cause IPv4 addresses, mapped to IPv6, to be displayed in IPv6 notation?

When you use the -n option to tell lsof to display numeric network addresses, and an IPv4 address has been mapped to IPv6, lsof displays the address in IPv6 format and puts "ipv4" in the TYPE column. That combination indicates the IPv4 address has been mapped to IPv6.

For example, the IPv4 address 1.2.3.4, when mapped to an IPv6 address, will be displayed by lsof as:

```
[::ffff:1.2.3.4]
```

The enclosing brackets are lsof's signal that this is an IPv6 address. Inside the brackets is a standard IPv6 address, reported by inet_ntop(). The first two colons, signifying
zeroes in the first 64 bits of the IPv6 address,
and the hexadecimal ffff in the next 32 bits, indicate that the last 32 bits contains a mapped IPv4 address, which is then displayed in IPv4 dot notation.

14.5 Why does lsof output \x, ^x, or \xnn for characters sometimes?

Lsof displays only printable ASCII characters. Lsof considers a character printable if isprint(3) says it is. If isprint(3) says a character isn't printable, the lsof may page explains:

> "... Non-printable characters are printed in one of three forms: the C ``\[bfrnt]" form; the control character `^' form (e.g., ``^@"); or hexadecimal leading ``\x" form (e.g., ``\xab"). Space is non-printable in the COMMAND column (``\x20") and

printable elsewhere."

### 14.5.1 Why is space considered a non-printable character in command names?

Space is considered an unprintable character in command names because it is sometimes possible to hide the full command name from scripts that parse ps(1) output by embedding a space in the name.

## 14.6 Why doesn't lsof print all the characters of a command name?

By default lsof prints the first nine characters of the names of commands associated with processes. If more characters are required, the "w" value of the "+c w" option may be used to specify a larger width.

If "w" is zero ('0') lsof will print all characters of all command names up to the limit of the number of characters supplied by the particular UNIX dialect. When reporting command names, lsof replaces non-printable characters as discussed in the answer to " Why does lsof output \x, ^x, or \xnn for characters sometimes?"

See the answer to the "Why is space considered a non-printable character in command names?" question for an explanation of why spaces are replaced by the ``\x20" representation in command names.

The number of command name characters supplied to lsof by UNIX dialects in files and structures varies by dialect. For example,
Linux 2.4.27 supplies lsof the first 15 characters of command names and Solaris 9 supplies 16. Thus, even if "w" is zero ('0'), lsof can't report more characters for command names on those two UNIX dialects than they provide lsof.

## 14.7 Why does lsof reject some -c command names, saying their lengths are "> what system provides (nn)"?

The command name length that a specific system provides varies from dialect to dialect. As noted in the answer to the "Why doesn't lsof print all the characters of a command name?" question, Linux and Solaris provide a limited number of command name characters.

When more characters are specified in the parameter to the -c

option, lsof considers it an error and issues a fatal error
message -- e.g.,

lsof: "-c xxxxyyyy" length (8) > what system provides (7)

The only work-around is to specify no more characters to -c
that the system provides to lsof.

14.8 Why does lsof sometimes print TYPE numbers instead of names?

When lsof can't
convert a type number to a name for printing in
the TYPE column, it will report the number as four octets.

14.9 Marker line format problems

14.9.1 Why won't lsof accept a marker line format?

Lsof's Configure script must find the localtime(3) and
strftime(3) functions in the dialect's C library in order to
enable support for marker line formats.

Check the output of lsof's -v option for the presence of
-DHAS_STRFTIME in the compiler flags. If it isn't there,
Configure didn't find the necessary two C library functions.

If you think lsof should have found the functions, make a copy
of the C test program in the Configure script that it uses to
find the functions. Then use the copy, or a more informative
modification of it, to learn why Configure can't find the
functions. You can find that program by searching for
strftime.

14.9.2 Why does lsof reject the NL (%n) marker line format?

When repeat mode and field output (with -F) have both been
specified, lsof won't allow
new line (NL) formats to be
specified with ``%n''. That's because the marker line is
always guaranteed to be a single line.

There is no work-around to this restriction.

14.10 How are protocol state name exclusion and inclusion used?

Protocol state name inclusion and exclusion with the ``-s p:s''
option and its arguments have some issues to consider.

First, there is the problem of determining what state names, if any, the dialect produces. Try running this lsof command to find them:

```
$ lsof -i
```

Knowing the state names of interest, the next problem is to decide on the lsof options and their parameters that will produce the desired output. Here some examples are probably the most useful.

To list only TCP socket files in LISTEN and CLOSE_WAIT states, use:

```
$ lsof -itcp -stcp:listen,close_wait
```

or

```
$ lsof -iTCP -sTCP:LISTEN,CLOSE_WAIT
```

Case isn't important to lsof in protocol and state names.

To exclude TCP socket files in CLOSE_WAIT state, use:

```
$ lsof -itcp -stcp:^close_wait
```

Note the `^' preceding close_wait; it selects exclusion. You can mix included and excluded names in a comma separated list, but you may not include and exclude the same name for the same protocol.

To list TCP files in LISTEN state and UDP files in Idle state, use:

```
$ lsof -i -stcp:listen -sudp:idle
```

Note: if you don't accompany the ``-s p:s" list option and arggument with the -i option, lsof will list all other regular files, while applying the specified inclusion and exclusion specifications to network files. Generally, then, you want to use -i with -s.

### 14.10.1 Why doesn't my dialect support state name exclusion and inclusion?

When state name inclusion and exclusion was added, I had access to test systems for AIX, Darwin, FreeBSD, Linux, PSTAT-based HP-UX and Solaris.

Therefore, I was unable to add and test the support to any other

UNIX dialects.

If a dialect has the support, then the HASTCPUDPSTATE definition in its
machine.h header file will be active; if not, it will be
absent or commented out.

If your dialect doesn't have the support and you want it added,
you will have to provide me Internet access to a test host, where
I can compile lsof and have the credentials to test the changes
the support requires. If that's possible for you, please contact
me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in
the "Subject:" line so my e-mail filter won't classify your letter
as Spam.

## 15.0 Pyramid Version Problems

### 15.0.5 Statement of deprecation

As of lsof revision 4.52 support for all Pyramid versions has
been dropped. Contact me via e-mail at <abe@purdue.edu> if you
are interested in obtaining the last lsof Pyramid distribution.
Make sure "lsof" appears in the "Subject:" line so my e-mail
filter won't classify your letter as Spam.

## 16.0 SCO Problems

### 16.1 SCO OpenServer Problems

#### 16.1.1 How can I avoid segmentation faults when compiling lsof?

If you have an older SCO OpenServer
compiler, it may get
a segmentation fault when compiling some lsof modules.
That appears to happen because of the -Ox optimization
action requested in the lsof Makefile.

Try changing -Ox to -O with this make invocation:

```
$ make DEBUG=-O
```

Bela Lubkin supplied this tip and Steve Williams verified
it.

#### 16.1.2 Where is libsocket.a?

If you compile lsof and the loader says it can't find the
socket library, libsocket.a, called by the -lsocket option
in the lsof compile flags, you probably are running an SCO
OpenServer release earlier than 5.0 and don't have the
TCP/IP Development System package installed.

You may have the necessary header files, because you have
the TCP/IP run-time package installed, but if you don't
have the TCP/IP Development System package installed, you
won't have libsocket.a.

Your choices are to install the TCP/IP Development System
package or upgrade to OpenServer Release 5.0. You will
find libsocket.a in 5.0 -- you'll find all the
libraries
and header files there, in fact -- and you can use gcc to
compile lsof if you don't want to install the 5.0 Development
System package.

16.1.3 Why do I get "warning C4200" messages when I compile lsof?

When you compile lsof under OSR 3.2v4.2 (and perhaps under
earlier versions as well), you may get many compiler warning
messages of the form:

```
node.c(183) : warning C4200: previous declarator is not
compatible with default argument promotion
```

In my opinion this is a bug in the OSR compiler. Because
the compiler cannot handle full ANSI-C prototypes, it
assumes default types for function parameters as it encounters
untyped in a function prototype -- e.g., in this function
declaration from node.c,

```
readrnode(ra, r)
KA_T ra;
struct rnode *r;
{
...
```

the compiler assigns default int types to the ra and r
arguments.

Then, when the compiler encounters the fully typed parameters
after the function skeleton and sees parameters with types
that
don't match the assumptions it previously made, it
whines about its own assumptions.

You can ignore these messages.

## 16.2 SCO|Caldera UnixWare Problems

### 16.2.1 Why doesn't lsof compile on my UnixWare 7.1.1 or above system?

When you Configure lsof with the "uw" abbreviation and try to compile it for UnixWare 7.1.1, you may get compiler error messages like this:

```
   UX:acomp: ERROR: "dproc.c", line 98:
 undefined struct/union member: p_pgidp
```

This suggest that you probably have a non-stop cluster UnixWare 7.1.1 system. Its <sys/proc.h> header file differs from the one on the system where I did the lsof port to UnixWare 7.1.1. I currently don't have access to a non-stop cluster system to be able to develop changes to lsof that would make it compile and work there.

If you have a non-stop cluster UnixWare 7.1.1 system, want lsof for it, and can offer me a test account on the system, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in
the "Subject:" line so my e-mail filter won't classify your letter as Spam.

If you have a system with nsc_cfs and can offer me a test account on it, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

### 16.2.2 Why does lsof complain about node_self() on my UnixWare 7.1.1 or above system?

If lsof exits immediately after issuing this message:

```
   can't identify process NSC node; node_self(): <message>
```

It means that lsof has been built to run on a NonStop Cluster (NSC) UnixWare 7.1.1 or higher system and can't get the number of the node on which it is running. Lsof uses the node number to determine the path to the kernel boot file.

You can tell if lsof has been built for NSC by looking for

"-DHAS_UW_NSC" in lsof's "-v" option output.

If the system on which you're trying to run lsof isn't running an NSC kernel, you will need to build a non-NSC lsof.

### 16.2.3 Why does UnixWare 7.1.1 or above complain about -lcluster, node_self(), or libcluster.so?

When you build, compile, and load lsof for UnixWare 7.1.1 and above, ld may complain that it can't find the -lcluster library or that the node_self symbol is undefined. When you try to run an existing lsof binary it may complain that libcluster.so can't be found.

These messages mean the tests made by Configure on your system led it to believe your system is running a NonStop Cluster (NSC) kernel, or the lsof binary you're trying to use was built on a NonStop Cluster system. If an lsof binary was built for NSC, this shell command produces output:

```
$ strings <lsof_binary> | grep HAS_UW_NSC
```

If that's not the case, and you can rebuild lsof, set the UW_HAS_NSC environment variable to "N" and do this:

```
$ Configure -n clean
$ UW_HAS_NSC=N
$ export UW_HAS_NSC
$ Configure -n uw
$ make
```

You can also edit Makefile and lib/Makefile. Remove -DHAS_UW_NSC from the CFGF strings. Remove -lcluster from the CFGL strings. Then run make again.

If you have an existing NSC lsof binary and you want one for a non-NSC system, you will have to build lsof yourself on the system where you want to use it. (That's always a good idea anyway.)

### 16.2.4 Why does UnixWare 7.1.1 or above lsof complain it can't read the kernel name list?

If lsof complains:

    can't read kernel name list from <path>

It means that lsof can't find the booted kernel image file
at <path>.  On NonStop Cluster (NSC) UnixWare 7.1.1 or
higher systems lsof determines the booted file path by
examining this file:

    /stand/`node_self`/boot

If examining that file doesn't lead to an NSC path, lsof
uses:

    /stand/1/unix

On non-NSC systems lsof expects the booted kernel image to
be in /stand/unix.

If your booted kernel image is in a different place, use
lsof's "-k <path>" option to specify its path.

16.2.5  Why doesn't lsof report link count, node number, and size
for
some UnixWare 7.1.1 or above CFS files?

Lsof reports link count, node number, and size for open
CFS files as recorded in their kernel node structure's
cached attributes.  Sometimes not all attributes are cached
on the node where lsof runs, so lsof cannot report them.

16.2.6  Why doesn't lsof report open files on all UnixWare 7.1.1
NonStop Cluster (NSC) nodes?

Lsof can only report on files open on the node on which it
runs, because the information lsof reports comes from the
private kernel memory of the node.  This may mean that
asking lsof to find a specific open file, or use of a
specific Internet address or port, may not report all open
instances on nodes other than the one used to run lsof.

You can use the NSC onnode(1) command to run lsof on specific
nodes, or the onall(1) command to run lsof on all nodes --
e.g.,

    $ onall lsof [options] 2>&1 | less
 or
    $ onnode node-number lsof [options] 2>&1 | less

Note that, when lsof is run all nodes, the path name component
assembly results it reports in its NAME column
may vary, because the dynamic name cache from which lsof
gets the components is private to the kernel of each node.

Also note the use of shell redirection in the examples to
merge the standard error file information from onnode and
onall with lsof's standard output file output. That will
put the onnode and onall node announcements in proper
sequence with lsof's output.

16.2.7 Why doesn't lsof report the UnixWare 7.1.1 NonStop Cluster (NSC) node a process is using?

To induce lsof to report the node on which a process runs
would be a significant, non-standard modification to lsof.
It has much wider implications than merely the printing of
a number in an output column. I'm not currently (April
2001) prepared to undertake such a modification.

If you want node-specific NSC information about open files,
run lsof under the control of onall(1) or onnode(1).

```
   $ onall lsof [options] 2>&1 | less
 or
   $ onnode
node-number lsof [options] 2>&1 | less
```

16.2.8 Why does the compiler complain about missing UnixWare 2.1[.x] header files?

SCO|Caldera didn't ship the following header files with
UnixWare 2.1 through 2.1.3:

```
   <fs/proc/prdata.h>
   <fs/procfs/prdata.h>
   <sys/fs/fifonode.h>
   <sys/fs/namenode.h>
```

Lsof needs those header files for its compilation. Contact
SCO|Caldera to get copies of those header files.

If you can't get the header files from SCO|Caldera, please
contact me via e-mail at <abe@purdue.edu>. Make sure "lsof"
appears in the "Subject:" line so my e-mail filter won't
classify your letter as Spam.

17.0 Sun Problems

17.0.5 Statement of deprecation

Lsof support for SunOS 4.1.x was last tested at revision 4.51.
Contact me via e-mail at <abe@purdue.edu> if you're interested in
obtaining it. Make sure "lsof" appears in the "Subject:" line so
my e-mail filter won't classify your letter as Spam.

17.1 My Sun gcc-compiled lsof doesn't work -- why?

Gcc
can be used to build lsof successfully. However, an
improperly installed Sun gcc compiler will usually not
produce a working lsof.

If your Sun gcc-compiled lsof doesn't report anything, or
reports ``can't read proc table,'' or gcc refuses to compile
lsof without error, check that the gcc step that "fixes"
Sun header files was run on the system where you're using
gcc to compile lsof. As an alternative, if you have the
SunPro C 5.0 compiler or later available, use it to compile
lsof -- e.g., use the solariscc Configure abbreviations.

17.2 How can I make lsof compile with gcc under Solaris 2.[456],
2.5.1, 7, 8 or 9?

Presuming your gcc-specific header files are wrong for
Solaris, edit the lsof Configure-generated Makefile and
lib/Makefile and make this change:

```
 CFGF=   -Dsolaris=20400 ...
to
 CFGF=   -Dsolaris=20400 -D__STDC__=0 -I/usr/include ...
```

or change:

```
 CFGF=   -Dsolaris=20500 ...
to
 CFGF=   -Dsolaris=20500 -D__STDC__=0 -I/usr/include ...
```

or change:

```
 CFGF=
  -Dsolaris=20501 ...
to
```

CFGF= -Dsolaris=20501 -D__STDC__=0 -I/usr/include ...

This is only a temporary work-around. You really should instruct gcc to to update your gcc-specific header files or install a recent gcc (e.g., 3.2), which has no need for private copies of Solaris include files.

17.3 Why does Solaris Sun C complain about system header files?

You're probably trying to use /usr/ucb/cc if you get compiler complaints like:

```
cc -O -Dsun -Dsolaris=20300 ...
"/usr/include/sys/machsig.h", line 81: macro BUS_OBJERR
redefines previous macro at "/usr/ucbinclude/sys/signal.h",
line 444
```

Note the reference to "/usr/ucbinclude/sys/signal.h". It reveals that the BSD Compatibility Package C compiler is in use. Lsof requires the ANSI C version of the Solaris C compiler, usually found in /usr/opt/bin/cc or /opt/SUNWspro/bin/cc.

Try adding a CC string to the lsof Makefile that points to the Sun ANSI C version of the Sun C compiler -- e.g.,

```
CC= /usr/opt/bin/cc
```

or

```
CC= /opt/SUNWspro/bin/cc.
```

17.4 Why doesn't lsof work under my Solaris 2.4 system?

If lsof doesn't work under your Solaris 2.4 system -- e.g., it produces no output, little output, or the output is missing command names or file descriptors -- you may have a pair of conflicting Sun patches installed.

Solaris patch 101945-32 installs a kernel that was built with a <sys/auxv.h> header file whose NUM_*_VECTORS definitions don't match the ones in the <sys/auxv.h> updated by Solaris patch 102303-02.

NUM_*_VECTORS in the kernel of patch 101945-32 are smaller than the ones in the <sys/auxv.h> of patch 102303-02. The consequence is that when lsof is compiled with the <sys/auxv.h> whose NUM_*_VECTORS definitions are larger than the ones used to compile the patched kernel, lsof's user structure

does not align with the one that the kernel employs.

If you have these two patches installed, contact Sun and
complain about the mis-match.

You
may be able to work around the problem by editing
/usr/include/sys/auxv.h to have the following NUM_*_VECTORS
definitions:

```
#define NUM_GEN_VECTORS 4
#define NUM_SUN_VECTORS 8
```

The Configure script issues a prominent WARNING that you should
try the work-around.

I thank Leif Hedstrom for identifying the offending patches.

### 17.5 Where are the Solaris header files?

If you try to compile lsof under Solaris and get a compiler
complaint that it can't find system header files, perhaps
you forgot to add the header file package, SUNWhea.

### 17.6 Where is the Solaris /usr/src/uts/<architecture>/sys/machparam.h?

When you try to Configure lsof for Solaris 2.[23456], 2.5.1,
and 7 -- e.g., on a `uname -m` == sun4m system -- Configure
complains:

```
grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
grep: /usr/src/uts/sun4m/sys/machparam.h:
No such file or directory
```

And when you try to compile the configured lsof, cc or gcc
complains:

```
dproc.c:530:
`KERNELBASE' undeclared (first use this function)
```

The explanation is that somehow your Solaris system doesn't
have the header files in /usr/src/uts it should have. Perhaps
someone removed the directory to save space. Perhaps you're
using a gcc installation, copied from another system. In any
event, you will have to load the header files from the SUNWhea
package of your Solaris distribution.

KERNELBASE is an important symbol to lsof -- it keeps lsof from sending an illegal kernel value to kvm_read() where a segmentation violation might result (a bug in the kvm library). Lsof can get illegal kernel values because it reads kernel values slowly with kvm_read() calls that the kernel is changing rapidly.

Lsof doesn't need KERNELBASE at Solaris 2.5 and above, because it has a KERNELBASE value whose address lsof can find with /dev/ksyms and whose value it can read with kvm_read(). Under Solaris 2.5 /usr/src/uts has moved to /usr/platform.

### 17.7 Why does Solaris lsof say ``can't read proc table''?

When lsof collects data on processes, using the kvm_*() functions to scan the kernel's proc structure table, it checks to make sure it has identified a reasonable number of them -- a minimum of three. When lsof can't identify three processes during a scan, it repeats the scan.

When five scans fail to yield three processes, lsof issues the fatal message:

```
lsof: can't read proc table
```

and exits.

Usually lsof fails to identify three processes during a scan because its idea of the form of the proc structure differs from that being used by the kernel. Since the proc structure is defined in <sys/proc.h> and other /usr/include header files, the root cause of a proc structure discrepancy usually can be found in the composition of /usr/include.

One common way that /usr/include header files can be incorrect is that gcc was used to compile lsof, gcc used its special (i.e., "fixed") header files instead of the ones in /usr/include, and the special gcc header files weren't updated when Solaris was. Answers to these questions:

My Sun gcc-compiled lsof doesn't work -- why?

How can I make lsof compile with gcc under Solaris 2.[456], 2.5.1, 7, 8 or 9?

Why does Solaris Sun C complain about system header files?

discuss the gcc header file problem and offer suggestions
on how to fix it or work around it.

It may also be that you are trying to run a version of lsof
that was compiled on an older version of Solaris. For
example, an lsof executable, compiled for Solaris 2.4, will
produce the ``can't read proc table'' message if you try
to run it under Solaris 2.5. If you have compiled lsof
under Solaris 2.5 and it still won't work, see if the header
files in /usr/include have been updated to 2.5, or still
represent a previous version of Solaris.

Another source of header file discrepancies to consider is
the Solaris patch level and whether a binary kernel patch
was not matched with a
corresponding header file update.
See the "Why doesn't lsof work under my Solaris 2.4 system?"
question for an example of one in Solaris 2.4 -- there may
be other such patch conflicts I don't know about.

17.8 Why does Solaris lsof complain about a bad cached clone device?

When lsof revisions below 4.04 have been run on a Solaris
system and have been allowed to create a device cache file,
the running of revisions 4.04 and above on the same systems
may produce this complaint:

lsof: bad cached clone device: ...
lsof: WARNING: created device cache file: ...

This is the result of a change in the device cache file
that took place at lsof revision 4.04. The change introduced
a node number into the clone device lines of the device
cache file and was done in such a way that lsof could detect
device cache files whose clone lines don't have node numbers
(lines created by previous lsof revisions) and recognize
the need to regenerate the device cache file.

17.9 Why
doesn't Solaris make generate .o files?

Solaris /usr/ccs/bin/make won't generate .o files from .c
files if /usr/share/lib/make/make.rules is missing. It
may be found in and installed from the SUNWsport package.

17.10 Why does lsof report some Solaris 2.3 and 2.4 lock types as `N'?

For Solaris 2.3 with patch P101318 installed at level 45
or above, and for all versions of Solaris 2.4, NFS locks
are represented by a NFS-specific kernel lock structure
that sometimes lacks a read or write lock type indicator.
When lsof encounters such a lock structure, it reports the
lock type as `N'.

17.11 Why does lsof Configure say "WARNING: no cc in ..."?

When lsof's Configure script is executed with the solariscc
abbreviation it tries to make sure it's using the Sun C
compiler and not the UCB substitute from /usr/ucb/cc.
Thus, it looks for cc in the "standard" Sun compiler
location, /opt/SUNWspro/bin.

If Configure can't find cc there, it issues the warning:

```
    lsof: WARNING: no
cc in /opt/SUNWspro/bin;
  using cc without path.
```

and uses cc for the compiler name, letting the shell find
cc with its PATH environment variable.

You can tell Configure where to find your cc with the
SOLARIS_CCDIR cross-configuration environment variable.
(See 00XCONFIG for more information on SOLARIS_CCDIR).
For example, use this Configure shell command:

```
    SOLARIS_CCDIR=/usr/special/bin Configure -n solariscc
```

(SOLARIS_CCDIR should be the full path to the directory
containing your cc.)

17.12 Solaris 7, 8 and 9 Problems

17.12.1 Why does lsof say the compiler isn't adequate for Solaris
7, 8 or 9?

Solaris 7, 8 and 9 kernels come in two flavors, 32 and 64
bit.  64 bit kernels run on machines that support the SPARC
v9 instruction set architecture.  Separate executables for
some programs, -- e.g., ones using libkvm like lsof -- must
be built for 32 and 64 bit kernels.

Previous Sun (e.g., SC4.0) and earlier gcc compilers will
build lsof for 32 bit kernels, but

they won't build it for
64 bit kernels.  Compilers that will build lsof for 64 bit
Solaris 7, 8 and 9 kernels are the Sun WorkShop Compilers
C 5.0 and above, and recent gcc versions, e.g., 3.2.

When given the ``-xarch=v9" flag, the C 5.0 compiler and
above, and associated loader and 64 bit libraries will
build a 64 bit lsof executable; when given the "-m64" or
"-mcpu=v9" (deprecated) flags, an appropriate gcc compiler
will build a 64 bit lsof executable.

When the lsof Configure script detects a 64 bit kernel is
in use (e.g., by executing `/bin/isainfo -kv`), and when
it finds that the specified compiler is inappropriate,
it complains with these messages:

For gcc:

```
   "!!!WARNING!!!=========!!!WARNING!!!=========!!!WARNING!!!"
   "!                                          !"
   "! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT  !"
   "! THIS GCC DOESN'T SUPPORT THE BUILDING OF 64 BIT       !"
   "! SOLARIS EXECUTABLES.  LSOF WILL BE CONFIGURED
FOR A   !"
   "! 32 BIT echo KERNEL.                          !"
   "!                                          !"
   "!!!WARNING!!!=========!!!WARNING!!!=========!!!WARNING!!!"
```

For Sun C:

```
 !!!WARNING!!!==========!!!WARNING!!!==========!!!WARNING!!!
 !                                          !
 ! LSOF NEEDS TO BE CONFIGURED FOR A 64 BIT KERNEL, BUT    |
 ! THE VERSION OF SUN C AVAILABLE DOESN'T SUPPORT THE      !
 ! -xarch=v9 FLAG.  LSOF WILL BE CONFIGURED FOR A 32 BIT   !
 ! KERNEL.                                    !
 !                                          !
 !!!WARNING!!!==========!!!WARNING!!!==========!!!WARNING!!!
```

17.12.2 Why does Solaris 7, 8 or 9 lsof say "FATAL: lsof was compiled
for..."?

Solaris 7, 8 or 9 lsof may say:

```
   lsof: FATAL: lsof was compiled for a xx bit kernel,
  but this machine has booted a yy bit kernel.

   Where: xx = 32 or 64
```

yy = 64 or 32

(xx and yy won't match.)

This message indicates that lsof was compiled for one size kernel and is being asked to execute on a different size one. That's not possible for programs like lsof that use libkvm.

Depending on the instruction sets for which you need Solaris 7, 8 or 9 lsof, you may need two or more versions of lsof, compiled for each kernel size, installed for use with /usr/lib/isaexec. See the "How do I install lsof for Solaris 7, 8 or 9?" section of this document for more information on that.

17.12.3 How do I build lsof for a 64 bit Solaris kernel under a 32 bit Solaris kernel?

If your Solaris system has an appropriate compiler (e.g., WorkShop Compilers C 5.0 and above, or a recent gcc like 3.2) and the 64 bit libraries have been installed, you can force lsof's Configure script to build a 64 bit version of lsof with:

```
$ SOLARIS_KERNBITS=64 Configure -n solariscc
```

The SOLARIS_KERNBITS environment variable is part of the lsof cross-configuration
support, described in the 00XCONFIG
file of the lsof distribution.

17.12.4 How do I install lsof for Solaris 7, 8 or 9?

If you are installing lsof where it will be used only under the bit size kernel for which it was built, no special installation is required.

If, however, you are installing different versions of lsof for different bit sizes -- e.g., for use on a 64 bit NFS server and from its 32 bit clients -- you should read the man page for isaexec(3C) and install lsof according to its instructions.

The executable at the directory where lsof is to be found should be a hard link to /usr/lib/isaexec or a copy of it. In the directory there must be instruction architecture

subdirectories -- e.g., .../sparc/ and .../sparcv9/. The
lsof for 64 bit size kernels is installed in the .../sparcv9/
subdirectory; the one for 32 bit size kernels, in .../sparc/.

For example, if you're installing 32 and 64 bit lsof
executables in /usr/local/etc, you would:

```
 # cd /usr/local/etc
 #
ln /usr/lib/isaexec lsof
 # mkdir sparc sparcv9
 # install the 32 bit lsof as sparc/lsof
 # install the 64 bit lsof as sparcv9/lsof
 # chmod, chown, and chgrp sparc/lsof and
   sparcv9/lsof appropriately
```

Lsof permissions and ownerships are the same whether one
or more lsof executables are being installed, with or
without the /usr/lib/isaexec hard link.

17.12.5 Why does my Solaris 7, 8 or 9 system say it cannot execute lsof?

When you attempt to execute lsof, your Solaris 7, 8 or 9
shell may complain:

```
    ksh: ./lsof: cannot execute
```

If the lsof executable exists and has the proper execution
permissions, this error may be the result of trying to
execute an lsof, built for a 64 bit kernel, on a 32 bit
kernel.

This will tell you about the lsof executable:

```
    $ file lsof
    lsof: ELF 64-bit MSB executable SPARCV9 Version 1,
   dynamically linked, not stripped
```

The "64-bit" notation indicates the binary was built for
a 64 bit kernel. To see the running
kernel bit size, use
this command:

```
    $ isainfo -kv
    32-bit sparc kernel modules
```

The "32-bit" notation indicates a 32 bit kernel has been

booted.

The only work-around is to obtain, or Configure and make, an lsof for the appropriate kernel bit size. If you Configure and make lsof on the kernel where you wish to run it the proper compiler, the lsof Configure step will generate Makefiles that can be used with make to build an appropriate lsof executable.

To compile a 64 bit lsof, you must have an appropriate compiler -- i.e., Sun WorkShop Compilers C 5.0 or higher or a recent gcc like 3.2.

17.12.6 What gcc will produce 64 bit Solaris 7, 8 and 9 executables?
8 and 9 executables?

Properly built and installed recent gcc versions -- e.g., 3.2 -- will build lsof for 64 bit Solaris kernels.

If you update your gcc version to 3.2 or later, make sure the private gcc header files become current -- i.e., clear out any private header files from a previous gcc or Solaris installation
before installing the new ones, or build to a new --prefix root and replace the old root with it after the build and installation are complete.

17.12.7 Why does lsof on my Solaris 7, 8 or 9 system say, "can't read namelist from /dev/ksyms?"

You're probably trying to use an lsof executable built for an earlier Solaris release on a 64 bit Solaris 7, 8 or 9 kernel. The output from `lsof -v` will tell you the build environment of your lsof executable. You should also have gotten a warning message that lsof is compiled for a different Solaris version than the one under which it is running -- something like this:

lsof: WARNING: compiled for Solaris release X; this is Y

You need to build lsof on the system where you want to use it. For 64 bit Solaris 7, 8 and 9 you need a compiler that can generate 64 bit Solaris executables -- e.g., the Sun Workshop 5 C compiler or later, or a recent gcc version like 3.2. See the "Why does lsof say the compiler isn't
adequate for Solaris 7, 8 or 9?" section and the ones following it for a discussion of building lsof for 64 bit

Solaris 7, 8 or 9.

## 17.13 Solaris and COMMON

### 17.13.1 What does COMMON mean in the NAME column for a Solaris VCHR file?

When lsof puts COMMON or (COMMON) in the NAME column of a Solaris VCHR file, it means that the file is handled by the special file system functions of the kernel through a common vnode.

### 17.13.2 Why does a COMMON Solaris VCHR file sometimes seem to have an incorrect minor device number?

When lsof reports on an open file in a Solaris special file system that uses a COMMON vnode, and the file is a VCHR file, lsof tries to locate the associated device node by looking for matches on the major and minor device numbers first.

If no major and minor match results, lsof then looks for a match on pseudo and clone device files. (See /devices/pseudo.) Those device nodes are matched specially by either their major or minor device numbers, but not both. Hence, when lsof finds a match under those special conditions, it may report a value in its output DEVICE column that differs from one of the major and minor numbers of the device node.

Here's an example from a sun4m Solaris 7 system:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw-   1 root     sys      117,  0 ...
$ lsof /devices/pseudo/pm@0:pm
COMMAND ... DEVICE ...   NODE NAME
powerd       117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun    ...  117,0 ... 151261 /devices/pseudo/pm@0:pm
```

Note that the DEVICE value for the file with (COMMON) in its name field has a different minor device number (1) from what ls reports (0), while the DEVICE value for the file without (COMMON) matches the ls output exactly. Both match on the major device number, 117. The minor device number mis-match is a result of the way the Solaris kernel handles special file system common vnodes, and it's the reason lsof puts (COMMON) after the name

to signal that a mis-match is
possible.

## 17.14 Why don't lsof and Solaris pfiles reports always match?

/usr/proc/bin/pfiles for Solaris 2.6, 7, 8, and 9 also
reports information on open files for processes. Sometimes
the information it reports differs from what lsof reports.

There are several reasons why this might be true. First,
because pfiles is a Sun product, based on Sun kernel
features, its developers have a better chance of knowing
exactly how open file information is organized. I sometimes
have to guess at how kernel file structure linkages are
constructed by gleaning hints from header files.

Second, lsof is aimed at providing information, specifically
device and node numbers, that can be used to identify named
file system objects -- i.e., path names. Thus, lsof tries
to make sure its device and node numbers match those reported
by stat(2). Pfiles doesn't always report numbers that
match stat(2) -- e.g., for files using clone and pseudo
devices via common
vnodes like the nlist() /dev/ksyms usage.

Here's the Solaris 7 COMMON VCHR example again with additional
pfiles output:

```
$ ls -li /devices/pseudo/pm@0:pm
151261 crw-rw-rw-   1 root     sys      117,  0 ...
$ lsof /devices/pseudo/pm@0:pm
vic1: 10 = lsof /dev/pm
COMMAND ... DEVICE ...   NODE NAME
powerd  ...  117,1 ... 151261 /devices/pseudo/pm@0:pm (COMMON)
Xsun    ...  117,0 ... 151261 /devices/pseudo/pm@0:pm
$ pfiles ...
0: S_IFCHR ... dev:32,24 ino:61945 ... rdev:117,1
...
14: S_IFCHR ... dev:32,24 ino:151261 ... rdev:117,0
```

Note that the NODE number, reported by lsof, matches what
ls(1) and stat(2) report, while the ino value pfiles reports
doesn't. Lsof also indicates with the (COMMON) notation
that the DEVICE number is a pseudo one, derived from the
character device's value. The lsof DEVICE value matches
the pfiles rdev value, correct behavior for a character
device, but pfiles gives no sign that it's not possible

to
find that character device number in /devices with ls(1)
or stat(2).

17.15 Why does lsof say, "kvm_open(namelist=default, core=default):
Permission denied?"

Lsof needs permission to read from the /dev/kmem and /dev/mem
memory devices. Access to them is opened via a call to
the kvm_open() library function and it reports the indicated
message.

You must give lsof permission to read the memory devices.
The super user can almost always do that, but other lsof
users can do it if some group -- e.g., sys -- has permission
to read the memory devices, and the lsof binary is installed
with the group's ownership and with the setgid permission
bit enabled.

17.16 Why is lsof slow on my busy Solaris UFS file system?

Lsof may be slow on a busy Solaris UFS file system when
UFS logging has been enabled with the "logging" mount
option. That option can significantly increase disk
operations under certain conditions -- e.g., when a lot of
files are accessed quickly.

When
only the "logging" option is specified to mount, all
file accesses (atime updates) are logged to the UFS logging
queue. Each atime update requires two writes to the disk
to complete it.

If you want to do UFS logging -- and there are reliability
advantages to it -- consider using the "logging,noatime"
mount options instead. That will shift atime updates from
the logging queue to fewer and independent asynchronous
operations, consequently making the UFS logging queue a
smaller bottleneck.

Consult mount_ufs(1M) for more information on the logging
and noatime options.

(My thanks to Casper Dik for this tip on improving the
performance of UFS logging.)

17.17 Why is lsof so slow on my Solaris 8 or 9 system?

Solaris 8 has a post-release feature upgrade modifying kernel name cache (DNLC) handling that can slow lsof throughput dramatically. The feature, sometimes called negative DNLC caching, is standard in Solaris 9.

As best I can tell, when you install the Solaris 8 MU1
package, you get negative DNLC caching. If this pipe produces any output, your system has negative DNLC caching.

```
$ nm /dev/ksyms | grep negative_cache_vnode
```

The reason negative DNLC caching perturbs lsof is that a single vnode address (found in the negative_cache_vnode kernel variable) is used to mark entries in the DNLC that are not (the negative part) found on disk.

Since a single vnode address (the DNLC key lsof uses) can represent many (I've seen upwards of 30,000.) DNLC entries, their presence overloads lsof's internal DNLC hashing function. An overloaded hash function is a slow hash function, and lsof's slows to a crawl when it encounters thousands of keys that produce the same value when the lsof DNLC hash function is applied to them.

The solution is simple -- ignore negative DNLC cache keys. They don't represent path name components lsof can use. Lsof revisions 4.50 and above have an addition that ignores them and the performance of those lsof revisions improves
significantly when presented with negative DNLC cache keys.

If you don't have an lsof revision at 4.51 or later, there's a work-around. Use lsof's ``-C'' option. It disables lsof's DNLC caching. Of course, that also inhibits the reporting of any path name components from the kernel DNLC. When ``-c'' is used, lsof will continue to report file system and character device paths.

## 17.18 Solaris and VxFS

### 17.18.1 Why doesn't lsof support VxFS 3.4 on Solaris 2.6, and above?

Lsof will not support VxFS version 3.4 on Solaris 2.6 and above unless some files from VxFS Update 2 have been installed. VxFS 3.4 FCS and VxFS 3.4 update 1 lack the header files lsof normally uses to obtain information from the VxFS 3.4 kernel node structure, vx_inode. VxFS 3.4 Update 2 provides a method

whereby lsof can obtain the necessary vx_inode information from
the vxfsu_get_ioffsets() function in Veritas utility
libraries.

The utility libraries (32 bit and 64 bit versions)
may be
found in /opt/VRTSvxfs/lib.  An ancillary header file may
be found in /opt/VRTSvxfs/include/sys/fs/vx_libutil.h.
Documentation of the vxfsu_get_ioffsets(3) function may be
found in /opt/VRTS/man/man3/vxfsu_get_ioffsets.3.

Those files of VxFS 3.4 Update 2 may be downloaded from:

    ftp://ftp.veritas.com/pub/support/vxfs_34.i64243.tar

The vxfs_34.i64243.tar archive will unpack into an i64243
directory containing these files:

```
    $ ls i64243
    README
    libvxfsutil.sol26.sums
    libvxfsutil.sol26.tar.Z
    libvxfsutil.sol27.sums
    libvxfsutil.sol27.tar.Z
    libvxfsutil.sol28.sums
    libvxfsutil.sol28.tar.Z
```

Read README.  Select the *.tar.Z file appropriate for your
Solaris version.  Its contents will unpack into /opt/VRTS
and /opt/VRTSvxfs, so you will need sufficient permission
-- e.g., do it as root -- to unpack the uncompressed archive.
Once you've done that, it's a good idea to compare the
checksums of the archive you unpacked with the ones recorded
in
the appropriate *.sums file.  Use `sum -r` to verify
the checksums.

For example, if you want the Solaris 8 version, uncompress
and unpack libvxfsutil.sol28.tar.Z -- e.g.,

```
    $ su
    ...
    # cd i6423
    # zcat libvxfsutil.sol28.tar.Z | tar xf -
```

That should create these new files and subdirectories with
the indicated checksums:

File or subdirectory sum -r

/opt/VRTSvxfs/include/vxfsutil.h 03938
/opt/VRTSvxfs/lib/libvxfsutil.a 51794
/opt/VRTSvxfs/lib/sparcv9/
/opt/VRTSvxfs/lib/sparcv9/libvxfsutil.a 07420
/opt/VRTS/man/man3/
/opt/VRTS/man/man3/vxfsu_get_ioffsets.3 62480

Once these files are in place, run lsof's Configure script
for the solaris or solariscc abbreviation. Configure will
locate the appropriate VxFS 3.4 Update 2 files and set up
for the making of an lsof that will properly display open
VxFS 3.4 file information.

17.18.2 Why does lsof report "vx_inode: vxfsu_get_ioffsets error"
for open Solaris 2.6 and
above VxFS 3.4 and above files?

Even when lsof supports VxFS 3.4 and above on Solaris 2.6 and
above, it may report "vx_inode: vxfsu_get_ioffsets error" in
the NAME column for all VxFS files.

The usual cause is that lsof doesn't have permission to
read the file at the end of the /dev/vxportal symbolic
link. If, for example, lsof has been installed setgid(sys),
then the /dev/vxportal symbolic link destination should be
owned by the sys group and readable by it.

Update 2 for VxFS 3.4 sets the modes of the /dev/vxportal
symbolic link destination to 0640 and the group ownership
to sys. But I have had a report that the modes are wrong
in a VxFS 4.0 installation.

Another cause may be that the system has more than one version
of VxFS installed (Only one can be active.), and lsof's
Configure script did not choose the header files and libraries
for the active VxFS version. Configure opts for VxFS 4.0 and
above header files and libraries (in /opt/VRTS) in preference
to
those for VxFS below 4.0 (in /opt/VRTSvxfs).

Look for the directories /opt/VRTS and /opt/VRTSvxfs. If you
have /opt/VRTS, make sure its header and library symbolic links
point to those of the active VxFS version.

If you have both directories, look at the CFLAGS that Configure
constructed for making lsof and see which directory path

follows a -I option. If that doesn't match the directory path of the active VxFS version, try pointing Configure at the correct directory with the SOLARIS_VXFSINCL environment variable -- e.g.,

```
$ SOLARIS_VXFSINCL=/opt/.../include ./Configure -n solaris
```

### 17.18.3 Why does Solaris Configure claim there is no VxFS library?

The lsof Configure script, when configuring for Solaris, may report:

```
FATAL: no VxFS .../libvxfsutil.a
```

That fatal error message indicates lsof has found the VxFS utility library's header files, but can't find the library itself in the expected location adjacent to the header files.

One possible cause is an incorrect symbolic link from /opt/VRTS/lib/sparcv9/libvxfsutil.a to the library's real location. (Some VxFS distributions declared the link incorrectly.) Use `ls -lL` on that path to see if it exists. If it doesn't exist, the link may be missing an additional leading "../" component.

If the problem is a missing "../" from the library's link, you can correct the link or check with Veritas/Symantec for the patch that corrects it.

If the problem is not a missing "../", and you know the libvxfsutil.a location, you can define its path in the SOLARIS_VXFSLIB environment variable before running the lsof Configure script. (See 00XCONFIG for information about using the SOLARIS_VXFSLIB environment variable.)

If you have no libvxfsutil.a, you must obtain it from Veritas/Symantec or find it in your VxFS installation package.

### 17.18.4 Why doesn't Solaris lsof report VxFS path name components?

Solaris lsof will report path name components for VxFS versions that use the common Solaris Dynamic Name Lookup Cache (DNLC) or on some file systems of VxFS versions that support the VxFS Reverse Name Lookup (RNL) facility.

VxFS versions 3.3 (approximately) and below use the common

Solaris DNLC. (I haven't been able to determine exactly when VxFS stopped using the DNLC.) For versions above that boundary, but below 4.0, lsof can't report path name components.

At VxFS 4.0 and above, lsof can be compiled to use the VxFS RNL facility for reporting path names. If "-DHASVXFSRNL" appears in the compiler flags section of lsof "-v" option output, then the lsof Configure script detected the VxFS RNL facility and lsof has been compiled to use it.

Lsof's use of the RNL facility can fail when the VxFS file system disk layout version is below 6. In that case, lsof can report no path name components. For more information, see the vxfs_inotopath(3) manual page. any of the following commands will show the disk layout version for a VxFS file system, when supplied
the block device or mount point on which the file system is mounted.

```
   fstyp -v <block_device>
 or
   mkfs -m <block_device>
 or
   vxupgrade <mount_point>
```

You must have permission to read the block device -- e.g., be the root user.

You may also be able to upgrade an older disk layout to one that will work with the RNL. See the vxupgrade(1M) man page for more information on that.

When lsof can't report VxFS path name components, it reports the file system mount point and the path name of device on which it is mounted. The device path name is enclosed in parentheses.

17.18.5 Why does Solaris 10 lsof report scrambled VxFS paths?

Solaris 10 lsof may report a bogus, scrambled path for an open VxFS file, when lsof obtains the path from a vnode's cached path. Veritas/Symantec reports that their Solaris 10 implementation has bugs in the way it handles the Solaris 10 vnode cached path and those bugs will be fixed in an upcoming patch some time after August
15, 2005.

When Solaris 10 lsof reports a path for an open VxFs file

obtained via the VxFS Reverse Name Lookup facility, the path will be correct.

Also see the answers to the questions "Why does Solaris 10 lsof sometimes report the wrong path name?" and "Why doesn't Solaris lsof report VxFS path name components?"

## 17.19 Large file problems

### 17.19.1 Why does lsof complain it can't stat(2) a Solaris 2.5.1 large file?

When given an argument that is the path to a Solaris 2.5.1 file, enable for large file operations with the O_LARGEFILE open(2) option, lsof complains that it can't stat(2) the file. That's because lsof isn't using a stat(2) call and associated structure enabled for large files.

This error has been fixed, starting at lsof revision 4.58 for Solaris 2.6 and above. That fix won't work on Solaris 2.5.1 and I no longer have access to a Solaris 2.5.1 test system to develop a separate fix.

The work-around is to avoid specifying a O_LARGEFILE path as an argument
to lsof on Solaris 2.5.1. Instead use a
combination of lsof and grep to achieve the same results, albeit more clumsily.

## 17.20 Why does lsof get a segmentation fault on 64 bit Solaris 8 using NIS+?

I have received a report from Gary Craig that lsof produces a segmentation fault on his 64 bit Solaris 8 system using NIS+. Via an independent test program we have exonerated lsof and tracked the fault to the NIS+ __nis_server_name() function in the C name server library, -lnsl.

Lsof causes the __nis_server_name() NIS+ function to be called by calling getservent() to read entries of the port number to service name map.

The only Sun bug ID that appears to describe the problem is 4304244, although its text is unclear enough to leave room for doubt.

Until Sun eliminates the __nis_server_name() segmentation fault cause, a work-around for lsof is to use its "-P"

option, causing lsof to avoid port to service name lookups.

17.21 Will lsof crash the Solaris kernel?

I've
received and investigated one report that it has when
the Sun hardware (a QME interface) was faulty. Today (May
23, 2002) I've learned that Sun has reports of kernel
crashes caused by adb, lsof, and mdb.

The Sun investigation pinpointed a problem in the /dev/kmem
kernel driver and there is a Sun bug report, 4344513, about
the problem. There is a fix in Solaris 9, and patches for
Solaris 7 and 8 (SPARC and x86).

To see if your Solaris system is fixed, look for a
/devices/pseudo/*allkmem node.

Extensive address filtering was added to lsof revision 4.50
to forestall what I then (July 2001) believed to be only
the possibility that lsof might crash Solaris. However,
the filtering isn't perfect, since a filtered address might
become invalid after lsof has filtered it but before lsof
has delivered it to /dev/kmem. That filtering work is
described in .../dialects/sun/solaris_kaddr_filters, also
available at:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/solaris_kaddr_filters

The
best and safest work-around is to upgrade to Solaris
9 or install an appropriate patch or its equivalent from
this list:

```
Solaris SPARC  x86
Version Patch  Patch
======= =====  =====
  7 106541-20 106542-20
  8 108528-14 108529-14
```

17.22 Why does lsof on Solaris 7, 8, or 9 report a kvm_open()
failure?

When lsof is started on some Solaris 7, 8, and 9 systems
it may report:

```
lsof: kvm_open(namelist=default, corefile=default): \
No such file or directory
```

Lsof revisions 4.65 and later will first report:

    lsof: cannot stat /dev/allkmem

The second message, not delivered in lsof revisions below 4.65, explains the cause of the kvm_open() failure; it can't find /dev/allkmem.

/dev/allkmem is a device added to Solaris 7 and 8 in patches and in the Solaris 9 FCS. See the preceding "Will lsof crash the Solaris kernel?" section for more information on /dev/allkmem and the patches.

The kvm_open(3KVM) function in the KVM library of patched
Solaris 7 and 8 systems and in Solaris 9 expects to find /dev/allkmem and exits on error when it does not.

If you have installed the patch that updated your KVM library to a version that expects /dev/allkmem to be present and it is not, you may need to reconfigure your system's devices with devfsadm(1M) or enter "boot -r" to the OpenBoot monitor's prompt (usually "ok").

## 17.23 Solaris and SAM-FS

### 17.23.1 Why does Solaris lsof report "(limited SAM-FS info)"?

Lsof 4.68 and above report "(limited SAM-FS info)" on Solaris in the NAME column after the path or file system name for all files it finds on SAM-FS file systems.

That's because no more information is known about the composition of the nodes that follow SAM-FS vnodes. If you can provide that information, please contact me via e-mail at <abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so my e-mail filter won't classify your letter as Spam.

### 17.23.2 Why can't lsof locate named SAM-GS files?

Solaris lsof 4.68 and above can't locate files on SAM-FS file systems when the files are named as lsof arguments because lsof doesn't know how to locate open SAM-FS file device and node number information. (See also 'Why does Solaris lsof report "(limited SAM-FS info)?')

## 17.24 Lsof and Solaris 10 zones

### 17.24.1 How can I make lsof list the Solaris zone?

Use the lsof "-z [z]" option.

### 17.24.2 Why doesn't lsof work in a Solaris 10 zone?

When run from within a Solaris 10 zone, lsof will usually report:

```
lsof: can't stat(/devices): No such file or directory
```

That's because a Solaris zone usually has no /devices subdirectory, a restriction of the zone implementation intended to limit the ability of zone processes to control global system resources, including physical devices.

While a zone may have a /dev subdirectory, that subdirectory usually lacks the /dev/allkmem, /dev/mem and /dev/kmem devices lsof and the KVM library it uses require.

The work-around is to run lsof in the global zone. When it is run in a global zone lsof will be able to report on processes running in any zone, including the global zone.

### 17.24.3 Why does lsof complain it can't stat() Solaris 10 zone file systems?

When run from the global zone on Solaris 10 lsof may complain:

```
lsof: WARNING: can't stat() 15 zone file systems;
 using dev= options
```

The warning message means lsof found the reported number of file system entries in the mount table for which it didn't have permission to get stat(2) results, but which had "zone=" and "dev=" mount table options.

That is a normal restriction of Solaris 10 zones. Since the lsof warning message indicates it was able to find "dev=" options for the file systems, lsof will probably work correctly.

One work-around is to relax the restrictions on zone mount points, so that lsof can stat() them. While that may be

possible by changing directory modes or group ownerships, it is probably not a good idea, because it weakens the restrictions zones are intended to provide.

Another work-around is to suppress the warning message with lsof's "-w" option. The down side of that is that it causes the suppression of all warning messages, leading to the possibility that some non-stat() warning messages will be suppressed.

## 17.25 Solaris 10 problems

### 17.25.1 Why does Solaris 10 lsof sometimes report the wrong path name?

When a path name component is renamed -- e.g., with mv(1) -- Solaris 10 lsof may report the old component for an open file that used the component in its path before the rename. That's because Solaris 10 lsof reports the path name cached in the open file's vnode and the Solaris 10 kernel doesn't update the open vnode's cached path name when a component of it is changed.

When an open file is deleted -- e.g., with rm(1) -- the path name by which it was opened remains cached in the vnode. Lsof can be instructed to display that path name with the -X option. The path name might be incorrect because of the rename problem described above. See the answer to the 'What does "(deleted)" mean in the NAME column of a Solaris 10 open file?' question for more information.

Lsof is sometimes able to detect that cached path name is incorrect. In that case lsof may report only the mounted-on directory and device of the file system or it may report that the path name is of questionable accuracy by appending a trailing "(?)" to it in the NAME column.

See the answer to the "Why does Solaris 10 lsof sometimes report only the mounted-on directory and device?" and 'What does "(?)" mean in the NAME column of a Solaris 10 open file?' questions for more information.

### 17.25.2 Why does Solaris 10 lsof sometimes report only the mounted-on directory and device?

For some regular open files lsof may report only the mounted-on directory and device of the file system on which the file resides. That's because lsof was able to determine that the

path
name cached in the open file's vnode is incorrect.

Lsof detects the cached path name is incorrect by applying
stat(2) to it, provided that no error was detected when stat(2)
was applied to the file system mounted-on directory during lsof
setup. If a mounted-on directory stat(2) error was detected
during setup, lsof does no cached path name analysis and simply
reports it.

When the application of stat(2) to the cached path name returns
a no-entry reply (the ENOENT error number), lsof concludes the
path no longer exists (i.e., has been unlinked) and reports the
mounted-on directory and device of the file system. That
behavior can be modified with the -X option in lsof revisions
4.77 and above. See the answer to the 'What does "(deleted)"
mean in the NAME column of a Solaris 10 open file?' for more
information.

When the application of stat(2) to the cached path name returns
a permission error reply (the EACCES or EPERM error numbers),
lsof reports the cached path name
and adds a trailing "(?)" to
indicate the reported path name is of questionable accuracy.
See the answer to the question 'What does "(?)" mean in the
NAME column of a Solaris 10 open file?' for more information.

If the application of stat(2) to the cached path name yields
any other error reply, lsof reports the mounted-on directory
and device of the file system.

When the application of stat(2) to the cached path name
succeeds, lsof compares the reported device and node numbers to
what it has obtained for the open file from kernel structures.
If they match, lsof reports the cached path name. If they
don't match, lsof instead reports the mounted-on directory and
device of the file system.

A work-around that allows lsof to apply stat(2) successfully to
cached path names is to give lsof sufficient permission to do
it -- i.e., run lsof as the root user.

17.25.3 What does "(deleted)" mean in the NAME column of a Solaris 10
open file?

When the -X option is specified
to Solaris 10 lsof, it will
report in its NAME column the path name cached for a deleted

file in its vnode. The path name will be followed by "(deleted)".

Note that the path name cached in a file's vnode is the path name by which the file was opened. It is not updated by the Solaris kernel when any path name component is changed. Hence, it may not represent the final path name the open file had.

See the answer to the "Why does Solaris 10 lsof sometimes report the wrong path name?" question for more information on how changing a path name component affects the correctness of a what lsof reports.

17.25.4 What does "(?)" mean in the NAME column of a Solaris 10 open file?

When lsof encounters a path name cached in the open file's vnode that stat(2) reports lsof lacks permission to access, lsof adds "(?)" to the path name reported in the NAME column to indicate the path name is of questionable accuracy.

See the answers to the "Why does Solaris 10 lsof sometimes report the wrong path name?" and "Why does Solaris 10 lsof sometimes report only the mounted-on directory and device?" questions for more information on why lsof may report a path name of questionable accuracy.

A work-around that allows lsof to apply stat(2) successfully to cached path names is to give lsof sufficient permission to do it -- i.e., run lsof as the root user.

17.26 Solaris contract file problems

17.26.1 Why doesn't lsof report size, link count and node number for Solaris 10 contract files?

Lsof doesn't report size, link count or node number for Solaris 10 contract files because I don't know how to obtain them from contract file kernel structures.

17.26.2 Why can't lsof locate a Solaris 10 contract file by path name?

Because lsof can't find the node number of Solaris contract files, it can't match the device and node numbers it gets from applying stat(2) to the contract file path name with what it finds in kernel data.

## 17.27 Solaris 10 ZFS probblems

### 17.27.1 Why does Configure ask for the location of ZFS header files?

To provide ZFS support when lsof is compiled it needs to have access to the definitions of ZFS structures used by the kernel. Those definitions are contained in header files that Sun does not distribute with Solaris 10.

When the Configure script detects the system might support ZFS by finding the <sys/fs/zfs.h> header file, it checks for the required ZFS kernel structure definition header files. When they are not found, it asks if ZFS support should be included and if so, with what definitions.

Two sources can be declared for definitions: 1) lsof's internal ones; or 2) the necessary header files at some location other than /usr/include/sys.

The necessary header files are:

```
dmu.h  zfs_acl.h      zfs_debug.h  zfs_rlock.h   zil.h
spa.h  zfs_context.h  zfs_dir.h    zfs_vfsops.h  zio.h
txg.h  zfs_ctldir.h   zfs_ioctl.h  zfs_znode.h   zio_impl.h
```

The necessary header files might have been obtained, for example, from the http://src.opensolaris.org Open Solaris source site. However, the Open Solaris header files might not be adequate -- see the answer to the "Why don't the Open Solaris ZFS header files provide correct ZFS kernel structure definitions?' question for information on why the Open Solaris ZFS header files might not provide correct ZFS kernel structure definitions.

The supplied header file path must point to a directory that contains a sys/ subdirectory where the matching header files are located -- e.g., if the supplied path is /tmp/zfs, then /tmp/zfs/sys must contain the necessary header files.

See the answer to the "Why do -h and -v output warn about possibly inaccurate ZFS kernel structure definitions?" question for information on the risks associated with using lsof's internal definitions.

### 17.27.2 Why do -h and -v output warn about possibly inaccurate ZFS kernel structure definitions?

When lsof is configured to use its internal ZFS kernel
structure
definitions, there is the chance that the definitions
may be out of date.  Hence, an lsof built with them may report
incorrect device numbers, file sizes, node numbers and link
counts.

Please contact me via e-mail at <abe@purdue.edu> for work-around
suggestions.  Make sure "lsof" appears in the "Subject:" line so
my e-mail filter won't classify your letter as Spam.

17.27.3 Why don't the Open Solaris ZFS header files provide correct
ZFS kernel structure definitions?

The Open Solaris ZFS header files may not provide correct ZFS
kernel definitions.  An lsof built with them may report
incorrect device numbers, file sizes, node numbers and link
counts.

The definitions may be incorrect because the Open Solaris
header files are not synchronized with any particular Solaris
10 release.  Consequently they might contain modifications to
the structures not in the structure definitions used to build
the running kernel.  It may be that only Sun has header files
that
match the kernel structures of the running Solaris 10
kernel.

Please contact me via e-mail at <abe@purdue.edu> for work-around
suggestions.  Make sure "lsof" appears in the "Subject:" line so
my e-mail filter won't classify your letter as Spam.

18.0 Lsof Features

18.1 Why doesn't lsof doesn't report on /proc entries on my
system?

/proc file system support is generally available only for
BSD, SYSV R4 dialects, and Tru64 UNIX (Digital UNIX, DEC
OSF/1).  It's also available for Linux, and Pyramid DC/OSx
and Reliant UNIX.

Even on some SYSV R4 dialects I encountered many problems
while trying to incorporate /proc file system support.
The chief problem is that some vendors don't distribute
the header file that describes the /proc file system node

-- usually called prdata.h.

18.2 How do I disable the device cache file feature or alter it's behavior?

To disable the device cache file feature for a dialect, remove the HASDCACHE definition from the machine.h file of the
dialect's machine.h header file. You can also use HASDCACHE to change the default prefix (``.lsof'') of the device cache file.

Be sure you consider disabling the device cache file feature carefully. Having a device cache file significantly reduces lsof startup overhead by eliminating a full scan of /dev (or /devices) once the device cache file has been created. That full scan also overloads the kernel's name cache with the names of the /dev (or /devices) nodes, reducing the opportunity for lsof to find path name components of open files.

If you're worried about the presence of mode 0600 device cache files in the home directories of the real user IDs that execute lsof, consider these checks that lsof makes on the file before using it:

1. To read the device cache file, lsof must gain permission from access(2).

2. The device cache file's modes must be 0600 (0644 if lsof is reading a system-wide device cache file) and its size non-zero.

3. There must be a correctly formatted section count line at the beginning of the file.

4. Each section must have a header line with a count that properly numbers the lines in the section. Legal sections are device, clone, pseudo-device, and CRC.

5. The lines of a section must have the proper format.

6. All lines are included in a 16 bit CRC, and it is recorded in a non-checksummed section line at the end of the file.

7. The checksum computed when the file is read must match the checksum recorded when the file was written.

8. The checksum section line must be followed by end-of-information.

9. Lsof must be able to get matching results from stat(2) on a randomly chosen entry of the device section.

For more information on the device cache file, read the 00DCACHE file of the lsof distribution.

18.2.1 What's the risk with a perverted device cache file?

Even with the checks that lsof makes on the device cache file, it's
conceivable that an intruder could modify it so
it would pass lsof's tests.

The only serious consequence I know of this change is the removal of a file whose major device number identifies a socket from some user ID's device cache file. When such a device has been removed from the device cache file, and when lsof doesn't detect the removal, lsof may not be able to identify socket files when executed by the affected user ID. Only certain dialects are at risk to this attack -- e.g., SCO OpenServer and Solaris 2.x, 7, 8, and 9.

If you're tracking a network intruder with lsof, that could be important to you. If you suspect that someone has corrupted the device cache file you're using, I recommend you use lsof's -Di option to tell it to ignore it and use the contents of /dev (or /devices) instead; or remove the device cache file (usually .lsof_hostname, where hostname is the first component of the host's name returned by gethostname(2)) from the user ID's home directory
and let
lsof create a new one for you.

18.2.2 How do I put the full host name in a personal device cache file path?

Lsof constructs the personal device cache file path name from a format specified in the HASPERSDC #define in the dialect's machine.h header file. As distributed HASPERSDC declares the path to be ``.lsof_'' plus the first component

of the host name with the format ``.lsof_%L".

If you want to change the way lsof constructs the personal
device cache file path name, you can change the HASPERSDC
#define and recompile lsof.  If, for example, you #define
HASPERSDC to be ``.lsof_%l" (note the lower case `l'),
Configure and remake lsof, then the personal device cache
file path will be ``.lsof_" plus the host name returned
by gethostname(2).

See the 00DCACHE file of the lsof distribution for more
information on the formation of the personal device cache
file path and the use of the HASPERSDC #define.

18.2.3 How do I put the personal device cache file in
/tmp?

Change the HASPERSDC definition in your dialect's machine.h
header file.

When you redefine HASPERSDC, make sure you put at least
one user identification conversion in it to keep separate
the device cache files for each user of lsof.  Also give
some thought to including the ``%0" conversion to define
an alternate path for setuid-root and root processes.

Here's a definition that puts a personal device cache file
in /tmp with the name ``.lsof_login_hostname_pers".

```
#define HASPERSDC "/tmp/.lsof_%u_%l_pers"
```

Thus the /tmp personal device cache file path for login
"abe" on host "lsof.itap.purdue.edu" would be:

```
/tmp/.lsof_abe_lsof.itap.purdue.edu_pers
```

You can add the User ID (UID) with the "%U" conversion and
the first host name component with the ``%L" conversion.

CAUTION: be careful using absolute paths like /tmp lest
lsof processes that are setuid-root or whose real UID is
root be used to exploit some security weakness via /tmp.
Elect instead to
add an alternate path for those processes
with the ``%0" conversion.  Here's an extension of the
previous HASPERSDC format for /tmp that declares an alternate
path:

#define HASPERSDC "/tmp/.lsof_%u_%l_pers%0%h/.lsof_%L"

When the lsof process is setuid-root or its real UID is
root, presuming root's home directory is `/' and the host's
name is ``lsof.itap.purdue.edu", the extended format yields:

/.lsof_vic

18.3 Why doesn't lsof know about AFS files on my favorite dialect?

Lsof currently supports AFS for these dialects:

AIX 4.1.4 (AFS 3.4a)
Linux 1.2.13 (AFS 3.3)
NEXTSTEP 3.2 (AFS 3.3)
Solaris 2.[56] (AFS 3.4a)

It may recognize AFS files on other versions of these
dialects, but I have no way to test that. Lsof may report
correct information for AFS files on other dialects, but
I can't test that either.

AFS support must be custom crafted for each UNIX dialect
and then tested. If lsof supports your favorite dialect,
but doesn't recognize
its AFS files, probably I don't have
access to a test system. If you want AFS support badly
for your dialect, consider helping me do the development
and testing.

18.3.1 Why doesn't lsof report node numbers for all AFS volume files,
or how do I reveal dynamic module addresses to lsof?

When AFS is implemented via dynamic kernel modules -- e.g.,
in NEXTSTEP -- lsof can't obtain the addresses of AFS
variables in the kernel that it uses to identify AFS vnodes.
It can guess that a vnode is assigned to an AFS file and
it can obtain other information about AFS files, but it
has trouble computing AFS volume node numbers.

To determine node numbers for AFS volumes other than the
root volume, /afs, lsof needs access to a hashed volume
structure pointer table. When it can't find the address
of that table, because AFS support is implemented via
dynamic kernel modules, lsof will return blanks in the
INODE column for AFS volume files. Lsof can identify the
root volume's node

number (0), and can compute the node
numbers for all other AFS files.

If you have a name list file that contains the addresses
of the AFS dynamic modules -- e.g., you saved module symbols
when you created a loadable module kernel with modload(8)
by specifying -sym -- lsof may be able to find the kernel
addresses it needs in that file.

Lsof looks up AFS dynamic kernel addresses for these dialects
at these default paths:

    NEXTSTEP 3.2 /usr/vice/etc/afs_loadable

A different path to a name list file with AFS dynamic kernel
addresses may be specified with the -A option, when the -A
option description appears in lsof's -h or -? (help) output.

If any addresses appear in the -A name list file that also
appear in the regular kernel name list file -- e.g., /vmunix
-- they must match, or lsof will silently ignore the -A
addresses on the presumption that they are out of date.

Found in path(s):
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-tar/lsof_4.83_src/00FAQ
*
 /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/00FAQ
No license file was found, but licenses were detected in source scan.

Making and Installing lsof 4

**********
| The latest release of lsof is always available via anonymous ftp |
| from lsof.itap.purdue.edu.  Look in pub/tools/unix/lsof.         |
**********

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==========

Pre-built Lsof Binaries
==========

Avoid using pre-built lsof binaries if you can; build your own
instead.

I do not support lsof binaries built and packaged by third parties nor
lsof binaries built from anything but the latest lsof revision. (See
the Bug Reports section for more information on
the details of lsof
support.)

One important reasone for those support restrictions is that when lsof
is built its Configure script tunes lsof to the features available on
the building system, often embodied in supporting header files and
libraries. If the building system doesn't have support for a
particular feature, lsof won't be built to support the feature on any
system.

The Veritas VxFS file system is a good example of a feature that
requires build-time support.

UNIX dialect version differences -- Solaris 8 versus 9, AIX 4.3.3
vesus 5.2, etc. -- can also render a pre-built lsof binary useless
on a different version. So can kernel bit size.

There are so many potential pitfalls to using an lsof binary
improperly that I strongly recommend lsof be used only where it is
built.

==========
Making Lsof
==========

```
$ cd <lsof source directory>
$ ./Configure <your dialect's abbreviation>
$ make
```

(Consult the 00FAQ and 00XCONFIG files of the lsof distribution
for information about
using make command invocations and environment
variables to override lsof default Makefile strings.)

This lsof distribution can be used with many UNIX dialects. However,
it must be configured specifically for each dialect. Configuration
is done in three ways: 1) by changing definitions in the machine.h
header file of the UNIX dialect of interest; 2) by defining

environment variable values prior to calling Configure (see the 00XCONFIG file, the Environment Variabls and Environment Variables Affecting the Configure Script sections of this file); and 3) by running the Configure shell script found in the top level of the distribution directory.

You may not need to change any machine.h definitions, but you might want to look at them anyway. Pay particular attention to the definitions that are discussed in the Security section of this file. Please read that section.

The Configure script calls three other scripts in the lsof distribution: AFSConfig; Inventory; and Customize. The AFSConfig script is called for selected dialects (AIX, HP-UX, NEXTSTEP, and Solaris) to locate AFS header files and determine the AFS version. See The AFSConfig Script section of this file for more information.

The Inventory script checks the completeness of the lsof distribution. Configure calls Inventory after it has accepted the dialect abbreviation, but before it configures the top-level directory for the dialect. See The Inventory Script section of this file for more information.

Configure calls the Customize script after it has configured the top-level lsof directory for the declared dialect. Customize helps you modify some of the important compile-time definitions of machine.h. See the The Customize Script section.

You should also think about where you will install lsof and its man page, and whom you will let execute lsof. Please read the Installing Lsof section of this file for information on installation considerations.

Once you have inspected the machine.h file for the dialect for which you want to build lsof, and made any changes you need, run the Configure script, supplying it with the abbreviation for the dialect. (See the following table.) Configure selects the appropriate options for the dialect and runs the Mksrc shell script in the dialect sub-directory to construct the appropriate source files in the top-level distribution directory.

Configure may also run the MkKernOpts script in the dialect sub-directory to propagate kernel build options to the dialect Makefile. This is done for only a few dialects -- e.g., DC/OSx, and Reliant UNIX.

Configure creates a dialect-specific Makefile. You may want to
inspect or edit this Makefile to make it conform to local conventions.
If you want the Makefile to install lsof and its man page, you will
have to create an appropriate install rule.

Lsof may be configured using UNIX dialect abbreviations from the
following table. Alternative abbreviations are indicated by a
separating `|'. For example, for
SCO OpenServer you can use either
the ``osr'' or the ``sco'' abbreviation:

```
$ Configure osr
  or
$ Configure sco
```

Abbreviations UNIX Dialect
---------- ----------

aix IBM AIX 5.[23] and 5.3-ML1 using IBM's C Compiler
aixgcc IBM AIX 5.[12] and 5.3-ML1 using gcc
darwin Apple Darwin 7.x and 8.x for Power Macintosh systems
decosf DEC OSF/1, Digital UNIX, Tru64 UNIX 4.0 and 5.1
digital_unix Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1
du Digital UNIX, DEC OSF/1, Tru64 UNIX 4.0 and 5.1
freebsd FreeBSD 4.x, 4.1x, 5.x and [67].x
hpux HP-UX 11.00, 11.11 and 11.23, using HP's C
Compiler, both /dev/kmem-based and PSTAT-based
hpuxgcc HP-UX 11.00, 11.11 and 11.23, using gcc, both
/dev/kmem-based and PSTAT-based
linux Linux 2.1.72 and above for x86-based systems
netbsd NetBSD 1.[456], 2.x and 3.x
next NEXTSTEP 3.[13]
nextstep NEXTSTEP 3.[13]
ns NEXTSTEP 3.[13]
nxt NEXTSTEP 3.[13]
openbsd OpenBSD
2.[89] and 3.[0-9]
openstep OPENSTEP 4.x
os OPENSTEP 4.x
osr SCO OpenServer Release 5.0.6, using the C compiler
from the SCO developer's kit
osrgcc SCO OpenServer Release 5.0.6, using gcc
osr6 SCO Openserver 6.0.0, using the SCO C compiler
sco SCO OpenServer Release 5.0.6, using the C compiler
from the SCO developer's kit
scogcc SCO OpenServer Release 5.0.6, using gcc
solaris Solaris 2.x, 7, 8, 9 and 10 using gcc
solariscc Solaris 2.x, 7, 8, 9 and 10 using Sun's cc

tru64  Tru64 UNIX, DEC OSF/1, Digital UNIX 4.0 and 5.1
unixware  SCO|Caldera UnixWare 7.1.4
uw  SCO|Caldera UnixWare 7.1.4

If you have an earlier version of a dialect not named in the above list, lsof may still work on your system.  I have no way of testing that myself.  Try configuring for the named dialect -- e.g., if you're using Solaris 2.1, try configuring for Solaris 2.5.1.

After you have configured lsof for your UNIX dialect and have selected options
via the Customize script (See the The Customize Script section.) , use the make command to build lsof -- e.g.,

$ make

Other Configure Script Options
==========

There are three other useful options to the Configure script besides the dialect abbreviation:

-clean  may be specified to remove all traces of a dialect configuration, including the Makefile, symbolic links, and library files.

-h  may be specified to obtain a list of
-help  Configure options, including dialect abbreviations.

-n  may be specified to stop the Configure script from calling the Customize and Inventory scripts.

Caution: -n also suppresses the AFSConfig step.

Environment Variables
==========

Lsof configuration, building, and execution may be affected by environment variable settings.  See the Definitions That Affect Compilation section in the 00PORTING file, the General Environment Variables section in the 00XCONFIG

file, the Dialect-Specific
Environment Variables section in the 00XCONFIG file, and the
Environment Variables Affecting the Configure Script section of
this file for more information.

Note in the General Environment Variables section of the 00XCONFIG
file that there are five environment variables that can be used to
pre-define values in lsof's -v output: LSOF_BLDCMT, LSOF_HOST,
LSOF_LOGNAME, LSOF_SYSINFO, and LSOF_USER.

Security
========

If the symbol HASSECURITY is defined, a security mode is enabled,
and lsof will allow only the root user to list all open files.
Non-root users may list only open files whose processes have the
same user ID as the real user ID of the lsof process (the one that
its user logged on with).

However, if HASNOSOCKSECURITY is also defined, anyone may list
anyone else's open socket files, provided their listing is enabled
with the "-i" option.

Lsof is distributed with the security mode disabled -- HASSECURITY
is not defined. (When HASSECURITY is not
defined, the definition
of HASNOSOCKSECURITY has no meaning.) You can enable the security
mode by defining HASSECURITY in the Makefile or in the machine.h
header file for the specific dialect you're using -- e.g.
dialects/aix/machine.h.

The Customize script, run by Configure when it has finished its
work, gives you the opportunity to define HASSECURITY and
HASNOSOCKSECURITY. (See the The Customize Script section.)

The lsof -h output indicates the state HASSECURITY and HASNOSOCKSECURITY
had when lsof was built, reporting:

"Only root can list all files;"
if HASSECURITY was defined and HASNOSOCKSECURITY wasn't
defined;

"Only root can list all files, but anyone can list socket files."
if HASSECURITY and HASNOSOCKSECURITY were both defined;

"Anyone can list all files;"
if HASSECURITY wasn't defined. (The definition of

HASNOSOCKSECURITY doesn't matter when HASSECURITY isn't defined.)

You should carefully consider the implications of using the default security mode.

When lsof is compiled in the absence of the HASSECURITY definition, anyone who can execute lsof may be able to see the presence of all open files. This may allow the lsof user to observe open files -- e.g., log files used to track intrusions -- whose presence you would rather not disclose.

All pre-compiled binaries on lsof.itap.purdue.edu and mirrored from it were constructed without the HASSECURITY definition.

As distributed, lsof writes a user-readable and user-writable device cache file in the home directory of the real user ID executing lsof. There are other options for constructing the device cache file path, and they each have security implications.

The 00DCACHE file in the lsof distribution discusses device cache file path construction in great detail. It tells how to disable the various device cache file path options, or how to disable the entire device cache file feature by removing the HASDCACHE definition from the dialect's machine.h file. There is also information on the device cache file feature in the 00FAQ file. (The 00DCACHE and 00FAQ files are part of the lsof distribution package.)

The Customize script, run by Configure after it has finished its work, gives you the opportunity to change the compile-time options related to the device cache file. (See The Customize Script section.)

Since lsof may need setgid or setuid-root permission (See the Setgid Lsof Dialects and Setuid-root Lsof Dialects sections.), its security should always be viewed with skepticism. Lest the setgid and setuid-root permissions allow lsof to read kernel name list or memory files, declared with the -k and -m options, that the lsof user can't normally access, lsof uses access(2) to establish its real user's authority to read such files when it can't surrender its power before opening them. This change was added at the suggestion of Tim Ramsey.

Lsof surrenders setgid permission on most dialects when it has gained access to the kernel's memory devices. There are exceptions to this rule, and some lsof implementations need to run setuid-root. (The Setgid Lsof Dialects and Setuid-root Lsof Dialects sections

contains a list of lsof implementations and the permissions
recommended in the distribution's Makefiles.)

The surrendering of setgid permission is controlled by the WILLDROPGID
definition in the dialect machine.h header files.

In the end you must judge for yourself and your installation the
risks that lsof presents and restrict access to it according to
your circumstances and judgement.

## Run-time Warnings

Lsof can issue warning messages when it runs -- e.g., about the
state of the device cache file, about an inability to access an
NFS file system, etc.  Issuance of warnings are enabled by default
in the lsof distribution.

Issuance or warnings may be disabled by default by defining
WARNINGSTATE in the dialect's machine.h.  The Customize script may
also be used to change the default warning message issuance state.
(See The
 Customize Script section.)

The ``-w'' option description of the ``-h'' option (help) output
will indicate the default warning issuance state.  Whatever the
state may be, it can be reversed with ``-w''.

## Device Access Warnings

When lsof encounters a /dev (or /devices) directory, one of its
sub-directories, or one of their files that it cannot access with
opendir(3) or stat(2), it issues a warning message and continues.
Lsof will be more likely to issue such a warning when it has been
installed with setgid(<some group name>) permission; it won't have
trouble if it has been installed with setuid(root) permission or
is being run under the root login.

The lsof caller can inhibit or enable the warning with the -w
option, depending on the issuance state of run-time warnings.  (See
the Run-time Warnings section.)

The warning messages do not appear when lsof obtains device
information from a device cache file that it has built and believes
to be current or when warning

message issuance is disabled by
default. (See the "Caches -- Name and Device" section for more
information on the device cache file.)

The lsof builder can inhibit the warning by disabling the definition
of WARNDEVACCESS in the dialect's machine.h or disable all warnings
by defining WARNINGSTATE. WARNDEVACCESS is defined by default for
most dialects. However, some dialects have some device directory
elements that are private -- e.g., HP-UX -- and it is more convenient
for the lsof user if warning messages about them are inhibited.

Output from lsof's -h option indicates the status of WARNDEVACCESS.
If it was defined when lsof was compiled, this message will appear:

  /dev warnings = enabled

If WARNDEVACCESS was not defined when lsof was compiled, this
message will appear instead:

  /dev warnings = disabled

The Customize script, run by Configure after it has finished its
work, gives you the opportunity to change the WARNDEVACCESS
definition. (See The Customize Script section.)

NFS
Blocks
==========

Lsof is susceptible to NFS blocks when it tries to lstat() mounted
file systems and when it does further processing -- lstat() and
readlink() -- on its optional file and file system arguments.

Lsof tries to avoid being stopped completely by NFS blocks by doing
the lstat() and readlink() functions in a child process, which
returns the function response via a pipe. The lsof parent limits
the wait for data to arrive in the pipe with a SIGALRM, and, if
the alarm trips, terminates the child process with a SIGINT and a
SIGKILL.

This is as reliable and portable a method for breaking NFS deadlocks
as I have found, although it still fails under some combinations
of NFS version, UNIX dialect, and NFS file system mount options.
It generally succeeds when the "intr" or "soft" mount options are
used; it generally fails when the "hard" mount option is used.

When lsof cannot kill the child process, a second timeout causes

it to stop waiting for the killed child to complete.
While the
second timeout allows lsof to complete, it may leave behind a hung child process. Unless warnings are inhibited by default or with the -w option, lsof reports the possible hung child.

NFS block handling was updated with suggestions made by Andreas Stolcke. Andreas suggested using the alternate device numbers that appear in the mount tables of some dialects when it is not possible to stat(2) the mount points.

The -b option was added to direct lsof to avoid the stat(2) and readlink(2) calls that might block on NFS mount points and always use the alternate device numbers. If warning message issuance is enabled and you don't want warning messages about what lsof is doing, use the -w option, too.

The -O option directs lsof to avoid doing the potentially blocking operations in child processes. Instead, when -O is specified, lsof does them directly. While this consumes far less system overhead, it can cause lsof to hang, so I advise you to use -O sparingly.

Caches
-- Name and Device
==========

Robert Ehrlich suggested that lsof obtain path name components for open files from the kernel's name cache. Where possible, lsof dialect implementations do that. The -C option inhibits kernel name cache examination.

Since AFS apparently does not use the kernel's name cache, where lsof supports AFS it is unable to identify AFS files with path name components.

Robert also suggested that lsof cache the information it obtains via stat(2) for nodes in /dev (or /devices) to reduce subsequent running time. Lsof does that, too.

In the default distribution the device cache file is stored in .lsof_hostname, mode 0600, in the home directory of the login of the user ID that executes lsof. The suffix, hostname, is the first component of the host's name returned by gethostname(2). If lsof is executed by a user ID whose home directory is NFS-mounted from several hosts, the user ID's home directory may collect several device cache files, one for

each host from which it was executed.

Lsof senses accidental or malicious damage to the device cache file with extensive integrity checks, including the use of a 16 bit CRC. It also tries to sense changes in /dev (or /devices) that indicate the device cache file is out of date.

There are other options for forming the device cache file path. Methods the lsof builder can use to control and employ them are documented in the separate 00DCACHE file of the lsof distribution.

## Raw Sockets

On many UNIX systems raw sockets use a separate network control block structure. Display of files for applications using raw sockets -- ping, using ICMP, for example -- need special support for displaying their information. This support is so dialect-specific and information to provide it so difficult to find that not all dialect revisions of lsof handle raw sockets completely.

## Other Compile-time Definitions

The machine.h and dlsof.h header files for each dialect contains definitions that affect the compilation of lsof. Check the Definitions That Affect Compilation section of the 00PORTING file of the lsof distribution for their descriptions. (Also see The Customize Script section.)

## The AFSConfig Script

Lsof supports AFS on some combinations of UNIX dialect and AFS version. See the AFS section of this document for a list of supported combinations.

When configuring for dialects where AFS is supported, the Configure script calls the AFSConfig script to determine the location of AFS header files and the AFS version. Configure will not call AFSConfig, even for the selected dialects, unless the file /usr/vice/etc/ThisCell exists.

The AFS header file location is recorded in the AFSHeaders file;

version, AFSVersion. Once these values have been recorded, Configure can be told to skip the calling of AFSConfig by specifying its (Configure's) -n option.

## The Inventory Script

The lsof distribution contains a script, called Inventory, that checks the distribution for completeness. It uses the file 00MANIFEST in the distribution as a reference point.

After the Configure script has accepted the dialect abbreviation, it normally calls the Inventory script to make sure the distribution is complete.

After Inventory has run, it creates the file ".ck00MAN" in the top-level directory to record for itself the fact that the inventory has been check. Should Inventory be called again, it senses this file and asks the caller if another check is in order, or if the check should be skipped.

The -n option may be supplied to Configure to make it bypass the calling of the Inventory script. (The option also causes Configure to avoid calling the Customize script.)

The lsof power user may want to define (touch) the file ".neverInv". Configure avoids calling the Inventory script when ".neverInv" exists.

## The Customize Script

Normally when the Configure script has finished its work, it calls another shell script in the lsof distribution called Customize. (You can tell Configure to bypass Customize with its -n option.)

Customize leads you through the specification of these important compile-time definitions for the dialect's machine.h header file:

HASDCACHE device cache file control
HASENVDC device cache file environment variable name
HASPERSDC personal device cache file path format

HASPERSDCPATH name of environment variable that
provides an additional component
of the personal device cache file
path
HASSYSDC system-wide device cache file path
HASKERNIDCK the build-time to run-time kernel
identity check
HASSECURITY the security option
HASNOSOCKSECURITY the open socket listing option whe
HASSECURITY is defined
WARNDEVACCESS /dev (or /devices) warning message
control
WARNINGSTATE warning message issuance state

The Customize script accompanies its prompting for entry of new values for these
definitions with brief descriptions of each of
them. More information on these definitions may be found in this file or in the 00DCACHE and 00FAQ files of the lsof distribution.

You don't need to run Customize after Configure. You can run it later or you can edit machine.h directly.

The -n option may be supplied to Configure to make it bypass the calling of the Customize script. (The option also causes Configure to avoid calling the Inventory script.)

The lsof power user may want to define (touch) the file ".neverCust". Configure avoids calling the Customize script when ".neverCust" exists.

Customize CAUTION: the Customize script works best when it is applied to a newly configured lsof source base -- i.e., the machine.h header file has not been previously modified by the Customize script. If you have previously configured lsof, and want to rerun the Customize script, I recommend you clean out the previous configuration and create a new one:

$ Configure -clean
$ Configure
<dialect_abbreviation>
...
Customize in response to the Customize script prompts.

Cautions
========

Lsof is a tool that is closely tied to the UNIX operating system
version.  It uses header files that describe kernel structures and
reads kernel structures that typically change from OS version to
OS version, and even within a version as vendor patches are applied.

DON'T TRY TO USE AN LSOF BINARY, COMPILED FOR ONE UNIX OS VERSION,
ON ANOTHER.  VENDOR PATCHES INFLUENCE THE VERSION IDENTITY.

On some UNIX dialects lsof versions may be even more restricted by
architecture type.

The bottom line is use lsof where you built it.  If you intend to
use a common lsof binary on multiple systems, make sure all systems
run exactly the same OS version and have exactly the same patches.

Warranty
========

Lsof is provided as-is without any warranty of any kind, either
expressed or implied, including, but not limited to, the implied
warranties of merchantability and fitness for a particular purpose.
The
 entire risk as to the quality and performance of lsof is with
you.  Should lsof prove defective, you assume the cost of all
necessary servicing, repair, or correction.

License
=======

Lsof has no license.  Its use and distribution are subject to these
terms and conditions, found in each lsof source file.  (The copyright
year in or format of the notice may vary slightly.)

```
 /*
  * Copyright 2002 Purdue Research Foundation, West Lafayette,
  * Indiana 47907.  All rights reserved.
  *
  * Written by Victor A. Abell
  *
  * This software is not subject to any license of the American
  * Telephone and Telegraph Company or the Regents of the
  * University of California.
  *
  * Permission is granted to anyone to use this software for
  * any purpose on any computer system, and to alter it and
  * redistribute it freely, subject to the following
```

```
 * restrictions:
 *
 * 1. Neither the authors nor Purdue University are responsible
 *    for any consequences of the use of this software.
 *
 * 2. The origin of this software must not be misrepresented,
 *    either by explicit claim or by omission.  Credit to the
 *    authors and Purdue University must appear in documentation
 *    and sources.
 *
 * 3. Altered versions must be plainly marked as such, and must
 *    not be misrepresented as being the original software.
 *
 * 4. This notice may not be removed or altered.
 */
```

Bug Reports
==========

Now that the obligatory disclaimer is out of the way, let me hasten to add that I accept lsof bug reports and try hard to respond to them. I will also consider and discuss requests for new features, ports to new dialects, or ports to new OS versions.

PLEASE DON'T SEND BUG REPORTS ABOUT LSOF TO THE UNIX DIALECT OR DIALECT OPTION VENDOR.

At worst such bug reports will confuse the vendor; at best, the vendor will forward the bug report to me.

PLEASE DON'T SEND BUG REPORTS
ABOUT LSOF BINARIES BUILT OR DISTRIBUTED
BY SOMEONE ELSE, BECAUSE I CAN'T SUPPORT THEM.

I do support binaries I built, obtained ONLY from lsof.itap.purdue.edu. Before reporting a problem with a lsof.itap.purdue.edu binary, please verify the correctness of the signatures found in its associated CHECKSUMS file.

Before you send me a bug report, please do these things:

* Make sure you try the latest lsof revision.

  + Download the latest revision from:

  ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof

+ Verify the signatures of what you have downloaded;

+ While connected to lsof.itap.purdue.edu, check for patches:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/patches

+ If patches exist, install them in the latest revision
you just downloaded. Then build the latest revision and
see if it fixes your bug.

* If you're having trouble compiling lsof with gcc, try the
UNIX dialect vendor's compiler. I don't have access
to gcc on
all test systems, so my support for it is hit-and-miss, and so
is my ability to respond to gcc compilation problem reports.

* Check the lsof frequently asked questions file, 00FAQ,
to see if there's a question and answer relevant to your
problem.

* Make sure you're running the lsof you think you are by
checking the path to it with which(1). When in doubt, use an
absolute path to lsof. Make sure that lsof binary has
sufficient permissions to do what you ask, including internal
permissions given it (e.g., restrictions on what files lsof may
report for whom) during its build.

When you send a bug report, make sure you include output from your running of lsof's Configure script. If you were able to compile a running lsof, please also include:

* Output from which(1) that shows the absolute path to the
lsof binary in question;

* Output from running lsof with its -h and -v options at

lsof's absolute path;

* Output from "ls -l" directed to lsof's absolute path.

If you weren't able to compile a running lsof, please send me: the compiler error output; identification of the lsof revision you're using (contents of the lsof version.c file); identification of your system (full uname output or output from whatever other tool identifies the system); and compiler identification (e.g., gcc -v output).

Either set of output will help me understand how lsof was configured and what UNIX dialect and lsof revision is involved.

Please send all bug reports, requests, etc. to me via e-mail at
<abe@purdue.edu>. Make sure "lsof" appears in the "Subject:" line so
my e-mail filter won't classify your letter as Spam.

## The 00FAQ File

The lsof distribution contains an extensive frequently asked
questions file on lsof features and problems. I recommend you
consult it before sending me e-mail. Use your favorite editor or
pager to search 00FAQ -- e.g., supplying
as a search argument some
fixed text from an lsof error message.

## The lsof-l Mailing List

Information about lsof, including notices about the availability
of new revisions, may be found in mailings of the lsof-l listserv.
For more information about it, including instructions on how to
subscribe, read the 00LSOF-L file of the lsof distribution.

## Field Output Example Scripts

Example AWK and Perl 4 or 5 scripts for post-processing lsof field
output are locate in the scripts sub-directory of the lsof distribution.
The scripts sub-directory contains a 00README file with information
about the scripts.

## Field Output C Library

The lsof test suite (See "Testing Lsof."), checks basic lsof
operations using field output. The test suite has its own library
of C functions for common test program operations, including
processing of field output. The library or selections of its
functions could be adapted for use by C
programs that want to
process lsof field output. See the library in the file LTlib.c
in the tests/ sub-directory

Testing Lsof
============

Lsof has an automated test suite in the tests/ sub-directory that
can be used to test some basic lsof features -- once lsof has been
configured and made.  Tests are arranged in three groups: basic
tests that should run on all dialects; standard tests that should
run on all dialects; and optional tests that may not run on all
dialects or may need special resources to run.  See 00TEST for more
information.)

CAUTION!!!  Before you attempt to use the test suite make sure that
the lsof you want to test can access the necessary kernel resources
-- e.g., /dev/mem, /dev/kmem, /proc, etc.  Usually you want to test
the lsof you just built, so this is an important check.  (See
00TEST.)

To run the basic and standard tests, using the lsof in the parent
directory of tests/, do this:

```
 $ cd tests
 $ make test
   or $ make std
   or $ make standard
```

The basic
 and standard tests may be run as silently as possible,
using the lsof in the parent directory of tests/, with:

```
 $ cd tests
 $ make auto
```

This is the "automatic" test mode, designed for use by scripts that
build lsof.  The caller is expected to test the make exit code to
determine if the tests succeeded.  The caller should divert standard
output and standard error to /dev/null to suppress make's error
exit message.

The optional tests may be run, using the lsof in the parent directory
of tests/, with:

```
 $ cd tests
 $ make opt
   or $ make optional
```

It's possible to excute individual tests, too.  See the 00TEST file
of this distribution for more informaiton on the tests, what they
do, and how to run and possibly customize each test.

It's possible to run the tests, using an lsof other than the one
in the parent directory of /tests, too.  See 00TEST for information
about using the LT_LSOF_PATH environment variable to do that.

==========
Dialect Notes
==========

AFS
===

Lsof
 recognizes AFS files on the following combinations of UNIX
dialect and AFS versions:

 AIX 4.1.4 (AFS 3.4a)
 Linux 1.2.13 (AFS 3.3)
 NEXTSTEP 3.2 (AFS 3.3) (untested on recent lsof revisions)
 Solaris 2.6 (AFS 3.4a)
 Ultrix 4.2 RISC (AFS 3.2b) (no longer available)

Lsof has not been tested under other combinations -- e.g. HP-UX
10.10 and AFS 3.4a -- and probably won't even compile there.  Often
when a UNIX dialect version or AFS version changes, the new header
files come into conflict, causing compiler objections.

AIX
===

Specify the aix Configure abbreviation for AIX 4.1.[45], 4.2[.1],
4.3[.123], 5L, and 5.[123].

Specify aixgcc on AIX above 4.1 to use the gcc compiler.  (Gcc can't be
used to compile lsof on AIX 4.1 and below because of kernel structure
alignment differences between it and xlc.)  Gcc results sometimes
depend on the version of the gcc compiler that is used.

Compilation of lsof with gcc on AIX 4.3[.123], 5L, and 5.[123] has been
sparsely tested with varying degrees
 of success: it has been reported
to succeed on AIX 4.3.3 and 32 bit Power AIX 5.1; to fail on ia64 AIX
5.1 and 64 bit Power AIX 5.1; and to succeed on 32 and 64 bit Power AIX
5.2.  Lsof compilation with gcc hasn't been tested on AIX 5.3.

At revision 4.61 and above lsof is configured and built to match the
bit size of the kernel of Power architecture AIX 5.1 systems. Lsof
binaries built for 32 and 64 bit kernels are not interchangeable. See
00FAQ for more information.

The Configure script uses /usr/bin/oslevel to determine the AIX version
for AIX less than 5 and ``uname -rv'' for AIX 5 and higher. If
/usr/bin/oslevel isn't executable on AIX less than 5, the Configure
script issues a warning message and uses ``uname -rv'' to determine the
AIX version.

When Configure must use ``uname -rv'' on AIX less than 5 to determine
the AIX version, the result will lack a correct third component --
e.g., the `4' of ``4.1.4''. If your AIX less than 5 system lacks lacks
an executable oslevel,
I suggest you edit the Configure-produced
Makefile and complete the _AIXV definition in the CFGF string.

By default lsof avoids using the kernel's readx() function, causing
it to be unable to report information on some text and library file
references. The ``-X'' option allows the lsof user to ask for the
information readx() supplies.

Lsof avoids readx() to avoid the possibility of triggering a kernel
problem, known as the Stale Segment ID kernel bug. Kevin Ruderman
reported this bug to me. The bug shows up when the kernel's
dir_search() function hangs, hanging the application process that
called it so completely that the application process can neither
be killed nor stopped. The hang is the consequence of another
process (perhaps lsof) making legitimate use of the kernel's readx()
function to access the kernel memory that dir_search() is examining.
IBM has indicated they have no plans to fix the bug.

A fuller discussion of this bug may be found in the 00FAQ file of
the lsof distribution.
There you will find a description of the
Stale Segment ID bug, the APAR on it, and a discussion of the
sequence of events that exposes it.

I added the ``-X'' function so you can tell lsof to use readx(),
but if you use ``-X'', you should be alert to its possibly serious
side effects. Although readx() is normally disabled, its state is
controlled with the HASXOPT, HASXOPT_ROOT, and HASXOPT_VALUE
definitions in dialects/aix/machine.h, and you can change its
default state by changing those definitions. You can also change
HASXOPT_ROOT via the Customize script.

You can also compile lsof with readx() use permanently enabled or

disabled -- see the comments about the definitions in the
dialects/aix/machine.h header file. You may want to permanently
disable lsof's use of readx() if you plan to make lsof publicly
executable. You can also restrict -X to processes whose real UID
is root by defining HASXOPT_ROOT.

I have never seen lsof cause the Stale Segment ID bug to occur and
haven't
had a report that it has, but I believe there is a possibility
it could.

AFS support for AIX was added with help help from Bob Cook and Jan
Tax who provided test systems.

Henry Grebler and David J. Wilson helped with lsof for AIX 4.2.

Bill Pemberton provided an AIX 4.3 test system. Andrew Kephart
and Tom Weaver provided AIX 4.3 technical assistance. Niklas
Edmundsson did 4.3.1 testing. Doug Crabill provided an AIX 4.3.2
test system. Jeff W. Stewart provided an AIX 4.3.3 test system.

The SMT file type for AIX 4.1.[45], 4.2[.1], and 4.3[.12] is my
fabrication. See the 00FAQ file more information on it.

Loc Le and Nasser Momtaheni of IBM provided test systems for AIX 5L and
5.1. Lsof for AIX 5L and 5.1 needs setuid-root permission to process
the -X option on systems whose architecture type is ia64.

Dale Talcott of Purdue provided AIX 5.1 and 5.2 test systems. Dale and
John Jackson of Purdue provided an AIX 5.3 test system.

Apple Darwin
==========

The Apple Darwin
port was provided by Allan Nathanson for version
1.2. Allan also arranged for access to a test system for maintenance
and regression testing. Dale Talcott provided a test system, too.

Allan supplied patches for updates to 1.4, 5.x, 6.x, 7.x and 8.x.

BSDI BSD/OS
==========

As of lsof revision 4.77 support for BSDI BSD/OS has been
discontinued. Lsof revision 4.76 with BSDI BSD/OS support may be found

on lsof.itap.purdue.edu in pub/tools/unix/lsof/src.

DEC OSF/1, Digital UNIX, Tru64 UNIX
==========

Robert Benites, Dean Brock, Angel Li, Dwight McKay, Berkley Shands,
Ron Young and Steve Wilson have kindly provided test systems.
Jeffrey Mogul has provided technical assistance. Dave Morrison
and Lawrence MacIntyre did Digital UNIX V3.2 testing.

Lsof supports the ADVFS/MSFS layered file system product. Lsof
can locate all the open files of an ADVFS/MSFS file system when
its path is specified, provided the file system is listed in
/etc/fstab with an ``advfs"
type. (This /etc/fstab caveat applies
only to Digital UNIX 2.0.) At Digital UNIX 4.0 and Tru64 UNIX,
using code provided by David Brock, lsof 4.20 and above can locate
ADVFS file paths.

Testing of lsof on DEC OSF/1 and Digital UNIX 4.0 ended with lsof
revision 4.74. Hence, the lsof documentation has dropped the claim
that it works there. For a distribution of lsof 4.74 that was tested
on DEC OSF/1 and Digital UNIX 4.0, check pub/tools/unix/lsof/OLD/src
on the lsof ftp home, lsof.itap.purdue.edu.

Lsof revisions past 4.74 have only been tested on Tru64 UNIX 5.1.

FreeBSD
=======

Bill Bormann of Purdue University provided access to several FreeBSD
test systems. Ade Barkah, John Clear, Ralph Forsythe, Michael
Haro, Kurt Jaeger, and William McVey have also provided FreeBSD
test systems.

The FreeBSD distribution header files are augmented by header files
in the dialects/freebsd/include directory.

David O'Brien maintains the lsof FreeBSD port package.

HP-UX
=====

Lsof has

two HP-UX bases: /dev/kmem for HP-UX 11.0 and earlier;
and PSTAT for HP-UX 11.11 and later. The lsof Configure script
will pick the appropriate base.

To use the CCITT x.25 socket support for HP-UX, you must have the
x.25 header files in /etc/conf/x25

Pasi Kaara helped with the HP-UX port, especially with its CCITT
x.25 socket support.

Richard Allen provided HP-UX 10.x and 11.x test systems, as did
Mark Bixby, and Elias Halldor Agustsson. Marc Winkler helped test
the 10.20 port. Richard J. Rauenzahn provided a 64 bit HP-UX 11
test system and an HP-UX 11.11 development system.

AFS support for HP-UX was added thanks to help from Chaskiel Moses
Grundman, who provided a test system.

The /dev/kmem-based HP-UX 11.00 support is extremely fragile. It
depends on privately developed kernel structure definitions. (See
.../dialects/hpux/hpux11 for the header files making the definitions.)
Those header files and their definitions will not be updated by
HP-UX 11.00 patches, making it likely
that any patch changing a
kernel structure critical to lsof will break lsof in some way.

It's possible to build a 64 bit lsof for 64 bit HP-UX 11.00 with
gcc, but you must have a gcc compiler capable of producing 64 bit
executables. See the 00FAQ file for more information.

The PSTAT-based lsof for HP-UX 11.11 and later is much more solid.
I am indebted to the vision of HP for providing an lsof kernel API
through the PSTAT implementation. Specifically I appreciate the
help of HP staff members Carl Davidson, Louis Huemiller, Rich
Rauenzahn, and Sailu Yallapragada that made PSTAT-based HP-UX lsof
possible.

IPv6
====

Lsof has IPv6 support that has been tested for these UNIX dialects:
AIX 4.3.x; Apple Darwin 5.[12] and 6.0; the INRIA and KAME FreeBSD IPv6
implementations; PSTAT-based HP-UX; /proc-based Linux; the INRIA and
KAME NetBSD implementations; and Solaris 8 and 9. Lsof has IPv6
support that hasn't been tested for: OpenBSD (KAME); OpenUNIX 8; Tru64
Unix 5.[01]; and UnixWare

7.1.[34].

Please let me know if your UNIX dialect has IPv6 support and I'll
see if it can be supported by lsof.

Linux
=====

Tim Korb, Steve Logue, Joseph J. Nuspl Jr., and Jonathan Sergent
have provided Linux test systems.

Michael Shields helped add and test automatic handling of ELF/COFF
form names in /System.map, Marty Leisner and Keith Parks have helped
test many lsof revisions.  Marty has provided valuable suggestions,
Linux hints, and code, too.

The 00FAQ file gives some Linux tips, including information on
coping with system map file problems.

To determine the state of the Linux 2.1.x C library lseek() function,
the lsof Configure script runs a test program that must have
permission to read /dev/kmem.  The test determines if the lseek()
function properly handles kernel offsets, which appear to be negative
because their high order bit is set.  If the lseek() test reveals
a faulty lseek(), Configure activates the use of a private lseek()
function for kernel offset positioning.
  See the Linux problems
section of the 00FAQ file of the lsof distribution for more
information.

NetBSD
======

Greg Earle  and Paul Kranenburg have assisted with the NetBSD ports.
Paul has provided test systems.  Ray Phillips provided a NetBSA
Alpha test system.  Andrew Brown also provided a test system.

The NetBSD dialect version of lsof is compiled using the dialect
sources it shares with OpenBSD in the n+obsd dialect sub-directory.

NEXTSTEP and OPENSTEP
=====================

Virtual memory header files that allow lsof to display text references
were derived from the contents of /usr/include/vm of NEXTSTEP 2.0.

NeXT did not ship the virtual memory header files with other NEXTSTEP
or OPENSTEP versions.

You may use the RC_FLAGS environment variable to declare compiler
options outside the Makefile.  A common use of this variable is to
define the architecture types to be included in a "fat" executable.
See the comments in dialects/next/Makefile for an example.

OpenBSD
=======

David
 Mazieres has provided OpenBSD test systems.  The OpenBSD
dialect version of lsof is compiled using the dialect sources it
shares with NetBSD in the n+obsd dialect sub-directory.

Kenneth Stailey has provided OpenBSD testing and advice.

John Dzubera (Zube) reports, "lsof 4.33 compiles and runs on OpenBSD
2.3 for the pmax architecture (decstation 3100)."

I have not tested lsof on OpenBSD 3.8, but David Mazieres reports
revision 4.76 worked on OpenBSD 3.8.

Pyramid DC/OSx and Reliant UNIX
===============================

As of lsof revision 4.52 support for all Pyramid dialects has been
discontinued.  Lsof revision 4.51 with Pyramid support may be
obtained upon request.  Send the request to abe@purdue.edu.

These two UNIX dialects are very similar and share dialect-specific
source files from the pyramid sub-directory.

The Reliant Unix Pyramid C compiler issues warning messages that
I haven't found a convenient way to suppress.  You can ignore
warning messages about casts
 and conversions that lose bits.  The
message "warning: undefining __STDC__" is intentionally caused by
the lsof MkKernOpts configuration script to suppress warning messages
about cast and conversion problems in standard system header files,
such as <stdio.h> and <string.h>.

Bruce Beare and Kevin Smith provided test systems.

Caldera OpenUNIX
==========

Larry Rosenman provided an OpenUNIX 8 test system. Matthew Thurmaier provided technical assistance, along with these people from Caldera: Jack Craig, Robert Lipe, and Bela Lubkin.

Robert Lipe supplied changes to lsof for OpenUNIX 8.0.1. Those changes were also incorporated in UnixWare 7.1.3 when it became the release name for OpenUNIX 8.0.1.

Support for lsof on OpenUNIX ended at lsof revision 4.74. The last lsof revision, 4.74, tested on OpenUNIX, may be found at the lsof "home" ftp site, lsof.itap.purdue.edu, in pub/tools/unix/lsof/OLD/src.

SCO OpenServer
==========

Dion Johnson, Bela Lubkin, and Nathan Peterson of SCO gave me copies of SCO OpenServer and the SCO OpenServer Development System 3.0 and provided technical advice for the lsof port.

Hugh Dickins, Bela Lubkin, Craig B. Olofson, and Nathan Peterson provided version 5.0 and gave technical advice for porting lsof to it. Bela provided the 5.0.4 changes. D. Chris Daniels provided a 5.0.4 test system, Lee Penn provided one for 5.0.5, and John Dubois for 5.0.6.

The <netdb.h> header file was accidentally omitted from some SCO OpenServer Development System releases. The Configure script will sense its absence and substitute an equivalent from the BSD distribution. The BSD <netdb.h> and the <sys/cdefs.h> header file it includes are located in the dialects/os/include sub-directory tree.

To compile lsof from its distribution sources you must have the TCP/IP and NSF headers in /usr/include. While those are optional OpenServer packages, I have access to no system that doesn't have them, so I'm unable to build lsof for such a configuration. However, it should be possible to modify the lsof Configure script and sources so lsof would compile and work without those optional packages.

If you have an OpenServer system configured without the TCP/IP and NFS packages, and want to tackle the job of building lsof for it,

contact me via e-mail at <abe@purdue.edu>. I'll identify the
Configure script, header file, and source file changes you will
need to make. (Caution: this is not a simple task, or I would have
already done it.)

The optional osrgcc and scogcc Configure abbreviations construct
Makefiles for compiling lsof with gcc.

The UnixWare 7.1.4 sources are used for OpenServer Release 6.0.0.
Hence there is a separate Configure abbreviation for it, "osr6".
Richard of SCO provided a test system and technical assistance.

SCO|Caldera UnixWare
==========

D. Chris Daniels, John Hughes, Ken Laing, Andrew Merril, Lee Penn, and
Matthew Thurmaier provided test systems. Bela Lubkin provided
technical assistance. Larry Rosenman provided
7.1.[34] test systems.

Solaris 2.x, 7, 8, 9 and 10
==========

SEE THE CAUTIONS SECTION OF THIS DOCUMENT.

The latest Solaris revision of lsof 4 might work under Solaris
2.[1-4] and 2.5[.1] and 7 but hasn't been tested there. I have no
test systems for those Solaris versions.

Lsof will compile with gcc and the Sun C compiler under Solaris.
If you want to use the Sun compiler, use the solariscc Configure
abbreviation. If you use a gcc version less than 2.8 on Solaris,
make sure the gcc-specific includes have been updated for your
version of Solaris -- i.e., run the gcc fixincludes script.

Solaris 7, 8, 9 and 10 support for 64 bit kernels depends on a Sun
WorkShop or Forte C compiler version that supports the "-xarch=v9"
flag -- usually 5.0 or greater. Gcc versions 2.95 and above *may*
be configured and built for 64 bit support, but it takes some extra
work, the resulting compiler may be fragile, and the gcc developers
discourage it. I've built 64 bit capable
gcc compilers for Solaris
7, 8 and 9 from gcc versions 2.95 through 3.0.1 and produced working
lsof executables with them. More information on 64 bit gcc for
Solaris may be found in the 00FAQ file.

Solaris 10 ZFS support is questionable, because Sun does not distribute the ZFS kernel structure definition header files. The lsof Configure script and source code use some risky work-arounds. ZFS file system support was made possible with help from Horst Scheuermann.

Dave Curry and Steve Kirsch provided resources for Solaris 2.x ports. Casper Dik and Gerry Singleton consulted and provided valuable assistance.

Henry Katz, Joseph Kowalski, Charles Stephens, Mike Sullivan, and Mike Tracy provided technical assistance.

AFS support was added to Solaris lsof with help from Curt Freeland, Heidi Hornstein, Michael L. Lewis, Terry McCoy, Phillip Moore, and Sushila R. Subramanian.

Casper Dik provided valuable assistance for the Solaris 8 support.

Sun has graciously provided me access to
BETA versions of Solaris
2.5, 2.6, 7, 8, and 9.

John Dzubera provided Solaris 7 and 8 test systems.

Mike Miscevic provided Solaris 10 test systems.

Ultrix
======

As of lsof revision 4.52 support for Ultrix is no longer available, because I no longer have an Ultrix test system.

Terry Friedrichsen, Dwight McKay, and Jeffrey Mogul helped me with this port.

DECnet support was added to Ultrix lsof with the help of John Beacom, who kindly provided a test system. The Configure script decides that DECnet support is available if /usr/lib/libdnet.a and /usr/include/netdnet/dn.h exist and are readable.

Veritas VxFS and VxVM
=====================

Lsof supports some versions of Veritas VxFS and VxVM on some UNIX dialects. Consult the lsof Configure script for the specific dialect, and consult the lsof dialect-specific source files for

the UNIX dialect of interest.  Veritas support will usually be
found in a source file named dnode[1-9].c.

Since Veritas rarely has a version number that
 can be extracted
with shell commands, lsof doesn't use it.  Instead, when lsof
supports Veritas, the Configure script will form compile-time
definitions starting with HASVXFS.  Check the lsof 00PORTING
documentation file for more information.

Lsof Veritas support requires that the supporting Veritas header
files be installed -- e.g., in /usr/include/sys/fs.  (The location
will depend in the dialect's header file conventions.)

Some information on lsof support for Veritas extensions may be
found in the lsof 00DIST file.

Chris Kordish and Andy Thomas have provided Solaris VxFS test
systems.

==========
User-contributed Dialect Support
==========

There are some user-contributed dialect versions of lsof; more
information on them can be found at:

 ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/contrib

Check the 00INDEX file there for details.

==========
Dialects No Longer Supported
==========

Because
 I don't have access to test systems, these UNIX dialects
are no longer supported by lsof:

 CDC EP/IX
 /dev/kmem-based Linux
 MIPS RISC/os
 Motorola V/88
 Pyramid DC/OSx
 Pyramid Reliant UNIX
 Sequent DYNIX

SGI IRIX
SunOS 4.x
Ultrix
UnixWare below 7.0

Remnants of the support lsof once provided for these dialects may
be found in:

ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/binaries
and
ftp://lsof.itap.purdue.edu/pub/tools/unix/lsof/OLD/dialects

==========
Installing Lsof
==========

The distributed Makefiles do not have actions that will install
lsof. I've come to the conclusion there is no standard for installing
lsof or its man page, so I no longer distribute make rules for
installing them. You should adjust the Makefile for your local
preferences.

The Makefile does have an install rule that will cause lsof to
compile by virtue of its dependency clause. Some Makefiles also
have a dependency that causes the production of a man page that is
ready to install.
However, the actions of the install rule will
not cause the lsof executable or its man page to be installed in
any UNIX system-wide directory.

Instead, after the compilation and optional man page production
are completed, the install rule will produce a brief description
of what actions you might add to the install rule. The description
will suggest the possible modes, ownerships, permissions, and
destinations your install rule might employ to install the lsof
executable and man page.

As you form your install rule, keep in mind that lsof usually needs
some type of special permission to do its job. That may be permission
to read memory devices such as /dev/kmem, /dev/mem, or /dev/swap,
or it may be authorization to read entries in the /proc file system.

Memory device access can usually be provided by setting the modes
of the lsof executable so that it's effective group identifier when
it runs is the same as the group that has permission to read the
memory devices -- i.e., it

is setgid-group. The privileged group
is usually kmem, sys, or system.

Don't overlook using ACLs -- e.g., on AIX or Solaris 8 -- to give lsof permission to access memory devices. ACLs, coupled to a separate group like kmem, can be safer than giving lsof setgid authorization to a commonly used system group.

When lsof needs to read /proc file system entries, it must be installed with modes that make its effective user identifier root when it runs -- i.e., it must be setuid-root. If lsof must be installed setuid-root (only the AIX 5L, PSTAT-based HPUX, and /proc-based Linux, ports need such power.), then access to memory devices is automatic (or not needed in the case of /proc-based Linux).

Your choice of permissions for lsof may also be affected by your desire to allow anyone to use it or your need to restrict its usage to specific individuals. You will have to be guided by local policy and convention in this case.

The next two sections, Setgid Lsof Dialect Versions and Setuid-root Lsof
Dialect Versions, list recommended install permissions.

The system directory where you install the lsof executable is also open to choice. A traditional place for a tool like lsof is /usr/local/etc, but recent changes in directory structure organization suggest that somewhere in /opt may be more suitable.

Bear one other factor in mind when choosing a location for the lsof executable -- it usually is a shared executable, requiring access to shared libraries. Thus, locations like /sbin or /usr/sbin are probably unsuitable.

Once you've chosen a location for the executable you may find that the location for the man page follows -- e.g., if the executable goes in /usr/local/etc, then the man page goes in /usr/local/man. If the executable location doesn't imply a location for the man page, you'll have to let local custom guide you.

Setuid-root Lsof Dialect Versions
==========

These dialect versions should be installed with setuid-root permission -- i.e.,

the lsof binary should be owned by root and
its setuid execution bit (04000) should be set.

AIX 5L and above for full use of the -X option
Apple Darwin 8.x for Power Macintosh systems
PSTAT-based HP-UX 11.11 and 11.23
/proc-based Linux (generally 2.1.72 and above)

Setgid Lsof Dialect Versions
==========

These dialect versions should be installed with setgid permission,
owned by the group that can read kernel memory devices such as
/dev/drum, /dev/kmem, /dev/ksyms, /dev/mem, /dev/swap. ACLs may
be another mechanism (e.g., under AIX or Solaris 8) you can use to
grant read permission to the kernel memory devices.

AIX 4.1.[45], 4.2[.1], and 4.3[.123]
Apple Darwin 7.x for Power Macintosh systems
DEC OSF/1, Digital UNIX, Tru64 UNIX 2.0, 3.2, 4.0, and 5.[01]
FreeBSD 2.1.6, 2.2[.x], 3.x, 4.x, 5.x and [67].x
/dev/kmem-based 11.00
NetBSD 1.[456], 2.x and 3.x
NEXTSTEP 3.[13]
OpenBSD 2.[89] and 3.[0-9]
OPENSTEP 4.x
Caldera OpenUNIX 8
SCO OpenServer 5.0.[46]
SCO
UnixWare 7.0 and 7.1.[0134]
Solaris 2.6, 8, 9 and 10
Ultrix 4.2 (no longer available)

==========
Porting lsof 4 to a New UNIX Dialect
==========

If you're brave enough to consider this, look at the 00PORTING
file. Please contact me before you start. I might be able to help
you or even do the port myself.

Don't overlook the contrib/ directory in pub/tools/unix/lsof on my
ftp server, lsof.itap.purdue.edu. It contains user-contributed ports
of lsof to dialects I don't distribute, because I can't test new
revisions of lsof on them.

==========
Quick Start to Using lsof
==========

For information on how to get started quickly using lsof, consult
the 00QUICKSTART file of the lsof distribution. It cuts past the
formal density of the lsof man page to provide quick examples of
using lsof to solve common open file display problems.

==========
Cross-configuring Lsof
==========

Using
environment variables it is possible to Configure (and possibly
build) lsof for one UNIX dialect on a different one -- e.g., you
are running Configure on a Linux 2.3 system and you want to Configure
and build lsof for Linux 2.4.

See the 00XCONFIG file of the lsof distribution for a discussion
of how to do this.

==========
Environment Variables Affecting the Configure Script
==========

Configure script actions can be modified by introducing values to
the script via environment variables. In many cases the environment
variable values take the place of test operations the Configure
script makes.

For more information on environment variables that can affect
Configure, consult the 00XCONFIG file of the lsof distribution.
See the General Environment Variables sections for descriptions of
ones that affect all dialects. Consult the Dialect-Specific
Environment Variables section for ones that might
affect the dialect
you are trying to configure.

Vic Abell <abe@purdue.edu>
April 24, 2007

Found in path(s):
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83_src/00README
* /opt/cola/permits/1350150906_1655994764.9225438/0/lsof-4-83-r1-2-tar-gz/lsof_4.83/lsof-4-83-src-

tar/lsof_4.83_src/00README

# 1.143 sqlite 3.6.7

## 1.143.1 Available under license :

The author disclaims copyright to this source code.  In place of
a legal notice, here is a blessing:

  May you do good and not evil.
  May you find forgiveness for yourself and forgive others.
  May you share freely, never taking more than you give.

# 1.144 lvm2 2.02.64

## 1.144.1 Available under license :

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Version 2.1, February 1999

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[This is the first released version of the Lesser GPL.  It also counts
as the successor of the GNU Library Public License, version 2, hence
the version number 2.1.]

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When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the

entire combination fits
its criteria of freedom. The Lesser General
Public License permits more lax criteria for linking other code with
the library.

We call this license the "Lesser" General Public License because it
does Less to protect the user's freedom than the ordinary General
Public License. It also provides other free software developers Less
of an advantage over competing non-free programs. These disadvantages
are the reason we use the ordinary General Public License for many
libraries. However, the Lesser license provides advantages in certain
special circumstances.

For example, on rare occasions, there may be a special need to
encourage the widest possible use of a certain library, so that it becomes
a de-facto standard. To achieve this, non-free programs must be
allowed to use the library. A more frequent case is that a free
library does the same job as widely used non-free libraries. In this
case, there is little to gain by limiting the free library to free
software only, so we use
the Lesser General Public License.

In other cases, permission to use a particular library in non-free
programs enables a greater number of people to use a large body of
free software. For example, permission to use the GNU C Library in
non-free programs enables many more people to use the whole GNU
operating system, as well as its variant, the GNU/Linux operating
system.

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that program using a modified version of the Library.

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be combined with the library in order to run.

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# 1.145 libdevmapper 1.02.47

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# 1.146 golang 1.8.1

## 1.146.1 Available under license :

```
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# Names should be added to this file only after verifying that
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# Names should be added to this file like so:
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#
```

# An entry with multiple email addresses specifies that the
# first address should be used in the submit logs and
# that the other addresses should be recognized as the
# same person when interacting with Gerrit.

# Please keep the list sorted.

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