



Linux Host Utilities

ONTAP SAN Host Utilities

NetApp
January 30, 2026

This PDF was generated from <https://docs.netapp.com/us-en/ontap-sanhost/hu-luhu-release-notes.html> on January 30, 2026. Always check docs.netapp.com for the latest.

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Linux Host Utilities

Linux Host Utilities Release Notes

The release notes describe new features, enhancements, fixed issues, known issues, limitations, and important cautions for configuring and managing your specific host with your ONTAP storage system.

For specific information about the operating system versions and updates that the Host Utilities support, see the [Interoperability Matrix Tool](#).

What's New in Linux Host Utilities 8.0

The Linux Host Utilities 8.0 release contains the following new features and enhancements

Linux Host Utilities 8.0 includes support for 64-bit speed QLogic and Emulex FC host bus adapters (HBA).

The following operating systems are supported:

- Red Hat Enterprise Linux (RHEL) 9 and 8 series
- SUSE Linux Enterprise Server
- Oracle Linux 9 and 8 series
- Ubuntu

What's New in Linux Host Utilities 7.1

The Linux Host Utilities 7.1 release contains the following new features and enhancements:

- Linux Host Utilities is now called *Linux Unified Host Utilities* because it supports NetApp E-Series storage systems running SANtricity as well as AFF, FAS, and ASA systems running ONTAP.
- The following operating systems are supported:
 - Citrix XenServer
 - KVM and XEN, RHEV 6.5 and 6.4
 - Oracle VM 3.2 series
 - Oracle Linux 7 and 6 series
 - RHEL 7 and 6 series
 - SUSE Linux Enterprise Server 15 series
 - SUSE Linux Enterprise Server 11 SP4
- On RHEL 6 and 7 hosts, a tuned package for setting server profiles is now supported. You can use the `tuned-adm` command to set different profiles, depending on the environment. For example, you can use the virtual guest profile as a guest virtual machine and the enterprise storage profile for configurations when LUNs from enterprise storage arrays are used. Using these tuned packages can result in improvement in throughput and latency in ONTAP.
- Linux Host Utilities 7.1 adds support for 32GB FC adapters from Broadcom Emulex and Marvell QLogic.



NetApp continues to work with the Linux Host Utilities to add support for features after the initial release. For latest information about the features that are supported and the new features that have been added, see the [Interoperability Matrix Tool](#).

Fixed issues

The following issues have been fixed in Linux Host Utilities.

Fixed in version	Description
7.1	The intermittent host OS failure issue that occurs when running the <code>sanlun lun show -p</code> command in SUSE Linux Enterprise Server 12 SP1, Oracle Linux 7.2, RHEL 7.2, and RHEL 6.8.

Known issues and limitations

You should be aware of the following known issues and limitations that might impact performance on your specific host:

NetApp Bug ID	Affects version	Title	Description
1457017	7.1	sanlun installation issues warning messages related to <code>libdevmapper.so</code> and <code>libnl.so</code> libraries. These warnings do not affect the functionality of <code>sanlun</code> kit.	<p>When you execute the Linux Host Utilities CLI command - "<code>sanlun fcp show adapter -v</code>" on a SAN host, the command fails with an error message displaying that the library dependencies required for an host bus adapter HBA discovery cannot be located:</p> <pre>[root@hostname ~]# sanlun fcp show adapter -v Unable to locate /usr/lib64/libHBAAPI.so library Make sure the package installing the library is installed & loaded Refer to NetApp Bugs Online - 1508554.</pre>

[NetApp Bugs Online](#) provides complete information for most known issues, including suggested workarounds where possible.

What's next

[Learn about installing Linux Host Utilities](#)

Install Linux Host Utilities

Install Linux Host Utilities 8.0 for ONTAP storage

The Linux Host Utilities help you manage ONTAP storage attached to a Linux host.

NetApp strongly recommends installing the Linux Host Utilities, but it isn't mandatory. The utilities improve management and assist NetApp customer support in gathering information about your configuration.

Linux Host Utilities 8.0 supports the following distribution types:

- Red Hat Enterprise Linux (RHEL)
- SUSE Linux Enterprise Server
- Oracle Linux
- Ubuntu



The Linux Host Utilities software doesn't support NVMe over Fibre Channel (NVMe/FC) and NVMe over TCP (NVMe/TCP) host protocols.

About this task

When you install the Linux Host Utilities, it doesn't change any settings on your Linux host.

Before you begin

- For reliable operation, use the [Interoperability Matrix Tool](#) to verify that your iSCSI, FC, or FCoE configuration is supported.
- Install the host bus adapter (HBA) management packages available on the vendor support site. The management software enables the `sanlun` commands to gather information about the FC HBAs, such as their WWPNs.

Refer to the vendor documentation to verify that the following packages are correctly installed. These packages are required to support the `sanlun fcp show adapter` command:

- Marvell QLogic HBA – QConvergeConsole CLI
- Broadcom Emulex HBA - OneCommand Manager core application CLI

Steps

1. If you have a version of Linux Host Utilities currently installed, remove it:

Linux hosts

Remove Linux Host Utilities from a RHEL, SUSE Linux Enterprise Server, or Oracle Linux host:

```
rpm -e netapp_linux_unified_host_utilities-x-x
```

Ubuntu

Remove Linux Host Utilities from an Ubuntu host:

```
sudo apt remove netapp_linux_unified_host_utilities-x-x
```

For earlier versions of Linux Host Utilities, go to the directory where the host utility software is installed and enter the uninstall command to remove the installed package.

2. The NetApp Linux Host Utilities software package is available on the NetApp Support Site in a 64-bit .rpm file. Download the 64-bit file from the [NetApp Support Site](#) to your host.
3. Go to the directory to which you downloaded the software package and install it:

Linux hosts

Install Linux Host Utilities 8.0 on a RHEL, SUSE Linux Enterprise Server, or Oracle Linux host:

```
rpm -ivh netapp_linux_unified_host_utilities-8-0.x86_xx.rpm
```

You should see an output similar to the following example:

```
rpm -ivh netapp_linux_unified_host_utilities-8-0.x86_64.rpm
Verifying...
##### [100%]
Preparing...
##### [100%]
Updating / installing...

1:netapp_linux_unified_host_utilities-8-0.x86_64.rpm#####
# [100%]
```

Ubuntu

- a. Install Linux Host Utilities 8.0 on an Ubuntu host:

```
sudo apt install
/<path_to_file>/netapp_linux_unified_host_utilities-8-
0.x86_xx.deb
```

- b. Manually link the Ubuntu OS to the HBA library:

```
cp
/opt/QLogic_Corporation/QConvergeConsoleCLI/lib64/libHBAAPI.so.2.
0.2 /usr/lib64/libHBAAPI.so
```

4. Verify the installation:

```
sanlun version
```

You should see an output similar to the following example:

```
sanlun version 8.0.386.1644
```

What's next?

- Recommended driver settings with Linux kernel

When you configure an FC environment that uses native inbox drivers that are bundled with the Linux kernel, you can use the default values for the drivers.

- [Learn about the "sanlun" utility.](#)

Install Linux Host Utilities 7.1 for ONTAP storage

The Linux Host Utilities help you manage ONTAP storage attached to a Linux host. NetApp strongly recommends installing the Linux Host Utilities, but it isn't mandatory. The utilities improve management and assist NetApp customer support in gathering information about your configuration.

Linux Host Utilities 7.1 supports the following distribution types:

- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- Oracle Linux
- Oracle VM
- Citrix XenServer



The Linux Host Utilities software doesn't support NVMe over Fibre Channel (NVMe/FC) and NVMe over TCP (NVMe/TCP) host protocols.

About this task

When you install the Linux Host Utilities, it doesn't change any settings on your Linux host.

Before you begin

- For reliable operation, use the [Interoperability Matrix Tool](#) to verify that your iSCSI, FC, or FCoE configuration is supported.
- Install the host bus adapter (HBA) management packages available on the vendor support site. The management software enables the `sanlun` commands to gather information about the FC HBAs, such as their WWPNs.

Refer to the vendor documentation to verify that the following packages are correctly installed. These packages are required to support the `sanlun fcp show adapter` command:

- Marvell QLogic HBA – QConvergeConsole CLI
- Broadcom Emulex HBA - OneCommand Manager core application CLI
- Marvell Brocade HBA – Brocade Command Utility CLI
- Install the RPM "libhbaapi" and "libhbalinux" packages available for each Linux distribution on the Linux

host OS.

Steps

1. If you have a version of Linux Host Utilities currently installed, remove it:

```
rpm -e netapp_linux_unified_host_utilities-7-1
```

For earlier versions of Linux Host Utilities, go to the directory where the host utility software is installed and enter the uninstall command to remove the installed package.

2. Download the 32-bit or 64-bit Linux Host Utilities software package from the [NetApp Support Site](#) to your host.
3. Go to the directory to which you downloaded the software package and install it:

```
rpm -ivh netapp_linux_unified_host_utilities-7-1.x86_xx.rpm
```

You should see an output similar to the following example:

```
Verifying... #####
[100%]
Preparing... #####
[100%]
Updating / installing...
 1:netapp_linux_unified_host_utiliti#####
[100%]
```

4. Verify the installation:

```
sanlun version
```

You should see an output similar to the following example:

```
sanlun version 7.1.386.1644
```

What's next?

- Recommended driver settings with Linux kernel

When you configure an FC environment that uses native inbox drivers that are bundled with the Linux kernel, you can use the default values for the drivers.

- [Learn about the "sanlun" utility.](#)

Learn about the "sanlun" utility for ONTAP storage

Linux Host Utilities is a NetApp host software that provides `sanlun` commands on your Linux host. The `sanlun` utility is installed automatically when you install the NetApp Host Utilities package. This utility provides the `sanlun` commands that you can use to manage ONTAP LUNs and host bus adapters (HBAs). The `sanlun` commands return information about the ONTAP LUNs mapped to your host, multipathing, and information necessary to create initiator groups.

In the following example, the `sanlun lun show all` command returns ONTAP LUN information:

```
controller(7mode/E-Series) /          device      host          lun
vserver(cDOT/FlashRay)   lun-pathname filename  adapter  protocol  size
Product
-----
-----
data_vserver              /vol/vol1/lun1  /dev/sdb    host16    FCP
120.0g  cDOT
data_vserver              /vol/vol1/lun1  /dev/sdc    host15    FCP
120.0g  cDOT
data_vserver              /vol/vol2/lun2  /dev/sdd    host16    FCP
120.0g  cDOT
data_vserver              /vol/vol2/lun2  /dev/sde    host15    FCP
120.0g  cDOT
```

- For Linux Host Utilities 7.1, the "sanlun" utility is common across all configurations and protocols of the Host Utilities. As a result, some of its contents apply to one configuration, but not another. Having unused components doesn't affect your system performance.
- The "sanlun" utility isn't supported for the following hypervisor types:



8.0

For Linux Host Utilities 8.0, the "sanlun" utility isn't supported for Citrix XenServer, Oracle VM, and Red Hat Enterprise Virtualization.

7.1

For Linux Host Utilities 7.1, the "sanlun" utility isn't supported for Citrix Xenserver, Red hat Enterprise Virtualization, and Proxmox.

What's next?

[Learn about using the Linux Host Utilities tool.](#)

Use Linux Host Utilities commands to verify ONTAP storage configuration

You can use the Linux Host Utilities sample command reference for an end-to-end validation of the NetApp storage configuration using the Host Utilities tool.

List all host initiators mapped to host

You can retrieve a list of all host initiators mapped to a host.

```
sanlun fcp show adapter -v
```

Show example

```
adapter name:      host15
WWPN:              10000090fa022736
WWNN:              20000090fa022736
driver name:       lpfc
model:             LPe16002B-M6
model description: Emulex LPe16002B-M6 PCIe 2-port 16Gb Fibre Channel
Adapter
serial number:     FC24637890
hardware version:  0000000b 00000010 00000000
driver version:    12.8.0.5; HBAAPI(I) v2.3.d, 07-12-10
firmware version:  12.8.340.8
Number of ports:   1
port type:         Fabric
port state:        Operational
supported speed:   4 GBit/sec, 8 GBit/sec, 16 GBit/sec
negotiated speed:  16 GBit/sec
OS device name:    /sys/class/scsi_host/host15

adapter name:      host16
WWPN:              10000090fa022737
WWNN:              20000090fa022737
driver name:       lpfc
model:             LPe16002B-M6
model description: Emulex LPe16002B-M6 PCIe 2-port 16Gb Fibre Channel
Adapter
serial number:     FC24637890
hardware version:  0000000b 00000010 00000000
driver version:    12.8.0.5; HBAAPI(I) v2.3.d, 07-12-10
firmware version:  12.8.340.8
Number of ports:   1
port type:         Fabric
port state:        Operational
supported speed:   4 GBit/sec, 8 GBit/sec, 16 GBit/sec
negotiated speed:  16 GBit/sec
OS device name:    /sys/class/scsi_host/host16
```

List all LUNs mapped to host

You can retrieve a list of all LUNs mapped to a host.

```
sanlun lun show -p -v all
```

Show example

```
ONTAP Path: vs_sanboot:/vol/sanboot_169/lun
LUN: 0
LUN Size: 150g
Product: cDOT
Host Device: 3600a0980383143393124515873683561
Multipath Policy: service-time 0
DM-MP Features: 3 queue_if_no_path pg_init_retries 50
Hardware Handler: 1 alua
Multipath Provider: Native
```

```
-----
-----
dm-mp      host      vservers      host:
state      path      path      /dev/      chan:      vservers      major:
           state      type      node      id:lun      LIF      minor
-----
-----
active      up      primary      sdq      15:0:5:0      lif_18      65:0
active      up      primary      sds      16:0:5:0      lif_17      65:32
active      up      primary      sdac      16:0:7:0      lif_25      65:192
active      up      primary      sdad      15:0:7:0      lif_26      65:208
active      up      secondary    sdt      15:0:4:0      lif_20      65:48
active      up      secondary    sdr      15:0:6:0      lif_19      65:16
active      up      secondary    sdad      16:0:4:0      lif_27      66:96
active      up      secondary    sdan      16:0:6:0      lif_28      66:112
```

List all LUNs mapped to host from a given SVM

You can retrieve a list of all LUNs mapped to a host from a specific storage VM (SVM).

```
sanlun lun show -p -v vs_sanboot
```

Show example

```
ONTAP Path: vs_sanboot:/vol/sanboot_169/lun
LUN: 0
LUN Size: 160g
Product: cDOT
Host Device: 3600a0980383143393124515873683561
Multipath Policy: service-time 0
DM-MP Features: 3 queue_if_no_path pg_init_retries 50
Hardware Handler: 1 alua
Multipath Provider: Native
```

```
-----
-----
dm-mp      host      vservers      host:
major:     path      path      /dev/      chan:      vservers
state      state      type      node      id:lun      LIF
minor
-----
-----
active     up        primary    sdce      15:0:5:0    lif_16g_5
69:32
active     up        primary    sdfk      16:0:5:0    lif_16g_7
130:96
active     up        primary    sdfm      16:0:7:0    lif_16g_8
130:128
active     up        primary    sdcg      15:0:7:0    lif_16g_6
69:64
active     up        secondary  sdcd      15:0:4:0    lif_16g_1
69:16
active     up        secondary  sdcf      15:0:6:0    lif_16g_2
69:48
active     up        secondary  sdfj      16:0:4:0    lif_16g_3
130:80
active     up        secondary  sdf1      16:0:6:0    lif_16g_4
130:112
```

List all attributes of a given LUN mapped to host

You can retrieve a list of all attributes of a specified LUN mapped to a host.

```
sanlun lun show -p -v vs_sanboot:/vol/sanboot_169/lun
```

Show example

```
ONTAP Path: vs_sanboot:/vol/sanboot_169/lun
LUN: 0
LUN Size: 160g
Product: cDOT
Host Device: 3600a0980383143393124515873683561
Multipath Policy: service-time 0
DM-MP Features: 3 queue_if_no_path pg_init_retries 50
Hardware Handler: 1 alua
Multipath Provider: Native
```

dm-mp major: state minor	host path	vserver path	/dev/	host: chan:	vserver
	state	type	node	id:lun	LIF
active 69:32	up	primary	sdce	15:0:5:0	lif_16g_5
active 130:96	up	primary	sdfk	16:0:5:0	lif_16g_7
active 130:128	up	primary	sdfm	16:0:7:0	lif_16g_8
active 69:64	up	primary	sdcg	15:0:7:0	lif_16g_6
active 69:16	up	secondary	sdc d	15:0:4:0	lif_16g_1
active 69:48	up	secondary	sdc f	15:0:6:0	lif_16g_2
active 130:80	up	secondary	sdf j	16:0:4:0	lif_16g_3
active 130:112	up	secondary	sdf l	16:0:6:0	lif_16g_4

List the ONTAP SVM identity from which a given LUN is mapped to host

You can retrieve a list of ONTAP SVM identity from which a specific LUN is mapped to a host.

```
sanlun lun show -m -v vs_sanboot:/vol/sanboot_169/lun
```

Show example

```

                                device
host                               lun
vserver                           lun-pathname      filename
adapter    protocol    size    product
-----
vs_sanboot                               /vol/sanboot_169/lun      /dev/sdfm
host16      FCP          160g    cDOT
          LUN Serial number: 81C91$QXsh5a
          Controller Model Name: AFF-A400
          Vserver FCP nodename: 2008d039ea1308e5
          Vserver FCP portname: 2010d039ea1308e5
          Vserver LIF name: lif_16g_8
          Vserver IP address: 10.141.12.165
                                10.141.12.161
                                10.141.12.163
          Vserver volume name: sanboot_169
MSID::0x000000000000000000000000000000000809E7CC3
          Vserver snapshot name:
```

List ONTAP LUN attributes by host device filename

You can retrieve a list of ONTAP LUN attributes by a host device filename.

```
sanlun lun show -d /dev/sdce
```

Show example

```

controller(7mode/E-Series)/                                device      host
lun
vserver(cDOT/FlashRay)      lun-pathname      filename
adapter    protocol    size    product
-----
vs_sanboot                               /vol/sanboot_169/lun      /dev/sdce      host15
FCP          160g    cDOT
[root@sr630-13-169 ~]#
```

List all SVM target LIF WWPNs attached to host

You can retrieve a list of all SVM target LIF WWPNs attached to a host.

```
sanlun lun show -wwpn
```

Show example

```
controller(7mode/E-Series)/  target
device      host      lun
vserver(cDOT/FlashRay)      wwpn      lun-pathname
filename     adapter    size    product
-----
vs_169_16gEmu      202cd039ea1308e5
/vol/VOL_8g_169_2_8/lun      /dev/sdlo      host18      10g      cDOT
vs_169_16gEmu      202cd039ea1308e5
/vol/VOL_8g_169_2_9/lun      /dev/sdlp      host18      10g      cDOT
vs_169_16gEmu      202cd039ea1308e5
/vol/VOL_8g_169_2_7/lun      /dev/sdln      host18      10g      cDOT
vs_169_16gEmu      202cd039ea1308e5
/vol/VOL_8g_169_2_5/lun      /dev/sdll      host18      10g      cDOT
```

List ONTAP LUNs seen on host by a given SVM target LIF WWPN

You can retrieve a list of ONTAP LUNs noticed on a host by a specified SVM target LIF WWPN.

```
sanlun lun show -wwpn 2010d039ea1308e5
```

Show example

```
controller(7mode/E-Series)/  target
device      host      lun
vserver(cDOT/FlashRay)      wwpn      lun-pathname
filename     adapter    size    product
-----
vs_sanboot      2010d039ea1308e5      /vol/sanboot_169/lun
/dev/sdfm      host16      160g      cDOT
```


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