Linux Host Utilities

ONTAP SAN Host Utilities

NetApp
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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 `sanlun lun show -p` 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 `libdevmapper.so` and `libnl.so` libraries. These warnings do not affect the functionality of `sanlun` kit.	When you execute the Linux Host Utilities CLI command - "sanlun fcp show adapter -v" 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:
			
			`[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.

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_utiliti################################
# [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
----------- --------- ---------- ------- ------------ ----------
----------
            host      vserver            host:
dm-mp       path      path       /dev/   chan:        vserver    major:
state       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
----------- --------- ---------- ------- ------------ ---------------
----------
            host      vserver            host:
dm-mp       path      path       /dev/   chan:        vserver
major:
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  sdfl    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
----------- --------- ---------- ------- ------------ -----------------
----------
            host      vserver            host:
dm-mp       path      path       /dev/   chan:        vserver
major:
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  sdfl    16:0:6:0     lif_16g_4
130:112
```

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 hist.

```
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::0x00000000000000000000000809E7CC3
         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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