



Scheduling Maintenance Jobs

The Cisco MDS command scheduler feature helps you schedule configuration and maintenance jobs in any switch in the Cisco MDS 9000 Family. You can use this feature to schedule jobs on a one-time basis or periodically.

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Information About the Command Scheduler

The Cisco NX-OS command scheduler provides a facility to schedule a job (set of CLI commands) or multiple jobs at a specified time in the future. The job(s) can be executed once at a specified time in the future or at periodic intervals.

You can use this feature to schedule zone set changes, make QoS policy changes, back up data, save the configuration and do other similar jobs.

Scheduler Terminology

The following terms are used in this chapter:

- **Job**—A job is a set of NX-OS CLI commands (EXEC and config mode) that are executed as defined in the schedule.

- Schedule—A schedule determines the time when the assigned jobs must be executed. Multiple jobs can be assigned to a schedule. A schedule executes in one of two modes: one-time or periodic.
- Periodic mode—A job is executed at the user-specified periodic intervals, until it is deleted by the administrator. The following types of periodic intervals are supported:
 - Daily—The job is executed once a day.
 - Weekly—The job is executed once a week.
 - Monthly—The job is executed once a month.
 - Delta—The job is executed beginning at the specified start time and thereafter at user-specified intervals (days:hours:minutes).
- One-time mode—The job is executed once at a user-specified time.

Licensing Requirements for Command Scheduler

To use the command scheduler, you do not need to obtain any license.

Guidelines and Limitations

Before scheduling jobs on a Cisco MDS switch, note the following guidelines:

- Prior to Cisco MDS SAN-OS Release 3.0(3), only users local to the switch could perform scheduler configuration. As of Cisco MDS SAN-OS Release 3.0(3), remote users can perform job scheduling using AAA authentication.
- Be aware that the scheduled job can fail if it encounters one of the following situations when executing the job:
 - If the license has expired for a feature at the time when a job containing commands pertaining to that feature is scheduled.
 - If a feature is disabled at the time when a job containing commands pertaining to that feature is scheduled.
 - If you have removed a module from a slot and the job has commands pertaining to the interfaces for that module or slot.
- Verify that you have configured the time. The scheduler does not have any default time configured. If you create a schedule and assign job(s) and do not configure the time, that schedule is not launched.
- While defining a job, verify that no interactive or disruptive commands (for example, **copy bootflash: file ftp: URI**, **write erase**, and other similar commands) are specified as part of a job because the job is executed noninteractively at the scheduled time.

Default Settings

[Table 1: Default Command Scheduler Parameters](#), on page 3 lists the default settings for command scheduling parameters.

Table 1: Default Command Scheduler Parameters

Parameters	Default
Command scheduler	Disabled.
Log file size	16 KB.

Configuring the Command Scheduler

The Cisco NX-OS command scheduler provides a facility to schedule a job (set of CLI commands) or multiple jobs at a specified time in the future.

Task Flow for Configuring the Command Scheduler

Follow these steps to configure the Command Scheduler:

Procedure

- Step 1** Enable the scheduler.
 - Step 2** Authorize remote user access (optional).
 - Step 3** Define the job.
 - Step 4** Specify the schedule and assign jobs to the schedule.
 - Step 5** Specify the time for the schedule(s).
 - Step 6** Verify the scheduled configuration.
-

Enabling the Command Scheduler

To use the scheduling feature, you must explicitly enable this feature on the required switches in the fabric. By default, this feature is disabled in all switches in the Cisco MDS 9000 Family.

The configuration and verification commands for the command scheduler feature are only available when this feature is enabled on a switch. When you disable this feature, all related configurations are automatically discarded.

To enable the command scheduling feature, follow these steps:

Procedure

- Step 1** switch# **configure terminal**
Enters configuration mode.
- Step 2** switch(config)# **feature scheduler**
Enables the command scheduler.

Step 3 switch(config)# **no feature scheduler**

Discards the scheduler configuration and disables the command scheduler (default).

Examples

To display the command schedule status, use the **show scheduler config** command.

```
switch# show scheduler config
config terminal
feature scheduler
scheduler logfile size 16
end
```

Configuring Remote User Authentication

Prior to Cisco MDS SAN-OS Release 3.0(3), only users local to the switch could perform scheduler configuration. As of Cisco MDS SAN-OS Release 3.0(3), remote users can perform job scheduling using AAA authentication.

To configure remote user authentication, follow these steps:

Before you begin

AAA authentication requires the clear text password of the remote user before creating and configuring command scheduler jobs.

Procedure

Step 1 switch# **configuration terminal**

Enters configuration mode.

Step 2 switch(config)# **scheduler aaa-authentication password X12y34Z56a**

Configures a clear text password for remote users.

Step 3 switch(config)# **scheduler aaa-authentication password 0 X12y34Z56a**

Configures a clear text password for remote users.

Step 4 switch(config)# **no scheduler aaa-authentication password**

Removes the clear text password for remote users.

Step 5 switch(config)#**scheduler aaa-authentication user newuser password Z98y76X54b**

Configures a clear text password for remote user newuser.

Step 6 switch(config)#**scheduler aaa-authentication user newuser password 0 Z98y76X54b**

Configures a clear text password for remote user newuser.

Step 7 switch(config)# **no scheduler aaa-authentication password user newuser**

Removes the clear text password for remote user newuser.

Defining a Job

To define a job, you must specify the job name. This action places you in the job definition (config-job) submode. In this submode, you can define the sequence of CLI commands that the job has to perform. Be sure to exit the config-job submode to complete the job definition.

- Job configuration files created using MDS NX-OS or SAN-OS releases before Cisco MDS NX-OS Release 4.1(1b) are not supported. However, you can edit the job configuration file and combine the commands within a job into a single line using a semicolon (;).
- You must exit the config-job submode for the job definition to be complete.
- You cannot modify or remove a command after exiting the config-job submode. To make changes, you must explicitly delete the defined job name and then reconfigure the job with new commands.

To define a job for the command scheduler, follow these steps:

Procedure

- Step 1** `switch# configuration terminal`
Enters the configuration mode.
- Step 2** `switch(config)# scheduler job name addMemVsan99`
`switch(config-job)#`
Defines a job name and enters the job definition submode.
- Step 3** `switch(config-job)# command1 ;[command2 ;command3 ;...]`
`switch(config-job-submode)# end`

Example:

```
switch(config-job)# configure terminal;vsan database;vsan 99 interface fc1/1 4
switch(config-job-config-vsan-db)# end
switch#
```

Specifies a sequence of actions for the specified job. The defined commands are checked for validity and stored for future use.

Note Be sure you exit the config-job submode.

Example:

```
switch(config)# scheduler job name offpeakQOS
switch(config-job)# configuration terminal; qos class-map offpeakbackupcmap match-all ;
match source-wwn 23:15:00:05:30:00:2a:1f ; match destination-wwn 20:01:00:05:30:00:28:df
;exit ; qos policy-map offpeakbackuppolicy ; class offpeakbackupcmap ; priority high ; exit
; exit ; qos service policy offpeakbackuppolicy vsan 1
switch(config-job)# end
switch#
```

Provides example of scheduling a set of configuration commands.

Step 4 **exit****Example:**

```
switch(config-job)# exit
switch(config)#
```

Exits the job configuration mode and saves the job.

Step 5 **show scheduler job [name]****Example:**

```
switch(config)# show scheduler job
```

(Optional) Displays the job information.

Step 6 **copy running-config startup-config****Example:**

```
switch(config)# copy running-config startup-config
```

(Optional) Saves this configuration change.

Deleting a Job

To delete a job for the command scheduler, follow these steps:

Procedure

Step 1 **switch# configuration terminal**

Enters the configuration mode.

Step 2 **switch(config)# no scheduler job name addMemVsan99**

Deletes a defined job and all commands defined within that job.

Specifying a Schedule

After defining jobs, you can create schedules and assign jobs to the schedule. Subsequently, you can configure the time of execution. The execution can be one-time or periodic depending on your requirements. If the time for the schedule is not configured, then it will never be executed.

You can specify a periodic job execution at the specified (daily, weekly, monthly, or delta) intervals.

To specify a periodic job for the command scheduler, follow these steps:

Procedure

-
- Step 1** `switch# configuration terminal`
Enters the configuration mode.
- Step 2** `switch(config)# scheduler schedule name weekendbackupqos`
`switch(config-schedule)#`
Defines a job schedule (weekendbackup) and enters the submode for that schedule.
- Step 3** `switch(config)# no scheduler schedule name weekendbackup`
Deletes the defined schedule.
- Step 4** `switch(config-schedule)# job name offpeakZoning`
`switch(config-schedule)# job name offpeakQOS`
Assigns two jobs (offpeakZoning and offpeakQOS) for this schedule.
- Step 5** `switch(config-schedule)# no job name addMem99`
Deletes the job assigned for this schedule.
-

Examples

The following examples are for reference:

Command	Purpose
<code>switch(config-schedule)# time daily 23:00</code>	Executes the specified jobs at 11 p.m. every day.
<code>switch(config-schedule)# time weekly Sun:23:00</code>	Specifies a weekly execution every Sunday at 11 p.m.
<code>switch(config-schedule)# time monthly 28:23:00</code>	Specifies a monthly execution at 11 p.m. on the 28th of each month. If you specify the date as either 29, 30, or 31, the command is automatically executed on the last day of each month.
<code>switch(config-schedule)# time start now repeat 48:00</code>	Specifies a job to be executed every 48 hours beginning 2 minutes from <i>now</i> —if today is September 24, 2004, and the time is now 2:00 p.m., the command begins executing at 2 minutes past 2:00 p.m. on September 24, 2004, and continues to execute every 48 hours after that.
<code>switch(config-schedule)# time start 14:00 repeat 14:00:00</code>	If today is September 24, 2004, (Friday), this command specifies the job to be executed every alternate Friday at 2 p.m. (every 14 days).

The most significant fields in the **time** parameter are optional. If you omit the most significant fields, the values are assumed to be the same as the current time. For example, if the current time is September 24, 2004, 22:00 hours, then the commands are executed as follows:

- The **time start 23:00 repeat 4:00:00** command implies a start time of September 24, 2004, 23:00 hours.
- The **time daily 55** command implies every day at 22:55 hours.
- The **time weekly 23:00** command implies every Friday at 23:00 hours.
- The **time monthly 23:00** command implies the 24th of every month at 23:00 hours.



Note If the time interval configured for any schedule is smaller than the time taken to execute its assigned job(s), then the subsequent schedule execution occurs only after the configured interval amount of time has elapsed following the completion time of the last iteration of the schedule. For example, a schedule is executed at 1-minute intervals and a job assigned to it takes 2 minutes to complete. If the first schedule is at 22:00 hours, the job finishes at 22:02 after which the 1-minute interval is observed, and the next execution occurs at 22:03 and finishes at 22:05.

Specifying a One-Time Schedule

When you specify a one-time job execution, that job is only executed once.

To specify a one-time job for the command scheduler, follow these steps:

Procedure

- Step 1** `switch# configuration terminal`
Enters the configuration mode.
- Step 2** `switch(config)# scheduler schedule name configureVsan99`
`switch(config-schedule)#`
Defines a job schedule (configureVsan99) and enters the submode for that schedule.
- Step 3** `switch(config-schedule)# job name addMemVsan99`
Assigns a predefined job name (addMemVsan99) for this schedule.
- Step 4** `switch(config-schedule)# time start 2004:12:14:23:00`
Specifies a one-time execution on December 14, 2004, at 11 p.m.
- Step 5** `switch(config-schedule)# no time`
Deletes the time assigned for this schedule.
-

Deleting a Schedule

To delete a schedule, follow these steps:

Procedure

- Step 1** switch# **configuration terminal**
Enters the configuration mode.
- Step 2** switch(config)# **no scheduler schedule name weekendbackup**
Deletes the defined schedule.
-

Removing an Assigned Job

To remove an assigned job, follow these steps:

Procedure

- Step 1** switch# **configuration terminal**
Enters the configuration mode.
- Step 2** switch(config)# **scheduler schedule name weekendbackupqos**
switch(config-schedule)#
Specifies a job schedule (weekendbackupqos) and enters the submode for that schedule.
- Step 3** switch(config-schedule)# **no job name addMem99**
Removes a job (addMem99) assigned to this schedule.
-

Deleting a Schedule Time

To delete the schedule time, follow these steps:

Procedure

- Step 1** switch# **configuration terminal**
Enters the configuration mode.

Step 2 switch(config)# **scheduler schedule name weekendbackupqos**
switch(config-schedule)#
Defines a job schedule (weekendbackup) and enters the submode for that schedule.

Step 3 switch(config-schedule)# **no time**
Deletes the schedule time configuration. The schedule will not be run until the time is configured again.

Configuring Execution Logs

The command scheduler maintains a log file. While you cannot modify the contents of this file, you can change the file size. This log file is a circular log that contains the output of the job executed. If the output of the job is greater than the log file, then the output stored in this file remains truncated.

You can configure the log file size to be a maximum of 1024 KB. The default size of the execution log file is 16 KB.

To configure the execution log file size, follow these steps:

Procedure

Step 1 switch# **configuration terminal**
Enters the configuration mode.

Step 2 switch(config)# **scheduler logfile size 1024**
Configures the log file to be a maximum of 1024 KB

Step 3 switch(config)# **no scheduler logfile size**
Defaults to the log size of 16 KB.

Clearing the Execution Log File Contents

To clear the contents of the scheduler execution log file, issue the clear scheduler logfile command in EXEC mode.

```
switch# clear scheduler logfile
```

Verifying Scheduler Configuration

To display the command scheduler configuration information, perform one of the following tasks:

Command	Purpose
show scheduler config	Displays the scheduler configuration
show scheduler schedule	Verifies the command scheduler execution status
show scheduler job	Verifies the job definition
show scheduler logfile	Displays the execution log for all jobs executed in the system
clear scheduler logfile	Clear the contents of the scheduler execution log file

For detailed information about the fields in the output from these commands, refer to the *Cisco MDS 9000 Family Command Reference*.

Verifying the Command Scheduler Configuration

To display the scheduler configuration, use the **show scheduler config** command.

```
switch# show scheduler config
config terminal
  feature scheduler
  scheduler logfile size 512
end
config terminal
  scheduler job name addMemVsan99
  config terminal
    vsan database
    vsan 99 interface fc1/1
    vsan 99 interface fc1/2
    vsan 99 interface fc1/3
    vsan 99 interface fc1/4
  end
config terminal
  scheduler schedule name configureVsan99
  time start 2004:8:10:9:52
  job name addMemVsan99
end
```

Verifying the Command Scheduler Execution Status

To verify the command scheduler execution status, use the **show scheduler schedule** command.

```
switch# show scheduler schedule configureVsan99
Schedule Name      : configureVsan99
-----
User Name         : admin
Schedule Type     : Run once on Tue Aug 10 09:48:00 2004
Last Execution Time: Tue Aug 10 09:48:00 2004
-----
Job Name          Status
```

Verifying the Job Definition

To verify the job definition, use the **show scheduler job** command.

```
switch# show scheduler job addMemVsan99
Job Name: addMemVsan99
-----
config terminal
vsan database
vsan 99 interface fc1/1
vsan 99 interface fc1/2
vsan 99 interface fc1/3
vsan 99 interface fc1/4
```

Displaying Execution Log File Contents

To display the execution log for all jobs executed in the system, use the **show scheduler logfile** command.

```
switch# show scheduler logfile
Job Name       : addMemVsan99           Job Status: Success (0)
Schedule Name  : configureVsan99       User Name  : admin
Completion time: Tue Aug 10 09:48:00 2004
----- Job Output -----
`config terminal`
`vsan database`
`vsan 99 interface fc1/1`
`vsan 99 interface fc1/2`
`vsan 99 interface fc1/3`
`vsan 99 interface fc1/4`
```

To display the scheduler password configuration for remote users, use the **show running-config** command.

```
switch# show running-config | include "scheduler aaa-authentication"
scheduler aaa-authentication username newuser password 7 "C98d76S54e"
```



Note The scheduler remote user passwords are always displayed in encrypted form in the **show running-config** command output. The encrypted option (7) in the command exists to support applying the ASCII configuration to the switch.

To display the execution log file configuration, use the **show scheduler config** command.

```
switch# show scheduler config
config terminal
feature scheduler
scheduler logfile size 1024
end
```

Clearing the Execution Log File Contents

To clear the contents of the scheduler execution log file, issue the **clear scheduler logfile** command in EXEC mode.

```
switch# clear scheduler logfile
-----
addMemVsan99                               Success (0)
```

Configuration Examples for Scheduler

```
configure terminal

scheduler job name start
  configure
  no cli var name time
  exit
  echo $(TIMESTAMP) | sed 's/^/cli var name time /' | vsh
  show switchname > debug-$(time)-1
  show switchname > debug-$(time)-2
  exit

scheduler job name part1
  show clock >> debug-$(time)-1
  show interface mgmt 0 >> debug-$(time)-1
  sleep 60
  show clock >> debug-$(time)-1
  show interface mgmt 0 >> debug-$(time)-1
  sleep 200
  gzip debug-$(time)-1
  exit

scheduler job name part2
  show clock >> debug-$(time)-2
  show processes cpu history >> debug-$(time)-2
  sleep 60
  show clock >> debug-$(time)-2
  show processes cpu history >> debug-$(time)-2
  show clock >> debug-$(time)-2
  gzip debug-$(time)-2
  exit

scheduler schedule name cpu-stats
  job name start
  job name part1
  job name part2
  time start 2001:12:31:01:00
  exit

end
```

