SAN host utilities

SAN hosts and cloud clients

NetApp
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What you'll need

- For reliable operation, you must verify that your entire iSCSI, FC, or FCoE configuration is supported.

  You can use the NetApp Interoperability Matrix Tool to verify your configuration.

SAN Toolkit

AIX Host Utilities is a NetApp host software that provides a command line tool kit on your IBM AIX host. The toolkit is installed when you install the NetApp Host Utilities package. This kit provides the `sanlun` utility, which helps you manage LUNs and HBAs. The `sanlun` command returns information about the LUNs mapped to your host, multipathing, and information necessary to create initiator groups.

Example

In the following example, the `sanlun lun show` command returns the LUN information.

```
#sanlun lun show all

controller(7mode)/ device host lun

vserver(Cmode) lun-pathname filename adapter protocol size mode
--------------------------------------------------------------
data_vserver   /vol/vol1/lun1 hdisk0 fcs0    FCP      60g C
data_vserver   /vol/vol2/lun2 hdisk0 fcs0    FCP      20g C
data_vserver   /vol/vol3/lun3 hdisk11 fcs0   FCP      20g C
data_vserver   /vol/vol4/lun4 hdisk14 fcs0   FCP      20g C
```

This toolkit 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 does not affect your system performance.

The SAN toolkit is supported on AIX and PowerVM/VIOS OS versions.

Install AIX Host Utilities

The NetApp AIX Host Utilities software package is available on the NetApp Support Site in a compressed tar.gz file.

You must install the AIX Host Utilities Kit while using AIX MPIO with NetApp ONTAP Storage.

You can download the compressed file containing the Host Utilities software packages from the NetApp Support Site. After you have downloaded the file, you must decompress it to get the two software packages

you need to install the Host Utilities.

Steps

1. Login to your host.
   - On an AIX host, log in as **root**.
   - On a PowerVM host, log in as **padmin**, and then enter the oem_setup_env command to become root.
2. Download a copy of the compressed file containing the Host Utilities from NetApp Support Site to a directory on your host.
3. Go to the directory containing the download.
4. Decompress the file and extract the SAN Toolkit software package.

   ```
   tar -xvf ntap_aix_host_utilities_6.1.tar.gz
   ```

   The following directory is created when you decompress the file: `ntap_aix_host_utilities_6.1`. This directory will have one of the following subdirectories: MPIO, NON_MPIO, or SAN_Tool_Kit.

5. Install the AIX MPIO:

   ```
   installp -aXYd /var/tmp/ntap_aix_host_utilities_6.1/MPIO
   NetApp.MPIO_Host_Utilities_Kit
   ```

6. Install the SAN Toolkit:

   ```
   installp -aXYd /var/tmp/ntap_aix_host_utilities_6.1/SAN_Tool_Kit
   NetApp.SAN_toolkit
   ```

7. Reboot the host.
8. Verify the installation:

   ```
   sanlun version
   ```

Sample command reference

List all host initiators mapped to host

```
# sanlun fcp show adapter -v
bash-3.2# sanlun fcp show adapter -v
adapter name: fcs0
WWPN: 100000109b22e143
WWNN: 200000109b22e143
driver name: /usr/lib/drivers/pci/emfcdd
model: df1000e31410150
model description: FC Adapter
serial number: YA50HY79S117
hardware version: Not Available
driver version: 7.2.5.0
firmware version: 00012000040025700027
Number of ports: 1
port type: Fabric
port state: Operational
supported speed: 16 GBit/sec
negotiated speed: Unknown
OS device name: fcs0
adapter name: fcs1
WWPN: 100000109b22e144
WWNN: 200000109b22e144
driver name: /usr/lib/drivers/pci/emfcdd
model: df1000e31410150
model description: FC Adapter
serial number: YA50HY79S117
hardware version: Not Available
driver version: 7.2.5.0
firmware version: 00012000040025700027
Number of ports: 1
port type: Fabric
port state: Operational
supported speed: 16 GBit/sec
negotiated speed: Unknown
OS device name: fcs1
bash-3.2#
```

List all LUNs mapped to host

```
# sanlun lun show -p -v all
ONTAP Path: vs_aix_clus:/vol/gpfs_205p2_207p1_vol_0_8/aix_205p2_207p1_lun
LUN: 88
LUN Size: 15g
Host Device: hdisk9
Mode: C
Multipath Provider: AIX Native
Multipathing Algorithm: round_robin

host    vserver  AIX   AIX MPIO
path    path     MPIO  host      vserver      path
state   type     path  adapter   LIF          priority
-------------------------------------------------------
up     primary   path0   fcs0    fc_aix_1     1
up     primary   path1   fcs1    fc_aix_2     1
up     secondary path2   fcs0    fc_aix_3     1
up     secondary path3   fcs1    fc_aix_4     1
```

List all LUNs mapped to host from a given SVM

```
# sanlun lun show -p -v sanboot_unix

ONTAP Path: sanboot_unix:/vol/aix_205p2_boot_0/boot_205p2_lun
LUN: 0
LUN Size: 80.0g
Host Device: hdisk85
Mode: C
Multipath Provider: AIX Native
Multipathing Algorithm: round_robin

host    vserver    AIX   AIX MPIO
path    path       MPIO  host    vserver    path
state   type       path  adapter LIF        priority
-------------------------------------------------------
up      primary    path0 fcs0    sanboot_1   1
up      primary    path1 fcs1    sanboot_2   1
up      secondary  path2 fcs0    sanboot_3   1
up      secondary  path3 fcs1    sanboot_4   1
```

List all attributes of a given LUN mapped to host

```
# sanlun lun show -p -v
vs_aix_clus:/vol/gpfs_205p2_207p1_vol_0_8/aix_205p2_207p1_lun
ONTAP Path: vs_aix_clus:/vol/gpfs_205p2_207p1_vol_0_8/aix_205p2_207p1_lun
LUN: 88
LUN Size: 15g
Host Device: hdisk9
Mode: C
Multipath Provider: AIX Native
Multipathing Algorithm: round_robin

host     vserver   AIX   AIX MPIO
path     path      MPIO  host     vserver   path
state    type      path  adapter  LIF       priority
-------------------------------------------------------
up       primary   path0 fcs0    fc_aix_1   1
up       primary   path1 fcs1    fc_aix_2   1
up       secondary path2 fcs0    fc_aix_3   1
up       secondary path3 fcs1    fc_aix_4   1
```

List ONTAP LUN attributes by Host Device File name

```
#sanlun lun show -d /dev/hdisk1
controller(7mode)/
device host lun
vserver(Cmode)     lun-pathname
------------------------------------------------------------------------------
---
vs_aix_clus       /vol/gpfs_205p2_207p1_vol_0_0/aix_205p2_207p1_lun

filename adapter protocol size mode
----------------------------------
hdisk1    fcs0    FCP     15g  C
```

List all SVM target LIF WWPNs attached to host

```
# sanlun lun show -wwpn
controller(7mode)/
target device host lun
vserver(Cmode)          wwpn            lun-pathname
------------------------------------------------------------------------
------

vs_aix_clus          203300a098ba7afe
/vol/gpfs_205p2_207p1_vol_0_0/aix_205p2_207p1_lun
vs_aix_clus          203300a098ba7afe
/vol/gpfs_205p2_207p1_vol_0_9/aix_205p2_207p1_lun
vs_aix_clus          203300a098ba7afe
/vol/gpfs_205p2_207p1_vol_en_0_0/aix_205p2_207p1_lun_en
vs_aix_clus          202f00a098ba7afe
/vol/gpfs_205p2_207p1_vol_en_0_1/aix_205p2_207p1_lun_en

filename     adapter    size  mode
----------------------------------
hdisk1       fcs0       15g    C
hdisk10      fcs0       15g    C
hdisk11      fcs0       15g    C
hdisk12      fcs0       15g    C
```

AIX Host Utilities 6.1 Release Notes

This Release Notes document contains the latest information on the AIX Host Utilities 6.1 release, including updates about known problems, limitations, configuring and managing your ONTAP storage system.

The Release Notes document is updated when new information on using the AIX Host Utilities becomes available.

About the AIX Host Utilities 6.1 release

The AIX Host Utilities enable you to connect an AIX host to NetApp storage. The AIX Host Utilities support multiple environments and the FC, FCoE, and iSCSI protocols. The supported environments are AIX MPIO (Native OS) and PowerVM.

> For specific information about the operating system versions and updates that the Host Utilities support, see the NetApp Interoperability Matrix Tool.
>
> For more information about PowerVM feature, see the IBM PowerVM Live Partition Mobility Red Book.

The Host Utilities software is packaged as a single, compressed file. You can download the compressed file and the documentation from the NetApp Support Site. The ONTAP SAN Host Configuration provides instructions for installing and setting up the Host Utilities to work with your environment and protocol.

You must enable Dynamic Tracking for all FC and FCoE initiators for clustered Data ONTAP deployments.

AIX Host Utilities 6.1 enhancements

- AIX Host Utilities 6.1 added support for the memory fault issue that occurred in earlier versions of AIX host OS. With AIX Host Utilities 6.1, only the sanlun binary has changed. The MPIO and related ODM remain unchanged.

Fixed Issue

BugID	Title	Description
872113	`sanlun lun show -p` command might cause a memory fault on some versions of AIX host OS	Intermittent instances of AIX coredump are reported while running the `sanlun lun show -p` command. Sanlun's `lun show -p` option provides the multipathing information for all the LUNs discovered on a host. It arranges this information to present which SCSI device is sourced from which LUN, the path state (primary or secondary), and other details. However, on some AIX hosts running the `sanlun lun show -p` command might cause a memory fault. This issue is observed only when you run the sanlun command with the `-p` option.

Known Problems and Limitations

To use the Host Utilities efficiently, you should be aware that performance can be affected by known issues about a particular feature, such as a network, or by features that the Host Utilities do not support, such as a specific version of an operating system.

Bug ID	Title	Description
1069147	AIX HU Sanlun reports incorrect HBA speed	Instances of sanlun displaying incorrect HBA speeds are reported while running the `sanlun fcp show adapter -v` command. The `sanlun fcp show adapter -v` command displays the HBA cards information, such as supported and negotiated speeds for the adapters. This seems to be a reporting issue only. To identify the actual speed, use the `fcstat fcsx` command.

NetApp Bugs Online provides complete information for most known issues, including suggested workarounds where possible. Some keyword combinations and bug types that you might want to use include the following:

- FCP General: Displays FC and HBA bugs that are not associated with a specific host.
- FCP - AIX

About SAN Host Configuration documentation

Documentation for SAN Host Utilities is included in the ONTAP SAN Host Configuration documentation. ONTAP SAN HOST configuration documentation is cumulative, covering all current SAN HOST releases. Any functional differences across releases are noted in context.

Where to find product documentation and other information

You can access documentation for all NetApp products and find other product information resources, such as technical reports and white papers on the Product Documentation page of the NetApp corporate site.

Related information

Configuring and managing your ONTAP storage system

- The ONTAP Software Setup Guide for your version of ONTAP
- The ONTAP San Administration Guide for your version of ONTAP
- The ONTAP Release Notes for your version of ONTAP
- NetApp Interoperability Matrix
- Hardware Universe (formerly the System Configuration Guide)
- Supported Fibre Channel SAN topologies
- Configuring your host for Host Utilities

HP-UX host utilities

HP-UX Host Utilities 6.0

What you'll need

- For reliable operation, you must verify that your entire iSCSI, FC, or FCoE configuration is supported.

You can use the NetApp Interoperability Matrix Tool to verify your configuration.

SAN Toolkit

HP-UX Host Utilities is a NetApp host software that provides a command line tool kit on your HP-UX host. The toolkit is installed when you install the NetApp Host Utilities package. This kit provides the `sanlun` utility which helps you manage the LUNs and HBAs. The `sanlun` command returns information about the LUNs mapped to your host, multipathing, and information necessary to create initiator groups.

Example

In the following example, the `sanlun lun show` command returns the LUN information.

```
# sanlun lun show all

controller(7mode)/ device host lun
vserver(Cmode)           lun-pathname                    filename
adapter    protocol   size   mode
--------------------------------------------------------------------------
----------------------------------
sanboot_unix         /vol/hpux_boot/boot_hpux_lun      /dev/rdsk/c34t0d0
fclp1      FCP        150g    C
sanboot_unix         /vol/hpux_boot/boot_hpux_lun      /dev/rdsk/c23t0d0
fclp1      FCP        150g    C
sanboot_unix         /vol/hpux_boot/boot_hpux_lun      /dev/rdsk/c12t0d0
fclp0      FCP        150g    C
sanboot_unix         /vol/hpux_boot/boot_hpux_lun      /dev/rdsk/c81t0d0
fclp0      FCP        150g    C
```

This toolkit 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 does not affect your system performance.

Installing HP-UX Host Utilities

The NetApp HP-UX Host Utilities software package is available on the NetApp Support Site in a compressed file.

You can download the compressed file containing the Host Utilities software packages from the NetApp Support Site. After you have downloaded the file, you must decompress it before installation.

Steps

1. Login to your host.
2. Download the HP-UX Host Utilities file `netapp_hpux_host_utilities_6.0_ia_pa.depot.gz` from the NetApp Support Site to your HP-UX host.
3. Decompress the `netapp_hpux_host_utilities_6.0_ia_pa.depot.gz` file by entering the following command:

   ```
   # gunzip netapp_hpux_host_utilities_6.0_ia_pa.depot.gz
   ```

   The system places the extracted software in the directory where you uncompressed the depot file.

4. Install the software by entering the following command:

   ```
   # swinstall -s /depot_path
   ```

   `depot_path` provides the path and name of the depot file.

   The `swinstall` command runs an installation script that verifies the status of your HP-UX setup. If your system meets the requirements, this script installs the `sanlun` utility and diagnostic scripts in the `/opt/NetApp/santools/bin` directory.

5. Verify the installation:

```
sanlun version
```

Sample command reference

List all host initiators mapped to host

```
# sanlun fcp show adapter -v
adapter name:      fclp2
WWPN:              10000000c985ef92
WWNN:              20000000c985ef92
driver name:       fclp
model:             AJ763-63001
model description: HP 8Gb Dual Channel PCI-e 2.0 FC HBA
serial number:     MY19034N9U
hardware version:  3
driver version:    @(#) FCLP: PCIe Fibre Channel driver (FibrChanl-02),
B.11.31.1805, Feb  5 2018, FCLP_IFC (3,2)
firmware version:  2.02X2 SLI-3 (U3D2.02X2)
Number of ports:   1 of 2
port type:         Unknown
port state:        Link Down
supported speed:   8 GBit/sec
negotiated speed:  Speed not established
OS device name:    /dev/fclp2

adapter name:      fclp3
WWPN:              10000000c985ef93
WWNN:              20000000c985ef93
driver name:       fclp
model:             AJ763-63001
model description: HP 8Gb Dual Channel PCI-e 2.0 FC HBA
serial number:     MY19034N9U
hardware version:  3
driver version:    @(#) FCLP: PCIe Fibre Channel driver (FibrChanl-02),
B.11.31.1805, Feb  5 2018, FCLP_IFC (3,2)
firmware version:  2.02X2 SLI-3 (U3D2.02X2)
Number of ports:   2 of 2
port type:         Unknown
port state:        Link Down
supported speed:   8 GBit/sec
negotiated speed:  Speed not established
OS device name:    /dev/fclp3
```

List all LUNs mapped to host

```
# sanlun lun show -p -v all
\
                    ONTAP Path:
vs_hp_cluster:/vol/chathpux_217_vol_en_1_10/hp_en_217_lun
                           LUN: 55
                      LUN Size: 15g
                   Host Device: /dev/rdisk/disk718
                          Mode: C
                            VG: /dev/vg_data
              Multipath Policy: A/A
            Multipath Provider: Native
-------- ---------- -------------------- -------
----------------------------------------- -------------
host     vserver    /dev/dsk
HP A/A
path     path       filename             host    vserver
path failover
state    type       or hardware path     adapter LIF
priority
-------- ---------- -------------------- -------
----------------------------------------- -------------
up       primary    /dev/dsk/c37t6d7     fclp0   hpux_7
0
up       primary    /dev/dsk/c22t6d7     fclp1   hpux_8
0
up       secondary  /dev/dsk/c36t6d7     fclp0   hpux_5
1
up       secondary  /dev/dsk/c44t6d7     fclp1   hpux_6
1
```

List all LUNs mapped to host from a given SVM

```
# sanlun lun show -p -v vs_hp_cluster
                    ONTAP Path:
vs_hp_cluster:/vol/chathpux_217_vol_en_1_10/hp_en_217_lun
                           LUN: 55
                      LUN Size: 15g
                   Host Device: /dev/rdisk/disk718
                          Mode: C
                            VG: /dev/vg_data
              Multipath Policy: A/A
            Multipath Provider: Native
-------- ---------- -------------------- -------
----------------------------------------------- -------------
host     vserver    /dev/dsk
HP A/A
path     path       filename             host    vserver
path failover
state    type       or hardware path     adapter LIF
priority
-------- ---------- -------------------- -------
----------------------------------------------- -------------
up       primary    /dev/dsk/c37t6d7     fclp0   hpux_7
0
up       primary    /dev/dsk/c22t6d7     fclp1   hpux_8
0
up       secondary  /dev/dsk/c36t6d7     fclp0   hpux_5
1
up       secondary  /dev/dsk/c44t6d7     fclp1   hpux_6
1
```

List all attributes of a given LUN mapped to host

```
# sanlun lun show -p -v
vs_hp_cluster:/vol/chathpux_217_vol_en_1_5/hp_en_217_lun

                    ONTAP Path:
vs_hp_cluster:/vol/chathpux_217_vol_en_1_5/hp_en_217_lun
                           LUN: 49
                      LUN Size: 15g
                   Host Device: /dev/rdisk/disk712
                          Mode: C
                            VG: /dev/vg_data
              Multipath Policy: A/A
            Multipath Provider: Native
-------- ---------- -------------------- -------
----------------------------------------------- -------------
host     vserver    /dev/dsk
HP A/A
path     path       filename             host    vserver
path failover
state    type       or hardware path     adapter LIF
priority
-------- ---------- -------------------- -------
----------------------------------------------- -------------
up       primary    /dev/dsk/c37t6d1     fclp0   hpux_7
0
up       primary    /dev/dsk/c22t6d1     fclp1   hpux_8
0
up       secondary  /dev/dsk/c36t6d1     fclp0   hpux_5
1
up       secondary  /dev/dsk/c44t6d1     fclp1   hpux_6
1
```

List ONTAP LUN attributes by Host Device File name

```
#sanlun lun show -dv /dev/rdisk/disk716
                                                                        device
host                  lun
vserver               lun-pathname                                      filename
adapter    protocol   size    mode
--------------------------------------------------------------------------------
------------------------------------------
vs_hp_cluster        /vol/chathpux_217_vol_en_1_14/hp_en_217_lun
/dev/rdisk/disk716 0          FCP        15g     C
             LUN Serial number: 80D7l?NiNP5U
          Controller Model Name: AFF-A800
           Vserver FCP nodename: 208400a098ba7afe
           Vserver FCP portname: 207e00a098ba7afe
               Vserver LIF name: hpux_5
             Vserver IP address: 10.141.54.30
                                 10.141.54.35
                                 10.141.54.37
                                 10.141.54.33
                                 10.141.54.31
            Vserver volume name: chathpux_217_vol_en_1_14
MSID::0x00000000000000000000000080915935
          Vserver snapshot name:
```

List all SVM target LIF WWPNs attached to host

```
# sanlun lun show -wwpn

controller(7mode)/
vserver(Cmode)       target wwpn        lun-pathname
device filename
------------------------------------------------------------------------
------------------------------
vs_hp_cluster        208300a098ba7afe
/vol/chathpux_217_vol_en_1_10/hp_en_217_lun   /dev/rdsk/c22t6d7
vs_hp_cluster        208100a098ba7afe
/vol/chathpux_217_vol_en_1_10/hp_en_217_lun   /dev/rdsk/c44t6d7
vs_hp_cluster        208200a098ba7afe
/vol/chathpux_217_vol_en_1_10/hp_en_217_lun   /dev/rdsk/c37t6d7
vs_hp_cluster        207e00a098ba7afe
/vol/chathpux_217_vol_en_1_10/hp_en_217_lun   /dev/rdsk/c36t6d7
vs_hp_cluster        207d00a098ba7afe   /vol/chathpux_217_os/hp_217_os
/dev/rdsk/c18t7d4
vs_hp_cluster        207f00a098ba7afe   /vol/chathpux_217_os/hp_217_os
/dev/rdsk/c42t7d4

host adapter    lun size    mode
--------------------------------
fclp1           15g         C
fclp1           15g         C
fclp0           15g         C
fclp0           15g         C
fclp1           30g         C
fclp0           30g         C
```

HP-UX Host Utilities 6.0 Release Notes

This Release Notes document contains the latest information on the HP-UX Host Utilities 6.0 release, including updates about known problems, limitations, and configuring and managing your ONTAP storage system. The Release Notes document is updated when new information on using the HP-UX Host Utilities becomes available.

About the HP-UX Host Utilities 6.0 release

The HP-UX Host Utilities supports several HP-UX environments and multiple protocols.
The HP-UX Host Utilities support the following environments:

- Native MPIO
- Veritas Dynamic Multipathing (DMP)

To make it immediately clear which environment is being used, this document sometimes specifies “DMP” for the Veritas DMP environment and “MPIO” for the HP-UX native environment. In some cases, the commands you use might vary depending on which drivers you are using. In those cases, both the environment and driver types are specified.

HP-UX Host Utilities 6.0 enhancements

The Release Notes are updated between product releases as new information is available. The HP-UX Host Utilities 6.0 continues to support versions of the following:

- HP-UX 11iv2
- HP-UX 11iv3

Known Problems and Limitations

There are no known issues for the HP-UX 6.0 release.

About SAN Host Configuration documentation

Documentation for SAN Host Utilities is included in the ONTAP SAN Host Configuration documentation. The ONTAP SAN Host configuration documentation is cumulative, covering all current SAN Host releases. Any functional differences across releases are noted in context.

Where to find product documentation and other information

You can access documentation for all NetApp products and find other product information resources, such as technical reports and white papers on the Product Documentation page of the NetApp corporate site.

Related information

Configuring and managing your ONTAP storage system

- The ONTAP Software Setup Guide for your version of ONTAP
- The ONTAP San Administration Guide for your version of ONTAP
- The ONTAP Release Notes for your version of ONTAP
- NetApp Interoperability Matrix
- Hardware Universe (formerly the System Configuration Guide)
- Supported Fibre Channel SAN topologies
- Configuring your host for Host Utilities

Linux unified host utilities

Linux Unified Host Utilities 7.1

Pre-requisites

- For reliable operation, you must verify that your entire iSCSI, FC, or FCoE configuration is supported.

  You can use the NetApp Interoperability Matrix Tool to verify your configuration.

- You must install the HBA management packages provided by the vendors on their web sites.

  The management software enables the SAN Tool kit commands to gather information about the FC HBAs, such as their WWPNs. For sanlun fcp show adapter to work, ensure that the following packages are installed:

  - QLogic HBA – QConvergeConsole CLI
  - Emulex HBA - OneCommand Manager core application CLI
  - Brocade HBA – Brocade Command Utility CLI

RPM Packages "libhbaapi" and "libhbalinux" available for each Linux Distribution should be installed on the host OS.

SAN Toolkit

Linux Unified Host Utilities is a NetApp host software that provides a command line tool kit on your Linux host.

The toolkit is installed automatically when you install the NetApp Host Utilities package. This kit provides the `sanlun` utility, which helps you manage LUNs and HBAs. The `sanlun` command returns information about the LUNs mapped to your host, multipathing, and information necessary to create initiator groups.

Example

In the following example, the `sanlun lun show` command returns LUN information.

```
# sanlun lun show all
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
```

This toolkit 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 does not affect your system performance.

The SAN toolkit is not supported on Citrix XenServer, Oracle VM, and Red Hat Enterprise Virtualization Hypervisor.

Install Linux Unified Host Utilities

The NetApp Linux Unified Host Utilities software package is available on the NetApp Support Site in a 32-bit or

64-bit .rpm file.

Installing the Linux Unified Host Utilities is strongly recommended, but not mandatory. The utilities do not change any settings on your Linux host. The utilities improve management and assist NetApp customer support in gathering information about your configuration.

Steps

1. If you have a version of Linux Unified Host Utilities currently installed, use the following command to remove it:

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

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

2. Download the either the 32-bit or 64-bit Linux Unified 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 use the following command to install it:

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

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

4. Verify the installation:

   ```
   sanlun version
   ```

   ```
   sanlun version 7.1.386.1644
   ```

Sample command reference

List all host initiators mapped to host

```
# sanlun fcp show adapter -v

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

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

                    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

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

                    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

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

                    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

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

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

```
# sanlun lun show -wwpn
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

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

Notice File

Linux Unified Host Utilities Notice File

Linux Unified Host Utilities 7.1 Release Notes

This Release Notes document contains the latest information for the Linux Unified Host Utilities 7.1 release, including updates about known problems and limitations, any important cautions, new features, and enhancements. It also describes any issues that might have been discovered since the Host Utilities were released.

About the Linux Unified Host Utilities 7.1 release

The Linux Unified Host Utilities support several Linux operating systems. The Host Utilities enable you to connect a Linux host to NetApp storage systems.

The Linux Unified Host Utilities 7.1 continues to support the following versions of Linux:

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

> For specific information about the operating system versions and updates that the Host Utilities support, see the NetApp Interoperability Matrix Tool.

The Host Utilities software is provided as both 32-bit and 64-bit .rpm files. You can download the correct .rpm file for your host architecture and the documentation from the NetApp Support Site.

For instructions about installing and setting up, see the Linux Unified Host Utilities 7.1 Installation Guide.

What's new in the 7.1 release

Linux Host Utilities is now called *Linux Unified Host Utilities* because it supports NetApp E-Series storage systems running SANtricity as well as AFF and FAS systems running ONTAP.

> Any mention of Host Utilities or Linux Host Utilities in this document refers to Linux Unified Host Utilities.

- This release of the Linux Unified Host Utilities provides support for a tuned package for setting server profiles and improving I/O performance on Red Hat Enterprise Linux 6 and 7 hosts.
- The Linux Unified Host Utilities 7.1 continues to support versions of the following:
  - Red Hat Enterprise Linux
  - SUSE Linux Enterprise Server
  - Oracle Linux
  - Oracle VM
  - Citrix XenServer
  - Veritas
- Red Hat Enterprise Linux 6 and 7 now have a tuned package with a `tuned-adm` command to set different server profiles on the host depending on the environment.
  - This includes an enterprise storage profile for configurations where LUNs from enterprise storage arrays are used. You can also use the virtual guest profile for Red Hat Enterprise Linux as a guest virtual machine. Using these tuned packages can result in marked improvement in throughput and latency on ONTAP.

> NetApp continues to work with the 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 NetApp Interoperability Matrix Tool.

New features and enhancements

The Release Notes are updated between product releases as new information is available.

7.1 enhancements

- This release includes support for the following:
  - SUSE Linux Enterprise Server 15 series
  - Oracle VM 3.2 series
  - Oracle Linux 6 and 7 series
  - Red Hat Enterprise Linux 6 and 7 series
  - SUSE Linux Enterprise Server 11 SP4
  - KVM and XEN, RHEV 6.4 and 6.5
  - Citrix XenServer parameters
- Adds support for 32 GB Fibre Channel adapters from Emulex and Qlogic.
- Fixes `sanlun lun show -p getting SIGABRT` in SLES12SP1, OL7.2, RHEL7.2, and RHEL 6.8.
- Extends support for Red Hat Linux 6.8, Oracle Linux 6.8, XenServer 7.0, Oracle VM 3.3 series, and Oracle VM 3.4 series operating systems.

Known problems and limitations

NetApp Bug ID	Description
1457017	`sanlun` installation issues warning messages related to `libdevmapper.so` and `libnl.so` libraries. These warnings do not affect the functionality of `sanlun` kit.

NetApp Bugs Online provides complete information for most known issues, including suggested workarounds where possible.

Some keyword combinations and bug types that you might want to use include the following:

- FCP - Linux
- iSCSI – Linux

Refer to the ONTAP SAN Host Configuration documentation for more information on Host OS settings and configurations.

About SAN Host Configuration documentation

Documentation for SAN Host Utilities is included in the ONTAP SAN Host Configuration documentation. ONTAP SAN HOST configuration documentation is cumulative, covering all current SAN HOST releases. Any functional differences across releases are noted in context.

Additional information

Default values recommended when using drivers bundled with Linux kernel

When you are setting up an FC environment that uses the native, inbox drivers that are bundled with the Linux kernel, you can use the default values for the drivers. In iSCSI environments where you are using a iSCSI solution software, you need to manually set certain recommended values depending on the OS version you are using.

Where to find product documentation and other information

You can access documentation for all NetApp products and find other product information resources, such as technical reports and white papers on the Product Documentation page of the NetApp corporate site.

Related information

Configuring and managing your ONTAP storage system

- The ONTAP Software Setup Guide for your version of ONTAP
- The ONTAP SAN Administration Guide for your version of ONTAP
- The ONTAP Release Notes for your version of ONTAP

Configuring and managing your E-Series storage system

- The SANtricity Storage Manager Configuration and Provisioning for Windows Express Guide that is appropriate for your protocol
- The SANtricity Storage Manager Configuration and Provisioning Express Guide for your operating system, protocol, and version of SANtricity.
- The SANtricity Storage Manager Software Installation Reference specific for your version of SANtricity.
- The SANtricity Storage Manager Multipath Driver's Guide specific for your version of SANtricity.
- The SANtricity Storage Manager Release Notes for your version of SANtricity.

Go to the E-Series documentation to find SANtricity related documentation.

Solaris host utilities

Solaris Host Utilities 6.2

What you'll need

- For reliable operation, you must verify that your entire iSCSI,FC or FCoE configuration is supported.

You can use the NetApp Interoperability Matrix Tool to verify your configuration.

SAN Toolkit

Solaris Host Utilities is a NetApp host software that provides a command line toolkit on your Oracle Solaris host. The toolkit is installed when you install the NetApp Host Utilities package. This kit provides the `sanlun` utility which helps you manage LUNs and HBAs. The `sanlun` command returns information about the LUNs mapped to your host, multipathing, and information necessary to create initiator groups.

Example

In the following example, the `sanlun lun show` command returns the LUN information.

```
#sanlun lun show all
controller(7mode)/ device host lun
vserver(Cmode)                     lun-pathname       filename
adapter protocol size mode
--------------------------------------------------------------------------
-----------------------------------------------------
data_vserver                     /vol/vol1/lun1
/dev/rdsk/c0t600A098038304437522B4E694E49792Dd0s2 qlc3   FCP       10g
cDOT
data_vserver                     /vol/vol0/lun2
/dev/rdsk/c0t600A098038304437522B4E694E497938d0s2 qlc3   FCP       10g
cDOT
data_vserver                     /vol/vol2/lun3
/dev/rdsk/c0t600A098038304437522B4E694E497939d0s2 qlc3   FCP       10g
cDOT
data_vserver                     /vol/vol3/lun4
/dev/rdsk/c0t600A098038304437522B4E694E497941d0s2 qlc3   FCP       10g
cDOT
```

This toolkit 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 does not affect your system performance.

Installing Solaris Host Utilities

The Solaris Host Utilities 6.2 supports several Solaris environments and multiple protocols. The primary Host Utilities environments are:

- Native OS with MPxIO with either the Fibre Channel (FC) or iSCSI protocol on a system using either a SPARC processor or an x86/64 processor.
- Veritas Dynamic Multipathing (DMP) with either the FC or iSCSI protocol on a system using a SPARC processor and with the iSCSI protocol on system using an x86/64 processor.

The NetApp Solaris Host Utilities software package is available on the NetApp Support Site in a compressed file format for your processor. You can download the Host Utilities software package for your environment from the Support site.

Steps

1. Login to your host as root.
2. Download a copy of the compressed file containing the Host Utilities from NetApp Support Site to a directory on your host.

   At the time this documentation was prepared, the compressed files were called:

   - SPARC CPU: `netapp_solaris_host_utilities_6_2_sparc.tar.gz`
   - x86/x64 CPU: `netapp_solaris_host_utilities_6_2_amd.tar.gz`

3. Go to the directory containing the download.
4. Unzip the file using the gunzip command

   ```
   # gunzip netapp_solaris_host_utilities_6_2_sparc.tar.gz
   ```

5. Unzip the file. You can use the `tar xvf` command to do this.

   ```
   # tar xvf netapp_solaris_host_utilities_6_2_sparc.tar
   ```

6. Add the packages that you extracted from tar file to your host. You can use the `pkgadd` command to do this.

   The packages are added to the `/opt/NTAP/SANToolkit/bin` directory. The following example uses the `pkgadd` command to install the Solaris installation package:

   ```
   # pkgadd -d ./NTAPSANTool.pkg
   ```

7. Confirm that the toolkit was successfully installed by using the `pkginfo` command or the `ls - al` command.

   ```
   # ls -alR /opt/NTAP/SANToolkit
   /opt/NTAP/SANToolkit:
   total 1038
   drwxr-xr-x   3 root     sys            4 Jul 22  2019 .
   drwxr-xr-x   3 root     sys            3 Jul 22  2019 ..
   drwxr-xr-x   2 root     sys            6 Jul 22  2019 bin
   -r-xr-xr-x   1 root     sys       432666 Sep 13  2017 NOTICES.PDF

   /opt/NTAP/SANToolkit/bin:
   total 7962
   drwxr-xr-x   2 root     sys            6 Jul 22  2019 .
   drwxr-xr-x   3 root     sys            4 Jul 22  2019 ..
   -r-xr-xr-x   1 root     sys      2308252 Sep 13  2017 host_config
   -r-xr-xr-x   1 root     sys          995 Sep 13  2017 san_version
   -r-xr-xr-x   1 root     sys      1669204 Sep 13  2017 sanlun
   -r-xr-xr-x   1 root     sys          677 Sep 13  2017 vidpid.dat

   # (cd /usr/share/man/man1; ls -al host_config.1 sanlun.1)
   -r-xr-xr-x   1 root     sys        12266 Sep 13  2017 host_config.1
   -r-xr-xr-x   1 root     sys         9044 Sep 13  2017 sanlun.1
   ```

8. After you finish, you must configure the host parameters for your environment using `/opt/NTAP/SANToolkit/bin/host_config` command:
   - MPxIO
   - Veritas DMP
9. Verify the installation:

```
sanlun version
```

Sample command reference

List all host initiators mapped to host

```
# sanlun fcp show adapter -v
adapter name:      qlc3
WWPN:              21000024ff17a301
WWNN:              20000024ff17a301
driver name:       qlc
model:             7335902
model description: 7115462, Oracle Storage Dual-Port 32 Gb Fibre Channel
PCIe HBA
serial number:     463916R+1720333838
hardware version:  Not Available
driver version:    210226-5.10
firmware version:  8.08.04
Number of ports:   1 of 2
port type:         Fabric
port state:        Operational
supported speed:   8 GBit/sec, 16 GBit/sec, 32 GBit/sec
negotiated speed:  32 GBit/sec
OS device name:    /dev/cfg/c7

adapter name:      qlc2
WWPN:              21000024ff17a300
WWNN:              20000024ff17a300
driver name:       qlc
model:             7335902
model description: 7115462, Oracle Storage Dual-Port 32 Gb Fibre Channel
PCIe HBA
serial number:     463916R+1720333838
hardware version:  Not Available
driver version:    210226-5.10
firmware version:  8.08.04
Number of ports:   2 of 2
port type:         Fabric
port state:        Operational
supported speed:   8 GBit/sec, 16 GBit/sec, 32 GBit/sec
negotiated speed:  16 GBit/sec
OS device name:    /dev/cfg/c6
```

List all LUNs mapped to host

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

                    ONTAP Path: data_vserver:/vol1/lun1
                           LUN: 1
                      LUN Size: 10g
                   Host Device:
/dev/rdsk/c0t600A0980383044485A3F4E694E4F775Ad0s2
                          Mode: C
             Multipath Provider: Sun Microsystems
               Multipath Policy: Native
```

List all LUNs mapped to host from a given SVM/ List all attributes of a given LUN mapped to host

```
# sanlun lun show -p -v sanboot_unix`
ONTAP Path: sanboot_unix:/vol/sol_boot/sanboot_lun
                           LUN: 0
                      LUN Size: 180.0g
```

List ONTAP LUN attributes by Host Device File name

```
# sanlun lun show all

controller(7mode/E-Series)/                                          device
vserver(cDOT/FlashRay)       lun-pathname
filename
------------------------------------------------------------------------
------------------------------------
sanboot_unix                 /vol/sol_193_boot/chatsol_193_sanboot
/dev/rdsk/c0t600A098038304437522B4E694E4A3043d0s2

host adapter    protocol lun size   product
-------------------------------------------
qlc3            FCP      180.0g     cDOT
```

Solaris Host Utilities 6.2 Release Notes

This release notes document contains the latest information for the Solaris Host Utilities 6.2, including updates about known problems, limitations, configuring and managing your ONTAP storage systems.

The Release Notes document is updated when new information on using the Solaris Host Utilities becomes available.

About the Solaris Host Utilities 6.2 release

The Solaris Host Utilities 6.2 supports several Solaris environments and multiple protocols.

The primary Host Utilities environments are:

- Native OS with MPxIO with either the Fibre Channel (FC) or iSCSI protocol on a system using either a SPARC processor or an x86/64 processor.
- Veritas Dynamic Multipathing (DMP) with either the FC or iSCSI protocol on a system using a SPARC processor and with the iSCSI protocol on system using an x86/64 processor.

The Host Utilities software is packaged as a single, compressed file. You can download the compressed file and the documentation from the NetApp Support Site. The ONTAP SAN Host Configuration provides instructions for installing and setting up the Host Utilities to work with your environment and protocol.

Solaris Host Utilities 6.2 enhancements

The Release Notes are updated between product releases as new information is available.

The Solaris Unified Host Utilities 6.2 continues to support the following versions of Solaris:

- Solaris 11.x series
- Solaris 10.x series

Known Problems and Limitations

To use the Host Utilities efficiently, you should be aware that performance can be affected by known issues about a particular feature, such as a network, or by features that the Host Utilities do not support, such as a specific version of an operating system.

Bug ID	Title	Description
1385189	Solaris 11.4 FC driver binding changes required in HUK 6.2	Solaris 11.4 and HUK recommendations. FC driver binding is changed from `ssd(4D)` to `sd(4D)`. Move configuration that you have in `ssd.conf` to `sd.conf` as mentioned in Oracle (Doc ID 2595926.1). The behavior varies across newly installed Solaris 11.4 system and upgraded from 11.3 or lower versions.

NetApp Bugs Online provides complete information for most known issues, including suggested workarounds where possible. Some keyword combinations and bug types that you might want to use include the following:

- FCP General: Displays FC and HBA bugs that are not associated with a specific host
- FCP - Solaris

About SAN Host Configuration documentation

Documentation for SAN Host Utilities is included in the ONTAP SAN Host Configuration documentation. ONTAP SAN HOST configuration documentation is cumulative, covering all current SAN HOST releases. Any

functional differences across releases are noted in context.

Where to find product documentation and other information

You can access documentation for all NetApp products and find other product information resources, such as technical reports and white papers on the Product Documentation page of the NetApp corporate site.

Related information

Configuring and managing your ONTAP storage system

- The ONTAP Software Setup Guide for your version of ONTAP
- The ONTAP SAN Administration Guide for your version of ONTAP
- The ONTAP Release Notes for your version of ONTAP
- NetApp Interoperability Matrix
- Hardware Universe (formerly the System Configuration Guide)
- Supported Fibre Channel SAN topologies
- Configuring your host for Host Utilities

Windows Unified Host Utilities

Windows Unified Host Utilities 7.1

What Windows Host Utilities is

Windows Unified Host Utilities includes an installation program that sets the required Windows registry and Host Bus Adapter (HBA) parameters so that the Windows host correctly handles the storage system behaviors for NetApp ONTAP and E-Series platforms.

When you install the Host Utilities software, the installer sets required Windows registry and Host Bus Adapter (HBA) parameters.

The following programs and files are installed on the Windows host computer. The default directory is `C:\Program Files\NetApp\Windows Host Utilities`.

Program	Purpose
`emulexhba.reg`	Troubleshooting program; run this program only if instructed to do so by technical support personnel.
`\NetAppQCLI\fcconfig.exe`	Used by the installation program to set HBA parameters.
`\NetAppQCLI\fcconfig.ini`	Used by the installation program to set HBA parameters.
`\NetAppQCLI*.*`	Used by the installation program to set QLogic Fibre Channel HBA parameters.
`san_version.exe`	Displays the version of the Host Utilities and Fibre Channel HBAs.

Configurations supported by Host Utilities

The Host Utilities support different Windows host configurations, protocols, and Multipathing options. For more information, see NetApp Interoperability Matrix Tool.

Verify your host and storage system configuration

Before you install the Host Utilities, you must verify that the Host Utilities version supports your host and storage system configuration so that the software installs correctly.

Steps

1. Check the supported configuration in the NetApp Interoperability Matrix Tool.
2. Check the hotfixes required for the respective host on the SAN host Windows documentation.

   Using Windows server 2022 with ONTAP provides instructions on installing Windows hotfixes for Windows server 2022. Refer to the Windows documents in the Host configurations category to find the relevant hotfix information for earlier versions of Windows server.

3. Add the iSCSI or FCP license and start the target service.

   The Fibre Channel and iSCSI protocols do not require licenses on E-Series storage systems using SANtricity Storage Manager.

4. Verify your cabling

   See the SAN Configuration Guide for your version of ONTAP or E-Series Hardware Cabling Guide for detailed cabling and configuration information.

Configure FC HBAs and switches

Install and configure one or more supported Fibre Channel host bus adapters (HBAs) for Fibre Channel connections to the storage system.

The Windows Host Utilities installer sets the required Fibre Channel HBA settings.

Do not change HBA settings manually.

Steps

1. Install one or more supported Fibre Channel host bus adapters (HBAs) according to the instructions provided by the HBA vendor.
2. Obtain the supported HBA drivers and management utilities and install them according to the instructions provided by the HBA vendor.
3. Connect the HBAs to your Fibre Channel switches or directly to the storage system.
4. Create zones on the Fibre Channel switch according to your Fibre Channel switch documentation.
5. For ONTAP, zone the switch by WWPN. Be sure to use the WWPN of the LIFs and not of the physical ports on the storage controllers. For more information, see SAN Configuration Guide.

Install the Host Utilities

The installation program installs the Host Utilities package and sets the Windows registry and HBA settings.

You must specify whether to include multipathing support when you install the Windows Unified Host Utilities software package. The installer prompts you for the following choice. You can also run a quiet (unattended) installation from a Windows command prompt.

Multipathing support

- Choose MPIO if you have more than one path from the Windows host or virtual machine to the storage system.
- Choose no MPIO only if you are using a single path to the storage system.
- The MPIO selection is not available for Windows XP and Windows Vista systems; multipath I/O is not supported on these guest operating systems.
- For Hyper-V guests, raw (pass-through) disks do not appear in the guest OS if you choose multipathing support. You can either use raw disks, or you can use MPIO, but you cannot use both in the guest OS.

Install the Host Utilities interactively

To install the Host Utilities software package interactively, you must run the Host Utilities installation program and follow the prompts.

Steps

1. Download the executable file from NetApp Support Site.
2. Change to the directory from which you downloaded the executable file.
3. Run the `netapp_windows_host_utilities_7.1_x64` file and follow the instructions on the screen.
4. Reboot the Windows host when prompted.

Install the Host Utilities from a command line

- You can perform a quiet (unattended) installation of the Host Utilities by entering the appropriate commands at a Windows command prompt.
- The Host Utilities installation package must be in a path that is accessible by the Windows host.
- Follow the instructions for installing the Host Utilities interactively to obtain the installation package.
- The system automatically reboots when the installation is complete.

Steps

1. Enter the following command at a Windows command prompt:

```
msiexec /i installer.msi /quiet MULTIPATHING= {0 | 1} [INSTALLDIR=inst_path]
```

   - where installer is the name of the `.msi` file for your CPU architecture;
   - MULTIPATHING specifies whether MPIO support is installed. Allowed values are 0 for no, 1 for yes
   - `inst_path` is the path where the Host Utilities files are installed. The default path is `C:\Program Files\NetApp\Windows Host Utilities\`.

To see the standard Microsoft Installer (MSI) options for logging and other functions, enter `msiexec /help` at a Windows command prompt. For example:
`msiexec /i install.msi /quiet /l*v <install.log> LOGVERBOSE=1`

Upgrade the Host Utilities

The new Host Utilities installation package must be in a path that is accessible by the Windows host. Follow the instructions for installing the Host Utilities interactively to obtain the installation package.

Upgrade the Host Utilities interactively

To install the Host Utilities software package interactively, you must run the Host Utilities installation program and follow the prompts.

Steps

1. Change to the directory from which you downloaded the executable file.
2. Run the executable file and follow the instructions on the screen.
3. Reboot the Windows host when prompted.
4. Check version of the host Utility after reboot:
   a. Open **Control Panel**.
   b. Go to **Program and features** and check the host utility version.

Upgrade the Host Utilities from command line

You can perform a quiet (unattended) installation of the new host utilities by entering the appropriate commands at a Windows command prompt.
The New Host Utilities installation package must be in a path that is accessible by the Windows host. Follow the instructions for installing the Host Utilities interactively to obtain the installation package.

Steps

1. Enter the following command at a Windows command prompt:

```
msiexec /i installer.msi /quiet MULTIPATHING= {0 | 1} [INSTALLDIR=inst_path]
```

   - where `installer` is the name of the `.msi` file for your CPU architecture.
   - MULTIPATHING specifies whether MPIO support is installed. Allowed values are 0 for no, 1 for yes
   - `inst_path` is the path where the Host Utilities files are installed. The default path is `C:\Program Files\NetApp\Windows Host Utilities\`.

To see the standard Microsoft Installer (MSI) options for logging and other functions, enter `msiexec /help` at a Windows command prompt. For example:
`msiexec /i install.msi /quiet /l*v <install.log> LOGVERBOSE=1`

The system automatically reboots when the installation is complete.

Repair and removing Windows Host Utilities

You can use the Repair option of the Host Utilities installation program to update HBA and Windows registry settings. You can remove the Host Utilities entirely, either interactively or from the Windows command line.

Repair or remove Windows Host Utilities interactively

The Repair option updates the Windows registry and Fibre Channel HBAs with the required settings. You can also remove the Host Utilities entirely.

Steps

1. Open Windows **Programs and Features** (Windows Server 2012 R2, Windows Server 2016, Windows Server 2019).
2. Select **NetApp Windows Unified Host Utilities**.
3. Click **Change**.
4. Click **Repair** or **Remove**, as needed.
5. Follow the instructions on the screen.

Repair or remove Windows Host Utilities from command line

The Repair option updates the Windows registry and Fibre Channel HBAs with the required settings. You can also remove the Host Utilities entirely from a Windows command line.

Steps

1. Enter the following command on the Windows command line to repair Windows Host Utilities:

   ```
   msiexec {/uninstall | /f]installer.msi [/quiet]
   ```

   - `/uninstall` removes the Host Utilities entirely.
   - `/f` repairs the installation.
   - `installer.msi` is the name of the Windows Host Utilities installation program on your system.
   - `/quiet` suppresses all feedback and reboots the system automatically without prompting when the command completes.

Overview of settings used by the Host Utilities

The Host Utilities require certain registry and parameter settings to ensure the Windows host correctly handles the storage system behavior.

Windows Host Utilities sets the parameters that affect how the Windows host responds to a delay or loss of data. The particular values have been selected to ensure that the Windows host correctly handles events such as the failover of one controller in the storage system to its partner controller.

Not all the values apply for the DSM for SANtricity Storage Manager; however, any overlap of values set by the Host Utilities and those set by the DSM for SANtricity Storage Manager do not result in conflicts.
Fibre Channel and iSCSI host bus adapters (HBAs) also have parameters that must be set to ensure the best performance and to successfully handle storage system events.

The installation program supplied with Windows Unified Host Utilities sets the Windows and Fibre Channel HBA parameters to the supported values.

You must manually set iSCSI HBA parameters.

The installer sets different values depending on whether you specify multipath I/O (MPIO) support when running the installation program,

You should not change these values unless technical support directs you to do so.

Registry values set by Windows Unified Host Utilities

The Windows Unified Host Utilities installer automatically sets registry values that are based on the choices that you make during installation. You should be aware of these registry values, the operating system version. The following values are set by the Windows Unified Host Utilities installer. All values are decimal unless otherwise noted. HKLM is the abbreviation for HKEY_LOCAL_MACHINE.

Registry key	Value	When set
HKLM\SYSTEM\CurrentControlSet\Services \msdsm\Parameters \DsmMaximumRetryTimeDuringStateTransition	120	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \msdsm\Parameters \DsmMaximumStateTransitionTime	120	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\msdsm \Parameters\DsmSupportedDeviceList	"NETAPP LUN"	When MPIO support is specified
	"NETAPP LUN", "NETAPP LUN C-Mode"	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Control\Class {iSCSI_driver_GUID}\ instance_ID\Parameters \IPSecConfigTimeout	60	Always, except when Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Control \Class{iSCSI_driver_GUID} \ instance_ID\Parameters\LinkDownTime	10	Always
HKLM\SYSTEM\CurrentControlSet\Services\ClusDisk \Parameters\ManageDisksOnSystemBuses	1	Always, except when Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Control \Class{iSCSI_driver_GUID} \ instance_ID\Parameters\MaxRequestHoldTime	120	When no MPIO support is selected
	30	Always, except when Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet \Control\MPDEV\MPIOSupportedDeviceList	"NETAPP LUN"	When MPIO support is specified
	"NETAPP LUN", "NETAPP LUN C-Mode"	When MPIO is support-specified, except if Data ONTAP DSM is detected

Registry key	Value	When set
HKLM\SYSTEM\CurrentControlSet\Services\mpio \Parameters\PathRecoveryInterval	40	When your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016 only
HKLM\SYSTEM\CurrentControlSet\Services\mpio \Parameters\PathVerifyEnabled	0	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\msdsm \Parameters\PathVerifyEnabled	0	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \msdsm\Parameters\PathVerifyEnabled	0	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \msiscdsm\Parameters\PathVerifyEnabled	0	When MPIO support is specified and your server is Windows Server 2003, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\vnetapp \Parameters\PathVerifyEnabled	0	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\mpio \Parameters\PDORemovePeriod	130	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\msdsm \Parameters\PDORemovePeriod	130	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\msiscdsm \Parameters\PDORemovePeriod	130	When MPIO support is specified and your server is Windows Server 2003, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \vnetapp \Parameters\PDORemovePeriod	130	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \mpio\Parameters\RetryCount	6	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\msdsm \Parameters\RetryCount	6	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \msiscdsm\Parameters\RetryCount	6	When MPIO support is specified and your server is Windows Server 2003, except if Data ONTAP DSM is detected

Registry key	Value	When set
HKLM\SYSTEM\CurrentControlSet\Services \vnetapp\Parameters\RetryCount	6	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \mpio\Parameters\RetryInterval	1	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \msdsm\Parameters\RetryInterval	1	When MPIO support is specified and your server is Windows Server 2008, Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services \vnetapp\Parameters\RetryInterval	1	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet \Services\disk\TimeOutValue	120	When no MPIO support is selected, except if Data ONTAP DSM is detected
	60	When MPIO support is specified, except if Data ONTAP DSM is detected
HKLM\SYSTEM\CurrentControlSet\Services\mpio \Parameters\UseCustomPathRecoveryInterval	1	When your server is Windows Server 2008,Windows Server 2008 R2, Windows Server 2012, Windows Server 2012 R2, or Windows Server 2016 only

Related information

Refer to the Microsoft documents for the registry parameter details.

FC HBA values set by Windows Host Utilities

On systems using Fibre Channel, the Host Utilities installer sets the required timeout values for Emulex and QLogic FC HBAs.
For Emulex Fibre Channel HBAs, the installer sets the following parameters when MPIO is selected:

Property type	Property value
LinkTimeOut	1
NodeTimeOut	10

For Emulex Fibre Channel HBAs, the installer sets the following parameters when MPIO is not selected:

Property type	Property value
LinkTimeOut	30
NodeTimeOut	120

For QLogic Fibre Channel HBAs, the installer sets the following parameters when MPIO is selected:

Property type	Property value
LinkDownTimeOut	1

Property type	Property value
PortDownRetryCount	10

For QLogic Fibre Channel HBAs, the installer sets the following parameters when MPIO is not selected:

Property type	Property value
LinkDownTimeOut	30
PortDownRetryCount	120

> The names of the parameters might vary slightly depending on the program.
> For example, in the QLogic QConvergeConsole program, the parameter is displayed as `Link Down Timeout`.
> The Host Utilities `fcconfig.ini` file displays this parameter as either `LinkDownTimeOut` or `MpioLinkDownTimeOut`, depending on whether MPIO is specified. However, all of these names refer to the same HBA parameter.

Related information

Refer to Emulex or QLogic site to know more about the timeout parameters.

Troubleshooting

This section describes general troubleshooting techniques for Windows Host Utilities. Be sure to check the latest Release Notes for known problems and solutions.

Different areas to identify the possible interoperability problems

- To identify potential interoperability problems, you must confirm that the Host Utilities support your combination of host operating system software, host hardware, ONTAP software, and storage system hardware.
- You must check the Interoperability Matrix.
- You must verify that you have the correct iSCSI configuration.
- If iSCSI LUNs are not available after a reboot, you must verify that the target is listed as persistent on the Persistent Targets tab of the Microsoft iSCSI initiator GUI.
- If applications using the LUNs display errors on startup, you must verify that the applications are configured to depend on the iSCSI service.
- For Fibre Channel paths to storage controllers running ONTAP, you must verify that the FC switches are zoned using the WWPNs of the target LIFs, not the WWPNs of the physical ports on the node.
- You must review the Release Notes for Windows Host Utilities to check for known problems. The Release Notes include a list of known problems and limitations.
- You must review the troubleshooting information in the SAN Administration Guide for your version of ONTAP.
- You must search Bugs Online for recently discovered problems.
- In the Bug Types field under Advanced Search, you should select ISCSI - Windows and then click Go. You should repeat the search for Bug Type FCP -Windows.
- You must collect information about your system.
- Record any error messages that are displayed on the host or storage system console.

- Collect the host and storage system log files.
- Record the symptoms of the problem and any changes made to the host or storage system just before the problem appeared.
- If you are unable to resolve the problem, then you can contact NetApp technical support.

Related information

NetApp Interoperability Matrix Tool
NetApp Documentation
NetApp Bugs Online

Understand the Host Utilities changes to FC HBA driver settings

During the installation of the required Emulex or QLogic HBA drivers on an FC system, several parameters are checked and, in some cases, modified.

The Host Utilities set values for the following parameters if MS DSM for Windows MPIO is detected:

- LinkTimeOut – defines the length of time in seconds that the host port waits before resuming I/O after a physical link is down.
- NodeTimeOut – defines the length of time in seconds before the host port recognizes that a connection to the target device is down.

When troubleshooting HBA issues, check to make sure these settings have the correct values. The correct values depend on two factors:

- The HBA vendor
- Whether you are using multipathing software (MPIO)

You can correct the HBA settings by running the Repair option of the Windows Host Utilities installer.

Verify the Emulex HBA driver settings on FC systems

If you have a Fibre Channel system, you must verify the Emulex HBA driver settings. These settings must exist for each port on the HBA.

Steps

1. Open OnCommand Manager.
2. Select the appropriate HBA from the list and click the **Driver Parameters** tab.

   The driver parameters appear.

3. If you are using MPIO software, ensure that you have the following driver settings:
   - LinkTimeOut - 1
   - NodeTimeOut - 10
4. If you are not using MPIO software, ensure that you have the following driver settings:
   - LinkTimeOut - 30
   - NodeTimeOut - 120

Verify the QLogic HBA driver settings on FC systems

On FC systems, you need to verify the QLogic HBA driver settings. These settings must exist for each port on the HBA.

Steps

1. Open QConvergeConsole, and then click **Connect** on the toolbar.

   The Connect to Host dialog box appears.

2. Select the appropriate host from the list, and then click **Connect**.

   A list of HBAs appears in the FC HBA pane.

3. Select the appropriate HBA port from the list, and then click the **Settings** tab.
4. Select **Advanced HBA Port Settings** from the **Select Settings** section.
5. If you are using MPIO software, ensure you have the following driver settings:
   - Link Down Timeout (linkdwnto) - 1
   - Port Down Retry Count (portdwnrc) - 10
6. If you are not using MPIO software, ensure you have the following driver settings:
   - Link Down Timeout (linkdwnto) - 30
   - Port Down Retry Count (portdwnrc) - 120

Windows Unified Host Utilities 7.1 Release Notes

This Release Notes document contains the latest information for the Windows Unified Host Utilities 7.1 release, including updates about new features, enhancements, and known issues. The document is updated when new information on using the Windows Host Utilities becomes available.

About the Windows Unified Host Utilities 7.1 release

The Windows Unified Host Utilities enable you to connect a Windows host computer to NetApp storage systems. The Windows Unified Host Utilities include an installation program that sets the required Windows registry and HBA values.

The Windows Unified Host Utilities 7.1 continues to support the following versions of Windows:

- Windows 2012
- Windows 2012R2
- Windows 2016
- Windows 2019
- Windows 2022

NetApp qualifies additional components between releases of the Host Utilities software. For the latest information about the system requirements, see the NetApp Interoperability Matrix Tool.

Features in this Host Utilities release

Windows Unified Host Utilities 7.1 includes support for E-Series storage systems, support for ONTAP 9 and later versions, and enhanced iSCSI timeouts for faster failover.

Important cautions

Before deploying the latest release of Windows Host Utilities, you must read the information available to help you identify and resolve issues that might affect the operation of your systems.

For more information about an individual bug and to explore other bug-related tools, see NetApp Bugs Online.

Installing the required hotfixes

To ensure a successful installation or upgrade of Windows Unified Host Utilities, you must install a specific Windows hotfix. Some hotfixes are a component of Windows updates.

Refer to the Windows Host Utilities documentation for your specific configuration hotfix requirements.

Known issues

Some unexpected and potentially undesired behaviors, as well as, in some cases, workarounds to avoid these behaviors, have been identified in this release.

Title	Description	Workaround
Running the `linux_gos_timeout-install.sh` script is no longer required on Hyper-V guests running Red Hat Enterprise Linux or SUSE Linux Enterprise Server	You are no longer required to run the `linux_gos_timeout-install.sh` script to change disk timeouts on Red Hat Enterprise Linux 5, Red Hat Enterprise Linux 6, or SUSE Linux Enterprise Server 11 Hyper-V guests because the default timeout settings are being used. The `linux_gos_timeout-install.sh` script that was included in previous versions of the Host Utilities is no longer included in the Windows Unified Host Utilities. Windows Unified Host Utilities 7.1 uses the default disk timeout settings.	NA
iSCSI sessions do not reconnect after reboot with mixed IPv4 and IPv6	In a multipath I/O (MPIO) configuration or multiple connections per session (MCS) configuration that has both IPv4 and IPv6 endpoints, some iSCSI sessions might fail to reconnect after rebooting the Windows host.	To ensure that all of your iSCSI paths return after a reboot, use either all IPv4 endpoints or all IPv6. Do not mix IPv4 and IPv6.

Title	Description	Workaround
MCS is not supported with iSCSI software boot	When using iSCSI software boot with iSCSI multiple connections per session (MCS), the iSCSI boot leading connection cannot be protected. This can lead to disconnection from the boot LUN causing the host to crash.	Microsoft does not support MCS for iSCSI software booted hosts. Use MPIO as the high availability solution. Note that mixing MPIO and MCS is not supported.

NetApp Bugs Online provides complete information for most known issues, including suggested workarounds where possible.

About SAN Host Configuration documentation

Documentation for SAN Host Utilities is included in the ONTAP SAN Host Configuration documentation. ONTAP SAN HOST configuration documentation is cumulative, covering all current SAN HOST releases. Any functional differences across releases are noted in context.

Where to find product documentation and other information

You can access documentation for all NetApp products and find other product information resources, such as technical reports and white papers on the Product Documentation page of the NetApp corporate site.

Related information

Configuring and managing your ONTAP storage system

- The ONTAP Software Setup Guide for your version of ONTAP
- The ONTAP SAN Administration Guide for your version of ONTAP
- The ONTAP Release Notes for your version of ONTAP

Configuring and managing your E-Series storage system

- The SANtricity Storage Manager Configuration and Provisioning for Windows Express Guide that is appropriate for your protocol
- The SANtricity Storage Manager Configuration and Provisioning Express Guide for your operating system, protocol, and version of SANtricity.
- The SANtricity Storage Manager Software Installation Reference specific for your version of SANtricity.
- The SANtricity Storage Manager Multipath Driver’s Guide specific for your version of SANtricity.
- The SANtricity Storage Manager Release Notes for your version of SANtricity.

See the E-Series documentation to find SANtricity related documentation.

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