

Configure Boot from SAN in UCS Manager

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Introduction

This document describes how to configure boot from Storage Area Network (SAN) in servers managed by Unified Computing System Manager (UCSM).

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- SAN topologies
- UCSM
- UCS Service Profiles

Components Used

- Cisco UCS 6454 Fabric Interconnect; firmware version 4.2.3h
- Cisco UCS B200 M5; firmware version 4.2.3h

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

Boot from SAN is a feature that allows servers to boot an operating system (OS) installed on external SAN-based storage, rather than a local disk and it is a very common solution currently.

If you boot from the SAN when you move a service profile from one server to another, the new server boots

from the exact same operating system image.

Ensure that you have these requirements before you attempt this configuration:

- Virtual Storage Area Network (VSAN) ID
- World Wide Port Name (WWPN) from initiators and targets
- Logical Unit Number (LUN) ID

Configure

Create Boot Order Policy

Step 1. Navigate to **Servers > Policies > Boot Policies** and click **Add** to create a new Boot policy.

Step 2. Name your policy and select the checkboxes according to your requirements.

Step 3. Extend vHBAs and select **Add SAN Boot** option.

Create Boot Policy

Description :

Reboot on Boot Order Change :

Enforce vNIC/vHBA/iSCSI Name :

Boot Mode : Legacy Uefi

Boot Security :

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Local Devices

CIMC Mounted vMedia

vNICs

vHBAs

Add SAN Boot

Add SAN Boot Target

iSCSI vNICs

EFI Shell

Boot Order

+ - Advanced Filter Export Print

Name	Order	vNIC/vH...	Type	LUN Na...	WWN	Slot Nu...	Boot Na...	Boot Path	Descripti...
No data available									

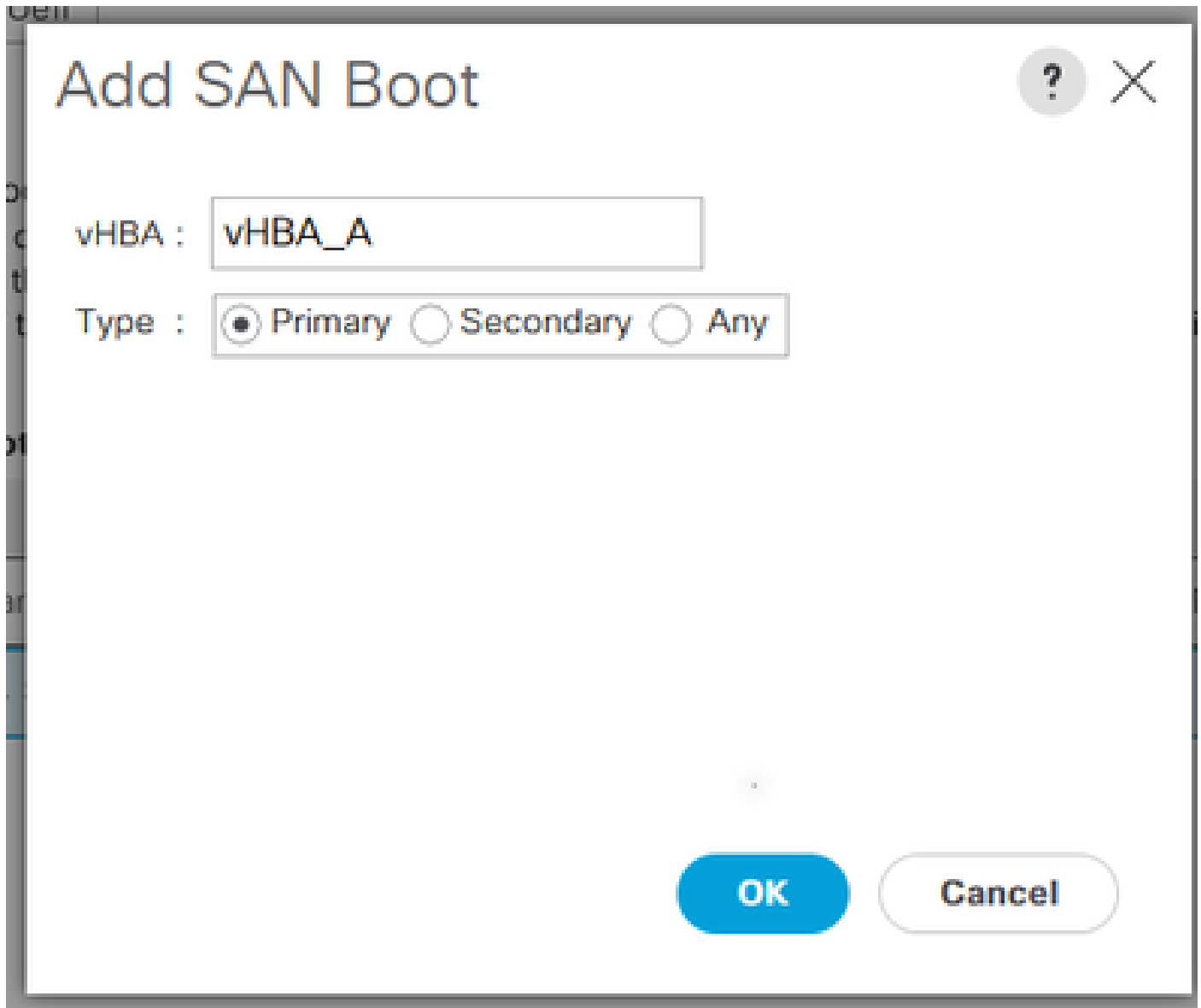
Move Up Move Down Delete

Set Uefi Boot Parameters

OK Cancel

- Note:** If desired, check the Enforce vNIC/vHBA/iSCSI Name check box.
- If checked, Cisco UCS Manager displays a configuration error and reports whether one or more of the vNICs, vHBAs, or iSCSI vNICs listed in the Boot Order table match the server configuration in the service profile.
 - If not checked, Cisco UCS Manager uses the vNICs, vHBAs, or iSCSI vNICs (as appropriate for the boot option) from the server configuration in the service profile. It does not report whether the vNICs, vHBAs, or iSCSI vNICs specified in the boot policy match the server configuration in the service profile.

Step 4. Name your vHBA and select if it goes for Primary, Secondary or Any. Click **Ok**.



Add SAN Boot ? X

vHBA :

Type : Primary Secondary Any

OK Cancel

Step 5. Select **Add SAN Boot Target**.

Create Boot Policy



Name :

Description :

Reboot on Boot Order Change :

Enforce vNIC/vHBA/iSCSI Name :

Boot Mode : Legacy Uefi

Boot Security :

WARNINGS:

The type (primary/secondary) does not indicate a boot order presence.

The effective order of boot devices within the same device class (LAN/Storage/iSCSI) is determined by PCIe bus scan order.

If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.

If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

- Local Devices
- CIMC Mounted vMedia
- vNICs
- vHBAs
 - [Add SAN Boot](#)
 - [Add SAN Boot Target](#)
- iSCSI vNICs
- EFI Shell

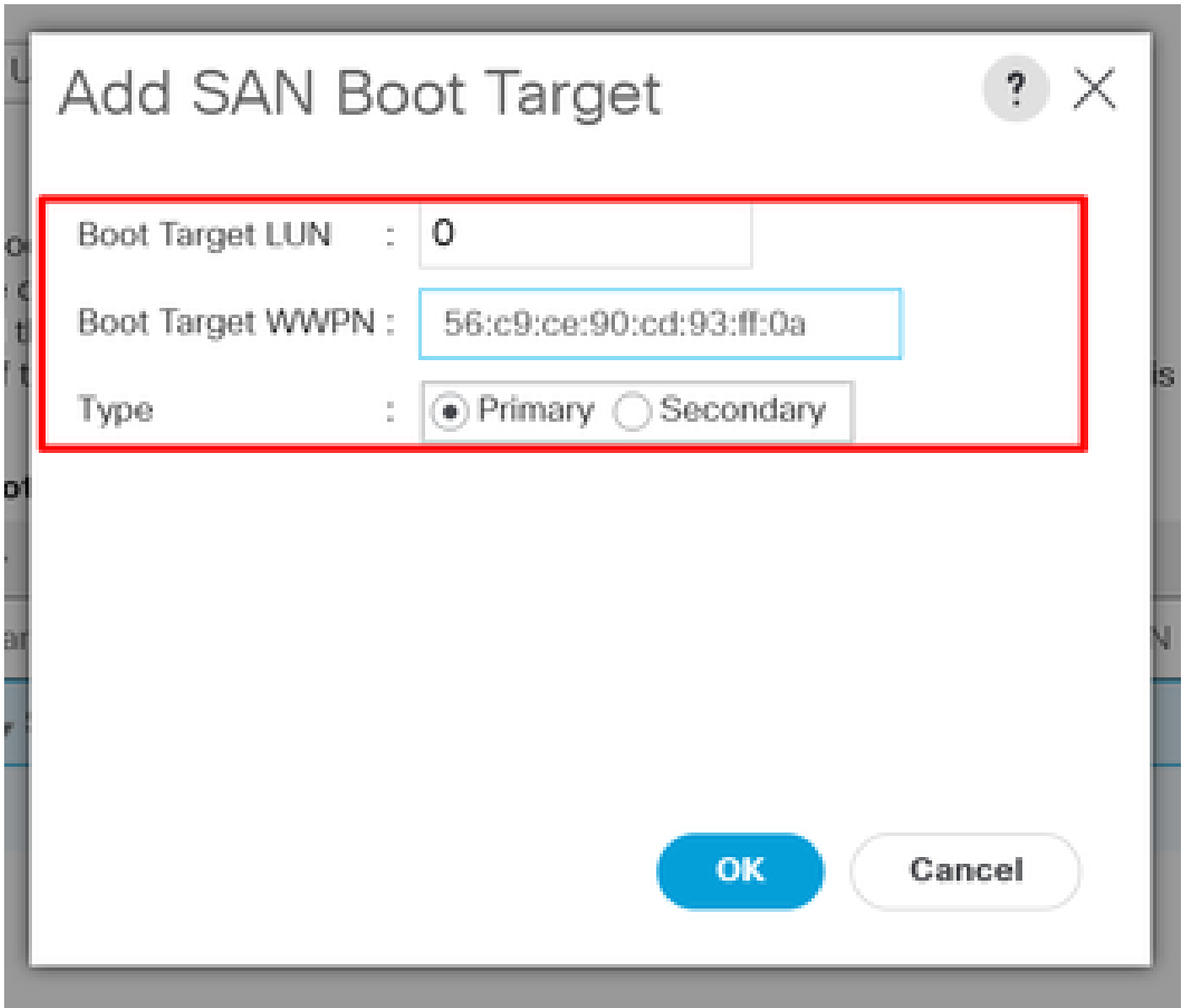
Boot Order

Name	Or...	vNIC/vHBA/IS...	Type	LUN ...	WWN	Slot ...	Boot ...	Boot ...	Desc...
▼ San 1									
SAN Primary		vHBA_A	Prim...						

↑ Move Up ↓ Move Down ⌫ Delete

Set Uefi Boot Parameters

Step 6. It displays a window with the Boot target LUN ID and WWPN. Ensure you enter the WWPN for the Storage and proper LUN ID.



Step 7 (Optional). Add a second SAN Boot and repeat procedure.

Step 8 (Optional). Add CD/DVD option to install the ISO through the virtual KVM.

Create Boot Policy



Reboot on Boot Order Change :

Enforce vNIC/vHBA/iSCSI Name :

Boot Mode : Legacy Uefi

Boot Security :

WARNINGS:

The type (primary/secondary) does not indicate a boot order presence.

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If **Enforce vNIC/vHBA/iSCSI Name** is selected and the vNIC/vHBA/iSCSI does not exist, a config error will be reported.

If it is not selected, the vNICs/vHBAs are selected if they exist, otherwise the vNIC/vHBA with the lowest PCIe bus scan order is used.

Local Devices

- Add Local Disk
 - Add Local LUN
 - Add Local JBOD
 - Add SD Card
 - Add Internal USB
 - Add External USB
 - Add Embedded Local LUN
 - Add Embedded Local Disk
- Add CD/DVD
 - Add Local CD/DVD
 - Add Remote CD/DVD
- Add Floppy
 - Add Local Floppy
 - Add Remote Floppy
- Add Remote Virtual Drive
- Add NVMe

Boot Order

+ - Advanced Filter Export Print

Name	vNIC/vHBA/...	Type	L..	WWN	S..	B..	B..	De:
San	1							
SAN Primary	vHBA_A	Primary						
SAN Target ...		Primary	0	56:C9:CE:90:CD:93:FF:0A				
SAN Secondary	vHBA_B	Secondary						
SAN Target ...		Primary	0	56:C9:CE:90:CD:93:FF:09				
CD/DVD	2							

Move Up Move Down Delete

Set Uefi Boot Parameters

OK Cancel

Step 9. Click **Ok** to save your policy.

Service Profile - vHBAs

Step 1. Navigate to your Service Profile > Storage > vHBAs. Add a World Wide Node Name (WWNN) either static or from a pool.

Servers / Service Profiles / root / Service Profile BootFromSan

General Storage Network iSCSI vNICs vMedia Policy Boot Order Virtual Machines FC Zones Policies Server Details CIMC Sessions FSM

Storage Profiles Local Disk Configuration Policy **vHBAs** vHBA Initiator Groups

Actions

- Change World Wide Node Name
- Modify vNIC/vHBA Placement
- Reset WWNN Address

World Wide Node Name

World Wide Node Name : **20:00:00:25:B5:00:00:4E**
WWNN Pool : **node-default**
WWNN Pool Instance : [org-root/wwn-pool-node-default](#)

Local Disk Configuration Policy


Local Disk Policy : **default**
Local Disk Policy Instance : [org-root/local-disk-config-default](#)

SAN Connectivity Policy

SAN Connectivity Policy :
SAN Connectivity Policy Instance :
[Create SAN Connectivity Policy](#)

vHBAs

Step 2. Add vHBA, name it, and assign a Worl Wide Port Name (static or from pool).

 **Caution:** Ensure that the vHBA is written in the same way as configured in the boot order when using the Enforce vNIC/vHBA/iSCSI Name option.

Step 3. Use your vHBA Template or manually configure your vHBA with Fabric ID, vSAN, and so on, according to your requirements. Click **Ok** to save.

Modify vHBA



Name : vHBA_A

World Wide Port Name

WWPN Assignment: 20:XX:XX:XX:XX:XX:XX

Create WWPN Pool

WWPN : 20:00:00:AA:10:00:00:02

WARNING: For compatibility with Cisco MDS Fibre Channel switches, choose the 20:00:00:25:B5:XX:XX:XX template.

Use vHBA Template :

Create vHBA Template

Fabric ID : A B

Select VSAN : VSAN_100

Create VSAN

Pin Group : <not set>

Create SAN Pin Group

Persistent Binding : Disabled Enabled

Max Data Field Size : 2048

OK

Cancel

Step 4 (Optional). Add more vHBAs as needed or as configured in the boot policy.

Servers / Service Profiles / root / Service Profile BootFromSan

General Storage Network iSCSI vNICs vMedia Policy Boot Order Virtual Machines FC Zones Policies Server Details CIMC Sessions FSM VF Paths Faults Events

Storage Profiles Local Disk Configuration Policy vHBAs vHBA Initiator Groups

Actions

- Change World Wide Node Name
- Modify vNIC/vHBA Placement
- Reset WWNN Address

World Wide Node Name

World Wide Node Name : 20:00:00:25:B5:00:00:4E

WWNN Pool : node-default

WWNN Pool Instance : org-root/wwnn-pool-node-default

Local Disk Configuration Policy

Local Disk Policy : default

Local Disk Policy Instance : org-root/local-disk-config-default

SAN Connectivity Policy

SAN Connectivity Policy : <not set>

SAN Connectivity Policy Instance :

Create SAN Connectivity Policy

vHBAs

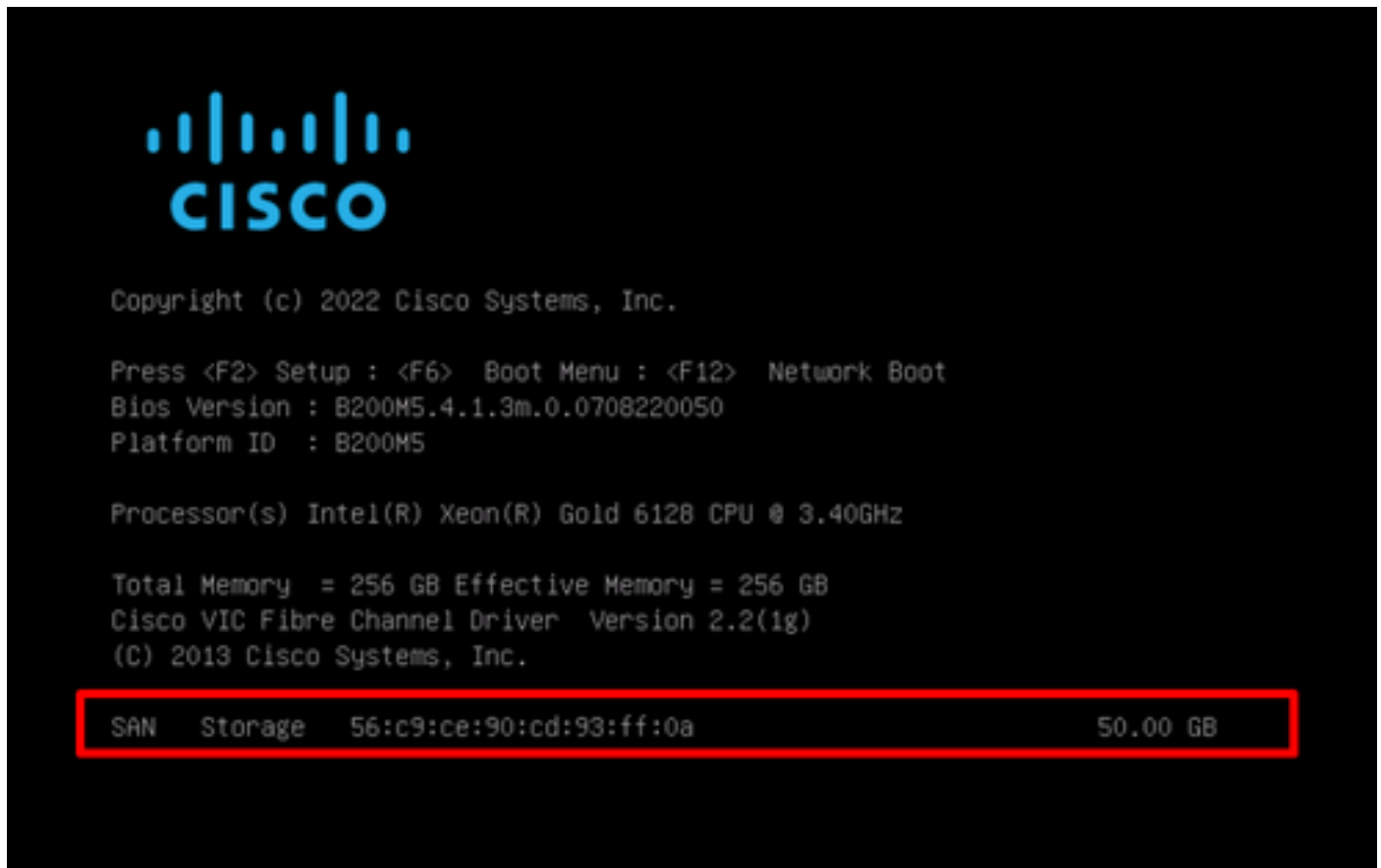
Advanced Filter Export Print

Name	WWPN	Desired Order	Actual Order	Fabric ID	Desired Placement
vHBA vHBA_A	20:00:00:AA:10:00:00:02	1	2	A	Any
vHBA vHBA_B	20:00:00:BB:10:00:00:02	2	4	B	Any

Delete Add Modify

Verify

A legend with the WWPN of the destination appears on the screen when the server boots. If this happens, it means that the configuration you have made is correct.



Troubleshoot

Step 1. Reboot the server and press F6 to access to the Boot Menu. This interrupts the initialization and allows you to connect to adapter and type commands to check connectivity.

Step 2. Open an SSH session to any of the fabric interconnects IP addresses and execute the next commands.

```
#connect adapter x/y/z >>>where x=chassis, y=server, z=adapter
#connect
#attach-fls
#lunlist
```

For example:

```
FI-A#connect adapter 1/5/1
adapter 1/5/1 # connect
adapter 1/5/1 (top):1# attach-fls
adapter 1/5/1 (fls):2# lunlist
vnic : 13 lifid: 3
· FLOGI State : flogi est (fc_id 0x161907)
· PLOGI Sessions
· WWNN 56:c9:ce:90:cd:93:ff:0a WWPN 56:c9:ce:90:cd:93:ff:0a fc_id 0x000000
· LUN's configured (SCSI Type, Version, Vendor, Serial No.)
LUN ID : 0x0000000000000000 access failure
```

- REPORT LUNs Query Response
- WWNN 56:c9:ce:90:cd:93:ff:0a WWPN 56:c9:ce:90:cd:93:ff:0a fc_id 0x000000
- LUN's configured (SCSI Type, Version, Vendor, Serial No.)
- LUN ID : 0x0000000000000000 access failure
- REPORT LUNs Query Response
- Nameserver Query Response
- vnic : 15 lifid: 5
- FLOGI State : flogi est (fc_id 0x741107)
- PLOGI Sessions
- WWNN 58:cc:f0:90:49:63:0b:fa WWPN 58:cc:f0:90:49:63:0b:fa fc_id 0x000000
- LUN's configured (SCSI Type, Version, Vendor, Serial No.)
- LUN ID : 0x0000000000000000 access failure
- REPORT LUNs Query Response
- WWNN 56:c9:ce:90:cd:93:ff:09 WWPN 56:c9:ce:90:cd:93:ff:09 fc_id 0x000000
- LUN's configured (SCSI Type, Version, Vendor, Serial No.)
- LUN ID : 0x0000000000000000 access failure
- REPORT LUNs Query Response
- Nameserver Query Response

If fc_id is 0x0000, as in this example, check the zoning configuration in the Fibre Switch and LUN masking in the storage array.

Ensure that the initiators' WWPNs are configured correctly.

After correction and verification, the result is as follows:

```

adapter 1/5/1 (fls):2# lunlist
vnic : 13 lifid: 3
- FLOGI State : flogi est (fc_id 0x161907)
- PLOGI Sessions
  - WWNN 56:c9:ce:90:cd:93:ff:0a WWPN 56:c9:ce:90:cd:93:ff:0a fc_id 0x160400
  - LUN's configured (SCSI Type, Version, Vendor, Serial No.)
    LUN ID : 0x0000000000000000 (0x0, 0x5, Nimble , 6fed4da9ceb4a3796c9ce9007f78ec52)
  - REPORT LUNs Query Response
    LUN ID : 0x0000000000000000
- Nameserver Query Response
  - WWPN : 56:c9:ce:90:cd:93:ff:05
  - WWPN : 56:c9:ce:90:cd:93:ff:0a

vnic : 15 lifid: 5
- FLOGI State : flogi est (fc_id 0x741107)
- PLOGI Sessions
  - WWNN 56:c9:ce:90:cd:93:ff:09 WWPN 56:c9:ce:90:cd:93:ff:09 fc_id 0x740200
  - LUN's configured (SCSI Type, Version, Vendor, Serial No.)
    LUN ID : 0x0000000000000000 (0x0, 0x5, Nimble , 6fed4da9ceb4a3796c9ce9007f78ec52)
  - REPORT LUNs Query Response
    LUN ID : 0x0000000000000000
- Nameserver Query Response
  - WWPN : 56:c9:ce:90:cd:93:ff:09
  - WWPN : 56:c9:ce:90:cd:93:ff:06

```

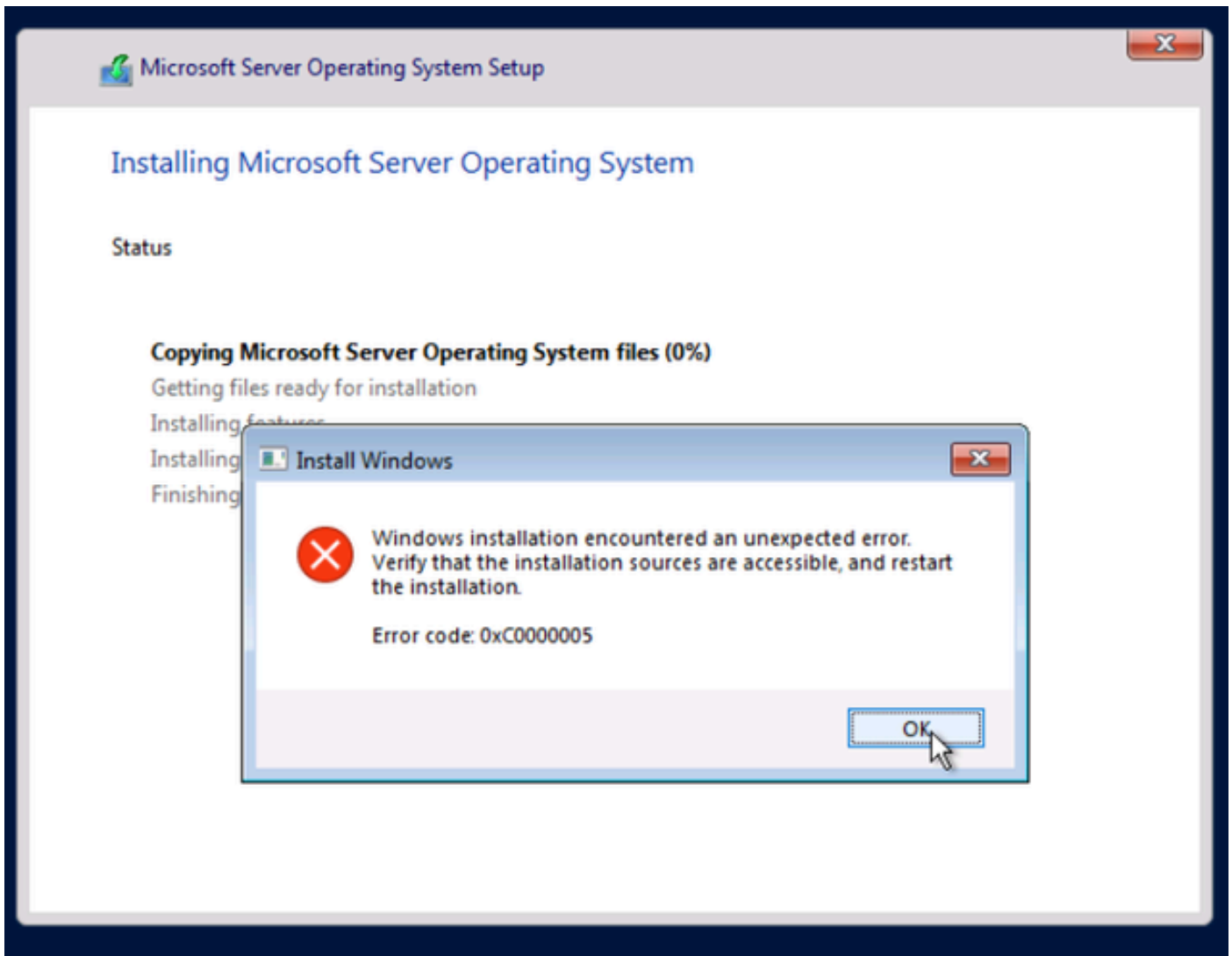
If you see this output and your server is still unable to boot, it is most likely that nothing is installed on your storage and you must map the ISO and install the operating system.

Windows Installation

Take into account the points when you install Windows for the first time.

- Ensure you use the correct driver version to see the storage where the Operating System is installed.

You can possibly encounter this error when you install Windows:



This error can possibly occur when you configured multiple SAN Boot Targets.

- Disable multipath in your server. Leave only one path to reach the remote storage.
 - Navigate to your server under Equipment tab. Expand it and look for your HBAs.
 - Disable your HBAs to leave only one active. Click on **Disable** button located in the Actions menu.

Equipment / Chassis / Chassis 1 / Servers / Server 5 / Adapters / Adapter 1 / HBAs / HBA 1

General | Faults | Events | FSM | Statistics

Fault Summary

0 0 0 0

States

Operability : + **Operable**

Actions

Reset Connectivity

Enable

Disable

Enable-Active

Disable-Active

Enable-Passive

Disable-Passive

Properties

ID : 1

Vendor : **Cisco Systems Inc**

vHBA : org-root/ls-BootFromSan/fc-vHBA_A

PCIe Address : **62:00:1**

WWPN : **20:00:00:AA:10:00:00:02**

Original WWPN : **00:00:00:00:00:00:00:00**

WWNN : **20:00:00:25:85:00:00:4E**

Original WWNN : **00:00:00:00:00:00:00:00**


Fabric Port : sys/chassis-1/slot-1/host/port-17

Purpose : **General**

Name : **vHBA_A**

Type : **Virtual**

- Verify that the zoning is properly configured and does not point to multiple targets.
 - If issue persists, modify your zoning to leave only one SAN target.

 **Note:** Once the installation is complete, re-enable your HBAs and configure zoning accordingly. Verify that your server boots from SAN as expected.

Related Information

- [Troubleshooting SAN Boot and SAN Connectivity Issues](#)
- [Technical Support & Documentation - Cisco Systems](#)