

IBM System Storage N series



AIX Host Utilities 6.0 Installation and Setup Guide

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Preface

Supported features

IBM System Storage N series storage systems are driven by NetApp Data ONTAP software. Some features described in the product software documentation are neither offered nor supported by IBM. Please contact your local IBM representative or reseller for further details.

Information about supported features can also be found on the N series support website (accessed and navigated as described in [Websites](#) on page 6).

Websites

IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. The following web pages provide N series information:

- A listing of currently available N series products and features can be found at the following web page:

www.ibm.com/storage/nas/

- The IBM System Storage N series support website requires users to register in order to obtain access to N series support content on the web. To understand how the N series support web content is organized and navigated, and to access the N series support website, refer to the following publicly accessible web page:

www.ibm.com/storage/support/nseries/

This web page also provides links to AutoSupport information as well as other important N series product resources.

- IBM System Storage N series products attach to a variety of servers and operating systems. To determine the latest supported attachments, go to the IBM N series interoperability matrix at the following web page:

www.ibm.com/systems/storage/network/interophome.html

- For the latest N series hardware product documentation, including planning, installation and setup, and hardware monitoring, service and diagnostics, see the IBM N series Information Center at the following web page:

publib.boulder.ibm.com/infocenter/nasinfo/nseries/index.jsp

Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains

information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM N series product, and whom to call for service, if it is necessary.

Before you call

Before you call, make sure you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure they are connected.
- Check the power switches to make sure the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.
- Refer to the N series support website (accessed and navigated as described in [Websites](#) on page 6) for information on known problems and limitations.

Using the documentation

The latest versions of N series software documentation, including Data ONTAP and other software products, are available on the N series support website (accessed and navigated as described in [Websites](#) on page 6).

Current N series hardware product documentation is shipped with your hardware product in printed documents or as PDF files on a documentation CD. For the latest N series hardware product documentation PDFs, go to the N series support website.

Hardware documentation, including planning, installation and setup, and hardware monitoring, service, and diagnostics, is also provided in an IBM N series Information Center at the following web page:

publib.boulder.ibm.com/infocenter/nasinfo/nseries/index.jsp

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services. Visit the following web page for support telephone numbers:

www.ibm.com/planetwide/

Firmware updates

IBM N series product firmware is embedded in Data ONTAP. As with all devices, ensure that you run the latest level of firmware. Any firmware updates are posted to the N series support website (accessed and navigated as described in [Websites](#) on page 6).

Note: If you do not see new firmware updates on the N series support website, you are running the latest level of firmware.

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support.

How to send your comments

Your feedback helps us to provide the most accurate and high-quality information. If you have comments or suggestions for improving this document, please send them by email to starpubs@us.ibm.com.

Be sure to include the following:

- Exact publication title
- Publication form number (for example, GC26-1234-02)
- Page, table, or illustration numbers
- A detailed description of any information that should be changed

Changes to this document: October 2012

Several changes have been made to this document since it was published for the AIX Host Utilities 6.0 release.

October 2012

The AIX Host Utilities 6.0 Installation and Setup Guide was updated in October to make the following changes:

- Remove information about features not supported in this release of the AIX Host Utilities:
 - References to Data ONTAP operating in Cluster-Mode
At this time, the AIX Host Utilities 6.0 do **not** support Data ONTAP operating in Cluster-Mode.
 - Information about Veritas Storage Foundation
While Veritas Storage Foundation is no longer qualified with AIX Host Utilities 6.0, it is supported in earlier versions of the AIX Host Utilities. For more information about the versions that support Veritas, see the IBM N series interoperability matrix at www.ibm.com/systems/storage/network/interophome.html.
 - References to iSCSI protocol support with AIX Host Utilities
The AIX Host Utilities 6.0 do not support the iSCSI protocol.

Note: The AIX Host Utilities 6.0 compressed installation file does contain an installation package for `IBM.iSCSI_Host Utilities_Kit` for single-path iSCSI. Because iSCSI is not supported with AIX Host Utilities 6.0, information about this package file is not included in the AIX Host Utilities 6.0 documentation.
- To add information that starting with AIX Host Utilities 6.0, the pre-install script automatically clears the Single Path Reserve when it detects a SAN-booted device from an ONTAP LUN.
- To add information about the maximum number of paths for a SAN boot configuration with AIX Host Utilities 6.0.
The post-install script releases the Single Path Reserve when a boot device with VID=ONTAP is detected during the installation. As a result, the data LUNs have no specific path limit; however, it is recommended that maximum path limit be set to 4 for all AIX SAN boot deployments.

The AIX Host Utilities

The Host Utilities provide software programs and documentation that you can use to connect your AIX host to storage systems running Data ONTAP. The software is available as a single compressed file.

The Host Utilities include the following components:

- The SAN Toolkit

Note: This toolkit is common across all the 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 toolkit is installed when you install the Host Utilities. This kit provides the following key tools:

- **(AIX MPIO, FC)** `dotpaths` utility, which lets you set path priorities in MPIO environments running the FC protocol that are not using ALUA.
- The `san_version` command, which displays the versions of the Host Utilities.
- `sanlun` utility. This utility displays information about LUNs on the storage system that are available to this host. In PowerVM environments, you must be running N_Port ID Virtualization (NPIV) in an FC environment if you want to run the `sanlun` utility on an VIO client. If you are running PowerVM with Virtual SCSI (vSCSI), you cannot run Host Utilities tools such as the `sanlun` utility on VIO clients. In vSCSI deployments, the tools only work on the VIO server.

For more information about using these tools, see the man pages.

Note: Previous versions of the Host Utilities also included diagnostics programs. These programs have been replaced by the nSANity Diagnostic and Configuration Data Collector and are no longer installed with the Host Utilities. The nSANity program is not a part of the Host Utilities. You should download, install, and execute it only when requested to do so by technical support.

- Documentation

The documentation provides information on installing, setting up, using, and troubleshooting the Host Utilities. The documentation consists of:

- *Installation and Setup Guide*
- *Release Notes*

Note: The *Release Notes* are updated whenever new information about the Host Utilities is available. You should check the *Release Notes* before installing the Host Utilities to see if there is new information about installing and working with the Host Utilities.

- *Host Settings Affected by AIX Host Utilities*
- *Quick Command Reference*

- *Quick Start Guide*

You can download the documentation at the N series support website (accessed and navigated as described in [Websites](#) on page 6) when you download the Host Utilities software.

Supported Host Utilities environments and protocols

The Host Utilities support AIX environments such as; AIX MPIIO and PowerVM environments.

For information about the environments that the Host Utilities support, check the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

The following table summarizes the key aspects of the primary Host Utilities environments for hosts running AIX:

AIX Environment	Notes
AIX MPIO (Native OS)	<p>This environment uses the AIX operating system to provide volume management and multipathing.</p> <ul style="list-style-type: none"> • Multipathing: AIX's Multiple Path I/O (MPIO) with IBM's default Path Control Module (PCM). • Volume management: AIX Logical Volume Manager (LVM). • Protocols: FC and FCoE. • Asymmetrical logical unit access (ALUA): You can use either ALUA or the <code>dotpaths</code> utility provided with the Host Utilities to set the path priorities within an environment not using ALUA. • Installation software: Install the software packages that are placed in the following two directories when you uncompress the Host Utilities file: <ul style="list-style-type: none"> • MPIO directory: <code>Ontap.MPIO_Host_Uilities_Kit</code> • SAN_Tool_Kit directory: <code>Ontap.SAN_toolkit</code> <p>Note: The SAN Toolkit software package is common to all AIX environments and you should install it in addition to the software package for your AIX environment.</p> • Setup issues: None. • LUN management: <ul style="list-style-type: none"> • To discover LUNs, use the <code>cfgmgr</code> command. • To manage the LUNs and volumes, use LVM. • To set LUN path priorities: <ul style="list-style-type: none"> • For FC environments that support ALUA and have it enabled, ALUA automatically sets the paths. • For FC environments that do not use ALUA, use the <code>dotpaths</code> utility provided by the Host Utilities. • SAN booting is supported.

AIX Environment	Notes
PowerVM	<p>PowerVM uses the Virtual I/O (VIO) Server/Client. This environment runs on top of the MPIO environment.</p> <ul style="list-style-type: none"> • Special notes about PowerVM environments: <ul style="list-style-type: none"> • You can run PowerVM with vSCSI and NPIV. • You must run as <code>padmin</code> and use VIO commands. • Some Host Utilities require you to run in an OEM Setup Mode. To enable you to become root while logged in as <code>padmin</code> in a PowerVM vSCSI environment, use the <code>oem_setup_env</code> command. • Multipathing: AIX MPIO with IBM's default PCM. • Volume management: AIX LVM. • Protocols: FC and FCoE. • ALUA: You can use either ALUA or the <code>dotpaths</code> utility provided with the Host Utilities to set the path priorities. • Installation software: Install the software packages that are placed in the following two directories when you uncompress the Host Utilities compressed file: <ul style="list-style-type: none"> • MPIO directory: <code>Ontap.MPIO_Host_Uilities_Kit</code> • SAN_Tool_Kit directory: <code>Ontap.SAN_toolkit</code> <p>Note: The SAN Toolkit software package is common to all AIX environments and must be installed in addition to the software package for your AIX environment.</p> • Setup issues: None. • LUN management: <ul style="list-style-type: none"> • To discover LUNs, use the <code>cfgmgr</code> command. • To manage the LUNs and volumes, use LVM. • To set LUN path priorities: <ul style="list-style-type: none"> • For FC environments that support ALUA and have it enabled, ALUA automatically sets the paths. • For FC environments that are not using ALUA, use the <code>dotpaths</code> utility provided by the Host Utilities. • If you have virtual SCSI LUNs set up, the <code>sanlun</code> utility does not recognize them. This is because the LUNs are identified as VID "IBM" and PID "VDASD". • SAN booting is supported.

How to find instructions for your AIX Host Utilities environment

Many instructions in this manual apply to all the environments supported by the Host Utilities. In some cases, though, commands or configuration information varies based on your environment.

To make finding information easier, this guide places a qualifier, such as "**PowerVM**," in the title if a section applies only to a specific Host Utilities environment. That way you can quickly determine whether a section applies to your Host Utilities environment and skip the sections that do not apply.

If the information applies to all supported AIX Host Utilities environments, there is no qualifier in the title.

This guide uses the following qualifiers to identify the different AIX Host Utilities environments:

Qualifier	The section that follows applies to
(PowerVM)	Environments using PowerVM VIO servers. Unless otherwise specified, the information for MPIO environments also applies to PowerVM environments.
(PowerVM NPIV)	Environments using PowerVM VIO servers with NPIV.
(PowerVM vSCSI)	Environments using PowerVM VIO servers with Virtual SCSI (vSCSI).
(AIX MPIO)	Environments using AIX MPIO as the multipathing solution. Currently, all AIX MPIO environments use native drivers. Unless otherwise specified, the information for "AIX MPIO" environments also applies to Host Utilities environments that use PowerVM.
(AIX MPIO, FC)	AIX MPIO environments using the FC protocol. Unless otherwise specified, the information for "AIX MPIO, FC" environments also applies to PowerVM environments.
(FC, FCoE)	Environments using the Fibre Channel protocol. Note: Unless otherwise specified, FC refers to both FC and FCoE in this guide.

There is also information about using the Host Utilities in an AIX environment in the *Release Notes* and the AIX Host Utilities reference documentation. You can download all the Host Utilities documentation from the N series support website (accessed and navigated as described in [Websites](#) on page 6)

Checklist for planning the Host Utilities installation

Installing the Host Utilities and setting up your system involves numerous tasks that are performed on both the storage system and the host. The checklist provides a high-level overview of these tasks.

If you are an experienced AIX user, this checklist can serve as a quick start guide to installing and setting up the Host Utilities.

The detailed steps for each of the tasks presented in the checklist are provided in the *AIX Host Utilities Quick Start Guide*.

Note: Occasionally, there are known problems that can affect your system setup. Read the *Host Utilities Release Notes* before you install the Host Utilities. The *Release Notes* are updated whenever an issue is found and might contain information about the Host Utilities that was observed after this guide was produced.

Task 1: Ensure the prerequisites for installing and setting up the Host Utilities have been met

1. Verify that your system setup is correct.
Check the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6) for the most current information about system requirements.
2. Verify that your storage system has Data ONTAP installed and is running correctly with the licensed protocol for your environment.
3. **(FC/FCoE)** If you are using a switch, verify that it is:
 - Set up correctly.
 - Zoned appropriately using the supported zoning technique in single initiator zoning from a host's initiator's standpoint.
 - Cabled correctly according to the instructions in the *SAN Configuration Guide (called Fibre Channel and iSCSI Configuration Guide in Data ONTAP 8.1 and earlier)* for your version of Data ONTAP.
 - Powered on in the correct order: switch, disk shelves, storage systems, and then the host.

Note: For information about supported topologies for your version of Data ONTAP, see *SAN Administration Guide (called Block Access Management Guide for iSCSI and FC in Data ONTAP 8.1 and earlier)*.
4. Confirm that the host and the storage system can communicate by verifying the following:
 - Host ports have "logged in" on controller.
 - LUNs are visible if mapped to the host.

Task 2: Install the Host Utilities

1. Download a copy of the compressed file containing the Host Utilities from N series support website (accessed and navigated as described in [Websites](#) on page 6).

2. Uncompress the file and extract the SAN Toolkit software package.
You can use the `zcat` and `tar` commands to uncompress the file and extract the software; for example:

```
zcat ibm_aix_host_utilities_6.0.tar.Z | tar -xvf -
```

3. Verify that the HBA initiator queue depth is appropriate for your system.
You can use the `lsattr -El hdiskx` command to check the queue depth.

Task 3: Set up access between the host and the LUNs on the storage system

1. Create and map igroups and LUNs.
If your environment supports ALUA, make sure ALUA is enabled. If you have Data ONTAP 8.0 or later, ALUA is automatically enabled when you create an igroup in an environment that uses the FC protocol.
You can use the `igroup show -v igroup_name` command to see if ALUA is enabled. If it is not enabled, you can use the `igroup set igroup_name alua yes` command to enable it.
2. **(FC, FCoE)** Set the path priorities.
If you have an MPIO environment running the FC protocol and you are not using ALUA, you can use the `dotpaths` utility that comes with the Host Utilities to set the path priorities.
3. Discover the new LUNs.
 - For **(PowerVM)**, use the `cfgdev` command.
4. **(PowerVM)** If you have LUNs presented to a VIO server from multiple third-party storage vendors, ensure that all the LUNs use the same maximum transfer size.
Use the `lsattr -El <disk> -a max_transfer` command.
5. Display information about the LUNs.
You can use the `sanlun` command to display information about the LUNs and the HBAs.

The AIX Host Utilities installation

The AIX Host Utilities software is provided in a single, compressed file that contains the software packages for AIX MPIO and PowerVM environments, and the SAN Toolkit. You must install both the host settings software package for your environment and the SAN Toolkit software package.

You can perform the installations using either `SMIT` or the `installp` command.

You must install the following software packages:

- The SAN Toolkit software package.
This software package contains the `sanlun` utility and other tools. You install the same software package for all the environments of the Host Utilities.
- The host settings software package for your environment.
This software package includes the Object Data Manager (ODM) stanza LPP packages that contain the device definitions for your multipathing environment. There is a separate software package for MPIO environment.

Note: Direct-attached configurations and switch configurations that have multiple paths should use the MPIO software package.

When you decompress the AIX Host Utilities file, it creates a directory within its current directory that has three subdirectories. The subdirectories contain the Host Utilities software packages for the MPIO host settings and the SAN Toolkit.

Getting the software

You can download the compressed file containing the Host Utilities software packages or you can install it from the physical media. After you have the file, you must uncompress it to get the two software packages you need to install the Host Utilities.

About this task

You can install the product software either from the physical media kit or from software updates available for download. Downloads are available only to entitled IBM N series customers who have completed the registration process on the IBM N series support website (accessed and navigated as described in [Websites](#) on page 6).

Steps

1. Check the publication matrix page at IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6) for important alerts, news, interoperability details, and other information about the product before beginning the installation.
 - If you are installing the software from the Physical media kit, insert the CD-ROM into your host machine. You are now ready to proceed to the instructions for installing the software.

- If you are installing the software from the Software updates available for download, go to the IBM N series support website (accessed and navigated as described in [Websites](#) on page 6).
2. On the AIX host, make sure you are logged in as root.
Note: (PowerVM) In PowerVM environments with vSCSI, log in as `padmin` and then enter the `oem_setup_env` command to become root.
 3. Go to the directory where you placed the Host Utilities file and uncompress it.

You can use the `zcat` and `tar` commands to uncompress the file and extract the software:

```
zcat ibm_aix_host_utilities_6.0.tar.Z | tar -xvf -
```

Note: The actual name of the file containing the Host Utilities software might differ from the file name shown in these examples.

When you uncompress this file, it creates the directory `ibm_aix_host_utilities_6.0` with the following three subdirectories:

- `SAN_Tool_Kit` (Recommended for all environments)
This directory contains the SAN Toolkit software package (`Ontap.SAN_toolkit`), which applies to all AIX Host Utilities environments and works with all multipathing solutions.
- `MPIO`
This directory contains the host settings software package (`Ontap.MPIO_Host_Utilities_Kit`) for supported Host Utilities environments using AIX MPIO for multipathing.
Both AIX MPIO and PowerVM environments must install this software package.

To install the Host Utilities, you must install both the host settings software package for your multipathing solution and the SAN Toolkit software.

Example

The following example shows the type of output that executing the `zcat` and `tar` commands produces:

```
#-> zcat ibm_aix_host_utilities_6.0.tar.Z | tar xvf -
x ibm_aix_host_utilities_6.0
x ibm_aix_host_utilities_6.0/NON_MPIO_Tool_Kit
x ibm_aix_host_utilities_6.0/NON_MPIO_Tool_Kit/Ontap.NON_MPIO_toolkit, 1343488
bytes,
2624 tape blocks
x ibm_aix_host_utilities_6.0/NON_MPIO
x ibm_aix_host_utilities_6.0/NON_MPIO/Ontap.fcp_Host_Utilities_kit, 24576
bytes, 48 tape
blocks
x ibm_aix_host_utilities_6.0/MPIO
x ibm_aix_host_utilities_6.0/MPIO/Ontap.mpio_Host_Utilities_kit, 184320 bytes,
360 tape
block
```

Using SMIT to install the Host Utilities software

You can use SMIT to install the Host Utilities software for your environment.

Before you begin

Make sure you have the host settings software package for your environment and the SAN Toolkit package that were contained in the compressed file you downloaded or got from the physical media.

In addition, it is a good practice to check the Host Utilities *Release Notes* to see if there have been any changes or new recommendations for installing and using the Host Utilities since this installation guide was produced.

About this task

This installation example installs the host settings software package first. You must repeat the steps to install the SAN Toolkit software package.

(PowerVM) If you have a PowerVM environment, you must install the SAN Toolkit on each client. If you are running NPIV in an FC environment, you can then run the `sanlun` utility on the VIO client. If you have a PowerVM vSCSI, the `sanlun` utility only runs on the VIO server; not the VIO clients.

Steps

1. Log in to the host as root.

(PowerVM) In PowerVM vSCSI environments, you must log into the host as `padmin` and then enter the `oem_setup_env` command to become root.

Example

(PowerVM) Entering the following command from a VIO server that uses vSCSI enables you to become root.

```
vioserver$ oem_setup_env
```

2. Start SMIT by entering the following command:

```
smitty install
```

3. At the screen that appears, select the option titled Install and Update Software.

Example

When you start SMIT, it displays the following screen. On this screen, the Install and Update Software option is the first menu option.

```

# smitty install
+-----+
----+
Software Installation and Maintenance
Move cursor to desired item and press Enter.
  Install and Update Software
  List Software and Related Information
  Software Maintenance and Utilities
  Software Service Management
  Network Installation Management
  EZ NIM (Easy NIM Tool)
  System Backup Manager
  Alternate Disk Installation
  EFI Management

F1=Help      F2=Refresh   F3=Cancel    Esc+8=Image
Esc+9=Shell  Esc+0=Exit   Enter=Do
+-----+
----+

```

4. At the next screen, select the Install Software menu option.

Example

The following is an example of the Install and Update Software screen.

```

+-----+
----+
Install and Update Software
Move cursor to desired item and press Enter.
  Install Software
  Update Installed Software to Latest Level (Update All)
  Install Software Bundle
  Update Software by Fix (APAR)
  Install and Update from ALL Available Software

F1=Help      F2=Refresh   F3=Cancel    Esc+8=Image
Esc+9=Shell  Esc+0=Exit   Enter=Do
+-----+
----+

```

5. At the Install Software screen, specify the location of the software.

For example, when you are installing from the host machine, you would enter the path to the software package. If you use MPIO for multipathing, you might enter something similar to:

```
/var/tmp/ibm_aix_host_utilities_6.0/MPIO/Ontap.MPIO_Host_Utilities_Kit
```

If you are installing from the CD-ROM, enter the CD-ROM drive.

Example

(AIX MPIO) The following is an example of entering the path to the MPIO software package when you are at the Install Software screen.

```
+-----+
Install Software

Type or select a value for the entry field.
Press Enter AFTER making all desired changes.

                                                    [Entry Fields]
* INPUT device / directory for software
[/var/tmp/ibm_aix_host_utilities_6.0/MPIO/
Ontap.MPIO_Host_Uilities_Kit]+

F1=Help      F2=Refresh    F3=Cancel      F4=List
Esc+5=Reset  Esc+6=Command Esc+7=Edit
Esc+8=Image
Esc+9=Shell  Esc+0=Exit    Enter=Do
+-----+
```

After you enter path to the software package, SMIT displays the following screen. This is the screen where you enter name of the software package and press Enter.

```
+-----+
Install Software

Type or select a value for the entry field.
Press Enter AFTER making all desired changes.

                                                    [Entry Fields]
* INPUT device / directory for software
[/var/tmp/ibm_aix_host_utilities_6.0/MPIO/
Ontap.MPIO_Host_Uilities_Kit]+

* SOFTWARE to install
[Ontap.MPIO_Host_Uilities_Kit] +

PREVIEW only? (install operation will NOT occur)    no    +
COMMIT software updates?                             yes   +
+
SAVE replaced files?                                  no    +
AUTOMATICALLY install requisite software?           yes   +
EXTEND file systems if space needed?                 yes   +
OVERWRITE same or newer versions?                   no    +
VERIFY install and check file sizes?                 no    +
Include corresponding LANGUAGE filesets?            yes   +
DETAILED output?                                     no    +
Process multiple volumes?                            yes   +
ACCEPT new license agreements?                       no    +
Preview new LICENSE agreements?                      no    +
+-----+
```

```

F1=Help      F2=Refresh   F3=Cancel    F4=List
Esc+5=Reset  Esc+6=Command Esc+7=Edit
Esc+8=Image
Esc+9=Shell  Esc+0=Exit    Enter=Do
+-----+

```

- SMIT displays a warning, asking you to confirm that you want to install the software. Press Enter to continue.

Example

The following is an example of the screen that SMIT displays.

```

x*****x
x                ARE YOU SURE?                x
x                                                                 x
x Continuing may delete information you may want x
x to keep. This is your last chance to stop    x
x before continuing.                          x
x Press Enter to continue.                    x
x Press Cancel to return to the application.   x
x                                                                 x
x F1=Help      F2=Refresh                       x
x F3=Cancel    x                               x
x Esx Esc+8=Image Esc+0=Exit Enter=Do        x
x*****x

```

- SMIT displays information about the installation.

Example

The following is the type of output you see when an installation using the MPIO fileset successfully completes.

```

COMMAND STATUS
Command: running      stdout: yes      stderr: no

Before command completion, additional instructions may appear below.

  Ontap.MPIO_Host_Utilitys_Kit.pcmadm 6.0.0.0
  Ontap.MPIO_Host_Utilitys_Kit.fcp 6.0.0.0
  Ontap.MPIO_Host_Utilitys_Kit.config 6.0.0.0
  . . . . . ** Copyright notice for Ontap.MPIO_Host_Utilitys_Kit
  ** . . . . .
  (C) Copyright, Inc. 2003-2011.
  All rights reserved.
  . . . . . ** End of copyright notice for
  Ontap.MPIO_Host_Utilitys_Kit **. . . .

Finished processing all filesets. (Total time: 5 secs).

```

```
0503-409 installp: bosboot verification starting...
installp: bosboot verification completed.
0503-408 installp: bosboot process starting...
```

```
bosboot: Boot image is 23825 512 byte blocks.
0503-292 This update will not fully take effect until after a
system reboot.
```

```
* * * A T T E N T I O N * * *
```

```
System boot image has been updated. You should reboot the
system as soon as possible to properly integrate the changes
and to avoid disruption of current functionality.
```

```
installp: bosboot process completed.
```

```
+-----+
Summaries:
```

```
+-----+
Installation Summary
```

```
-----
Name                      Level      Part      Event
Result
-----
```

```
-----
Ontap.MPIO_Host_Utilities_Kit.pcmmod 6.0.0.0 USR APPLY SUCCESS
Ontap
.MPIO_Host_Utilities_Kit.fcp 6.0.0.0 USR APPLY SUCCESS
Ontap.MPIO_Host_Utilities_Kit.conf 6.0.0.0 USR APPLY SUCCESS
```

```
COMMAND STATUS
```

```
Command: running      stdout: yes      stderr: no
```

```
Before command completion, additional instructions may appear below.
```

```
Ontap.MPIO_Host_Utilities_Kit.config 6.0.0.0
```

```
. . . . . ** Copyright notice for Ontap.MPIO_Host_Utilities_Kit
** . . . . .
```

```
(C) Copyright, Inc. 2003-2011.
```

```
All rights reserved.
```

```
. . . . . ** End of copyright notice for
Ontap.MPIO_Host_Utilities_Kit **. . . . .
```

```
Finished processing all filesets. (Total time: 5 secs).
```

```
0503-409 installp: bosboot verification starting...
installp: bosboot verification completed.
0503-408 installp: bosboot process starting...
```

```
bosboot: Boot image is 23825 512 byte blocks.
0503-292 This update will not fully take effect until after a system
reboot.
```

```
installp: bosboot process completed.
```

```
+-----+
Summaries:
```

```

+-----+
Installation Summary
-----

* * * A T T E N T I O N * * *
System boot image has been updated. You should reboot the
system as soon as possible to properly integrate the changes
and to avoid disruption of current functionality.

+-----+
Summaries:
-----+
Installation Summary
-----
Name                               Level           Part            Event
Result
-----
Ontap.MPIO_Host_Utilities_Kit.pcmo 6.0.0.0 USR APPLY SUCCESS
Ontap
.MPIO_Host_Utilities_Kit.fcp 6.0.0.0 USR APPLY SUCCESS
Ontap.MPIO_Host_Utilities_Kit.conf 6.0.0.0 USR APPLY SUCCESS

F1=Help           F2=Refresh       F3=Cancel       Esc
+6=Command
Esx Esc+8=Image  Esc+9=Shell      Esc+0=Exit

```

- Now that you have installed the host settings software package, you should install the SAN Toolkit software package: `Ontap.SAN_toolkit`. Repeat Steps 2-8 to install the toolkit.

Note: In a PowerVM environment, you should also install the SAN Toolkit on each client.

You can check the installation by looking in the SMIT log file (`smit.log` and `smit.script`). These files are in the SMIT log directory (`$HOME`).

After you finish

To complete the installation, you must configure any parameters required for your environment.

Using a command line to install the Host Utilities software

You can use command line to install the Host Utilities software for your environment.

Before you begin

Make sure you have the host settings software package for your environment and the SAN Toolkit package from the Host Utilities compressed file you downloaded or got from the physical media.

In addition, it is a good practice to check the Host Utilities *Release Notes* to see if there have been any changes or new recommendations for installing and using the Host Utilities since this installation guide was produced.


```

FILESET STATISTICS
-----
  2 Selected to be installed, of which:
  2 Passed pre-installation verification
-----
  2 Total to be installed

+-----+
|                                     |
|                               Installing Software...                               |
|                                     |
+-----+

installp: APPLYING software for:
  Ontap.SAN_toolkit.scripts 6.0.0.0
  Ontap.SAN_toolkit.sanlun 6.0.0.0
. . . . . ** Copyright notice for Ontap.SAN_toolkit ** . . . . .

All rights reserved.
. . . . . ** End of copyright notice for Ontap.SAN_toolkit ** . . . . .
Finished processing all filesets. (Total time: 2 secs).
+-----+
|                                     |
|                               Summaries:                                       |
|                                     |
+-----+
|                                     |
|                               Installation Summary                               |
|                                     |
+-----+

Name                    Level      Part      Event      Result
-----
Ontap.SAN_toolkit.scripts 6.0.0.0  USR    APPLY    SUCCESS
Ontap.SAN_toolkit.sanlun  6.0.0.0  USR    APPLY    SUCCESS

```

Values for the `queue_depth` and `num_cmd_elems` parameters

It is a good practice to confirm the values of `num_cmd_elems` and `queue_depth` parameters used with the HBA initiators.

The Host Utilities do not change the `num_cmd_elems` parameter value from the AIX default value.

For the `queue_depth` parameter, though, the host settings package provided by the Host Utilities changes the value to 64 on the hdisk handles.

You can use the command `lsattr -El fcsX` to verify these values.

The following example shows the value of `num_cmd_elems`.

```
# lsattr -El fcs0 -a num_cmd_elems
num_cmd_elems 200 Maximum number of COMMANDS to queue to the
adapter True
```

This example shows the queue depth on the hdisk handles.

```
# lsattr -El hdisk4 -a queue_depth  
queue_depth 64 Queue DEPTH True
```

(FC) AIX `fc_err_recov` parameter settings

The AIX Fast I/O Failure setting is controlled by the `fc_err_recov` attribute of each fscsi device handle. Setting `fc_err_recov` to a value of `fast_fail` is required by certain applications and MPIO environments. Enabling `fast_fail` might decrease the I/O recovery time when a link loss occurs between the host and storage device.

Related Information

[*APAR IY 85526: Fibre channel dyntrk and fc_err_recov absent from AIX docs*](#)

Information on removing the AIX Host Utilities

You can easily remove an older version of the Host Utilities using either SMIT or the `installp` command.

The Host Utilities are packaged as a standard AIX fileset. It is a good practice to remove the Host Utilities software before you install a new version of the Host Utilities or switch from one environment to another environment. By performing a clean upgrade, you can avoid possible problems in the future.

If you are using a SAN boot LUN, you must perform special steps when you want to upgrade to a new version of the Host Utilities. See the section (*AIX MPIO*) *Updating a SAN boot LUN* for more information.

Before you uninstall previous versions of software

Before you uninstall previous versions of the Host Utilities, you should prepare your system.

You need to disconnect the Data ONTAP LUNs from the host before you uninstall the Host Utilities. To disconnect the LUNs, you must:

1. Stop all I/O on the system.
2. Unmount the file systems that contain the volume groups mapped to storage system LUNs.
3. Varyoff the volume groups.
4. Remove the existing Data ONTAP LUN handles.

Uninstalling the Host Utilities software using SMIT

You can use SMIT to uninstall the Host Utilities software for your environment.

About this task

The example used in these steps uninstalls the MPIO host settings software package. If you have a different environment, substitute the name of that environment's host settings software package. You must repeat the steps to uninstall the SAN Toolkit.

Steps

1. Log in to the host as root.
(PowerVM) In PowerVM environments with vSCSI, you must log in to the host as `padmin` and then enter the `oem_setup_env` command to become root.
2. Start SMIT by entering the following command:

smit

3. At the screen that appears, select the option titled Software Installation and Maintenance.

Example

When you start SMIT, it displays the following screen. On this screen, the Software Installation and Maintenance option is the first menu option.

```
+-----+
# smit
  System Management

Move cursor to desired item and press Enter.
  Software Installation and Maintenance
  Software License Management
  Devices
  System Storage Management (Physical & Logical Storage)
  Security & Users
  Communications Applications and Services
  Print Spooling
  Problem Determination
  Performance & Resource Scheduling
  System Environments
  Processes & Subsystems
  Applications
  Cluster System Management
  Using SMIT (information only)

F1=Help      F2=Refresh   F3=Cancel
Esc+8=Image
Esc+9=Shell  Esc+0=Exit   Enter=Do
+-----+
```

4. At the screen that appears, select the Software Maintenance and Utilities menu option.

Example

The following is an example of the Software Installation and Maintenance screen.

```
+-----+
Software Installation and Maintenance
Move cursor to desired item and press Enter.

  Install and Update Software
  List Software and Related Information
  Software Maintenance and Utilities
  Network Installation Management
  System Backup Manager

F1=Help      F2=Refresh   F3=Cancel
Esc+8=Image
```

```
Esc+9=Shell   Esc+0=Exit   Enter=Do
+-----+
```

- At the next screen, select the Remove Installed Software menu option.

Example

The following is an example of the Software Maintenance and Utilities screen.

```
+-----+
Software Maintenance and Utilities
Move cursor to desired item and press Enter.

Commit Applied Software Updates (Remove Saved Files)
Reject Applied Software Updates (Use Previous Version)
Remove Installed Software

Copy Software to Hard Disk for Future Installation

Check Software File Sizes After Installation
Verify Software Installation and Requisites

Clean Up After Failed or Interrupted Installation

F1=Help       F2=Refresh    F3=Cancel
Esc+8=Image
Esc+9=Shell   Esc+0=Exit    Enter=Do
+-----+
```

- Remove the software by entering the package name.

For example, to remove the MPIO software package, you might enter

```
Ontap.MPIO_Host_Uilities_Kit
```

Make sure that the `PREVIEW only?` option is set to `no`.

Example

(MPIO) The following is an example of the Remove Installed Software screen displayed when you are removing the Host Utilities software package for environments using MPIO for multipathing.

Note: By default `PREVIEW only?` is set to `yes`. You must change it to `no` if you want to uninstall the software.

```
+-----+
Remove Installed Software

Type or select values in entry fields.
Press Enter AFTER making all desired changes.
```

```

[Entry Fields]
* SOFTWARE name
[Ontap..MPIO_Host_Utility_Kit
.config Ontap.mpio_Host_Utility_Kit.fcp
Ontap.MPIO_Host_Utility_Kit
_>

+
PREVIEW only? (remove operation will NOT occur)
no +
REMOVE dependent software?
no +
EXTEND file systems if space needed?
no +
DETAILED output?
no +

F1=Help          F2=Refresh      F3=Cancel      F4=List
Esc+5=Reset      Esc+6=Command   Esc+7=Edit
Esc+8=Image
Esc+9=Shell      Esc+0=Exit      Enter=Do
+-----+

```

Example of successful uninstall: The following output appears when you successfully uninstall the software for an MPIO environment.

```

Command: running      stdout: yes      stderr: no

Before command completion, additional instructions may appear below.

0503-409 installp: bosboot verification starting...
installp: bosboot verification completed.
+-----+
Deinstalling Software...
+-----+
Ontap.MPIO_Host_Utility_Kit.config 5.1.0.0
Ontap.MPIO_Host_Utility_Kit.fcp 5.1.0.0
Ontap.MPIO_Host_Utility_Kit.pcmadm 5.1.0.0

Finished processing all filesets. (Total time: 4 secs).

0503-409 installp: bosboot verification starting...
installp: bosboot verification completed.
0503-408 installp: bosboot process starting...
bosboot: Boot image is 23825 512 byte blocks.
0503-292 This update will not fully take effect until after a
system reboot.

* * * A T T E N T I O N * * *
System boot image has been updated. You should reboot the
system as soon as possible to properly integrate the changes
and to avoid disruption of current functionality.

```

```

installp: bosboot process completed.
+-----+
Summaries:
+-----+
Installation Summary
-----
Name                Level          Part           Event
Result
-----
Ontap.MPIO_Host_Utilities_Kit.config 5.1.0.0 USR DEINSTALL SUCCESS
Ontap.MPIO_Host_Utilities_Kit.fcp 5.1.0.0 USR DEINSTALL SUCCESS
Ontap
.MPIO_Host_Utilities_Kit.pcmmod 5.1.0.0 USR DEINSTALL SUCCESS

F1=Help           F2=Refresh      F3=Cancel      Esc
+6=Command
Esx Esc+8=Image  Esc+9=Shell     Esc+0=Exit

```

Using a command line to uninstall the Host Utilities software

You can use a command line to uninstall the Host Utilities software for your environment.

Steps

1. Log in to the host as root.

(PowerVM) In PowerVM environments with vSCSI, you must log into the host as `padmin` and then enter the `oem_setup_env` command to become root.

2. Use the `installp -u FileSetName` command to uninstall the software package.

Below are the command lines for uninstalling the different software packages.

(MPIO) To uninstall the host settings software for an MPIO environment, enter the following command line:

```
installp -u Ontap.MPIO_Host_Utilities_Kit
```

(All environments) To uninstall the SAN Toolkit for all Host Utilities environments, enter the following command line:

```
installp -u Ontap.SAN_toolkit
```


Overview of LUN configuration and management

Configuring and managing LUNs involves several tasks. The environment you are using determines the tasks you are required to perform.

The following table summarizes the tasks for all the supported AIX Host Utilities environments. If a task does not apply to all environments, the table specifies which environments it does apply to. If a task does not apply to your Host Utilities environment, do not perform it.

Task	Discussion
1. Create and map igroups and LUNs	<p>An igroup is a collection of WWPNs on the storage system that map to one or more host HBAs.</p> <p>You must create at least one igroup and at least one LUN. Then you must map the LUN to the igroup.</p> <p>For complete information on creating igroups and LUNs, see the <i>SAN Administration Guide</i> (called <i>Block Access Management Guide for iSCSI and FC</i> in Data ONTAP 8.1 and earlier) for your version of Data ONTAP.</p>
2. (FC) Enable ALUA	<p>If your environment uses MPIO for multipathing and supports ALUA, you should set it up to work with igroups. With Data ONTAP 8.0 or later, ALUA is enabled by default when you create an igroup that works with the FC protocol. Earlier versions of Data ONTAP require you to manually enable ALUA.</p> <p>To see if ALUA is set up for your igroup, use the <code>igroup show -v</code> command.</p> <p>Note: With certain versions of Data ONTAP, ALUA is automatically enabled when you create the igroup. You can use the command <code>igroup show -v igroup_name</code> to see if ALUA is enabled. If it is not enabled, you can use the command <code>igroup set igroup alua yes</code> to enable it.</p>

Task	Discussion
3. Discover and configure LUNs	You can discover LUNs using the following commands: <ul style="list-style-type: none"> • PowerVM <code>cfgdev</code> • MPIO <code>cfgmgr</code>
4. (Optional) Create volume groups and file systems	You can create volume groups and file systems using the AIX tools that you normally use for these tasks.
5. Display information about the LUNs and the HBAs	You can use the <code>sanlun</code> utility to display information about the LUNs and the HBAs.

For more information about what is supported, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

(AIX MPIO, PowerVM) Discovering and Managing LUNs

There are several tasks you need to perform when setting up LUNs for an AIX MPIO or PowerVM environment. The following sections provide information on those tasks.

(AIX MPIO without PowerVM) Discovering and configuring LUNs with AIX

When you are using AIX without PowerVM, you use the `cfgmgr` command to get the host to discover the LUNs. You do not need to reboot the host to discover the LUNs. To confirm that the host discovered the LUNs, you can use the `sanlun` utility.

About this task

The steps that follow do not apply to a host that is running a PowerVM environment.

Steps

1. Log in as root on the host.
2. On the AIX host, enter the following command to discover the newly created LUNs:

```
cfgmgr
```

The `cfgmgr` command causes:

- The initiators to log in to the fabric.
- The system to check for new devices.
- The system to create new device entries.

3. To display all AIX disks, including the LUNs, enter the following command:

```
lsdev -Cc disk
```

The LUNs appear on the host as disks. You can use these disks the same way you use local disks on the host. The host settings ODM file that is installed as part of the Host Utilities causes the LUNs to be displayed as FCP disks.

Write down the hdisk instance numbers. You use them when you perform the path configuration in Step 5.

4. To get information about you setup, enter the following command:

```
lsattr -El hdisk_name
```

5. Order and prioritize the paths to the storage system LUNs.

- If you are running the FC protocol and a version of Data ONTAP that supports ALUA, you should have ALUA running on the storage system. ALUA automatically sets the paths.

Note: With certain versions of Data ONTAP, ALUA is automatically enabled when you create the igroup. You can use the command `igroup show -v igroup_name` to see if ALUA is enabled on the storage system. If it is not enabled, you can use the command `igroup set igroup_name alua yes` to enable it.

- If you are not running ALUA, you must execute the `dotpaths` utility to set the path priorities. The `dotpaths` utility is installed when you install the Host Utilities. If you enter `dotpaths` without any options, it sets the priority for all Data ONTAP LUNs.

Note: Do not use the `dotpaths` utility if ALUA is enabled.

The command line for this utility has the following format:

```
dotpaths [-hqv] [hdiskN ...]
```

You can use the command line options to:

- Specify a set of disks for which you want to set the priority. When you enter a list of hdisk names, the utility sets the priority only for those disks.
- Display all the priorities. Enter the `-v` option to enable verbose mode.
- Query all or individual disk priorities. Enter the `-q` option to perform this task.

6. To verify that the host has discovered the LUNs, enter the following command:

```
# sanlun lun show
```

(PowerVM vSCSI) Discovering and configuring LUNs

When you are using PowerVM vSCSI and VIO servers, you must use the `padmin` login and the commands appropriate for it to configure and discover LUNs.

Steps

1. Log in to the host as `padmin`.
2. On the AIX host, enter the following command to discover the newly created LUNs:

cfgdev

The `cfgdev` command causes:

- The initiators to log into the fabric.
- The system to check for new devices.
- The system to create new device entries where the new LUNs are mapped as MPIO devices using the default PCM.

Example

On a VIO server, use the `cfgdev` command to discover the LUNs.

```
vioserver$ cfgdev
```

3. To verify that the `hdisk` MPIO devices were created, enter the following command:

lsdev -type disk

The LUNs appear on the host as disks. You can use these disks the same way you use local disks on the host.

Write down the `hdisk` instance numbers. You use them when you perform the path configuration in Step 6.

The `lsdev -type disk` command produces the following type of output.

```
vioserver$ lsdev -type disk ONTAP
name      status      description
hdisk0    Available   16 Bit LVD SCSI Disk Drive
hdisk1    Available   16 Bit LVD SCSI Disk Drive
hdisk2    Available   MPIO ONTAP FCP Default PCM Disk
hdisk3    Available   MPIO ONTAP FCP Default PCM Disk
hdisk4    Available   MPIO ONTAP FCP Default PCM Disk
hdisk5    Available   MPIO ONTAP FCP Default PCM Disk
hdisk6    Available   MPIO ONTAP FCP Default PCM Disk
```

Note: The output for this example has been truncated.

4. To get information about you setup, enter the following command:

lsdev -dev *hdisk_name* -attr

The `lsdev -dev hdisk_name -attr` command produces the following output.

```
vioserver$ lsdev -dev hdisk2 -attr
attribute value      description      user-settable
PCM PCM/friend/Default  PCM Path Control Module  False
PR_key_value none Persistent Reserve Key Value True
algorithm round_robin Algorithm True
clr_q no Device CLEARS its Queue on error True
dist_err_pcnt 0 Distributed Error Sample Time True
dist_tw_width 50 Distributed Error Sample Time True
hcheck_cmd inquiry Health Check Command True
hcheck_interval 30 Health Check Interval True
hcheck_mode nonactive Health Check Mode True
location Location Label True
lun_id 0x20000000000000 Logical Unit Number ID True
lun_reset_spt yes LUN Level Reset True
max_transfer 0x100000 Maximum TRANSFER Size True
```

node_name	0x500a0980894ae0e0	FC Node Name	False
pvid	00067fbad453a1da0000000000000000	Physical volume identifier	False
q_err	yes	Use QERR bit	True
q_type	simple	Queueing TYPE	True
qfull_dly	2	Delay in seconds for SCSI TASK SET FULL	True
queue_depth	64	Queue DEPTH	True
reassign_to	120	REASSIGN time out value	True
reserve_policy	no_reserve	Reserve Policy	True
rw_timeout	30	READ/WRITE time out value	True
scsi_id	0xd10001	SCSI ID	False
start_timeout	60	START unit time out value	True
ww_name	0x500a0984994ae0e0	FC World Wide Name	False

- Switch to the `oem_setup_env` mode to execute the Host Utilities commands `dotpaths` (if you are not using ALUA) and `sanlun`. To get into this mode, enter the following command:

```
oem_setup_env
```

Note: Once you enter the `oem_setup_env` command, you stay in that mode until you halt it by entering a command such as `exit`.

Example

When you enter the `oem_setup_env` mode, the command-line prompt changes from a dollar sign to a pound sign.

```
# vioserver$ oem_setup_env
```

- Order and prioritize the paths to the storage system LUNs.
 - If you are running the FC protocol and a version of Data ONTAP that supports ALUA, you should have ALUA running on the storage system. ALUA automatically sets the paths.

Note: With Data ONTAP 8.0 and later, ALUA is automatically enabled when you create the `igroup`. To confirm that ALUA is enabled, run the command `igroup show -v igroup_name` on the storage system. If it is not enabled, you can use the command `igroup set igroup_name alua yes` to enable it.
 - If you are not running ALUA, you must execute the `dotpaths` utility to set the path priorities. The `dotpaths` utility is installed when you install the Host Utilities. If you enter `dotpaths` without any options, it sets the priority for all Data ONTAP LUNs.

Note: Do not use the `dotpaths` utility if ALUA is enabled.

The command line for this utility has the following format:

```
dotpaths [-hqv] [hdiskN ...]
```

You can use the command line options to:

- Specify a set of disks for which you want to set the priority. When you enter a list of `hdisk` names, the utility sets the priority only for those disks.
- Display all the priorities. Enter the `-v` option to enable verbose mode.
- Query all or individual disk priorities. Enter the `-q` option to perform this task.

Example

The following is an example of using the dotpaths utility.

```
vioserver# dotpaths -v
hdisk2 (path 0): Optimized path - Setting priority to 255
hdisk2 (path 1): Optimized path - Setting priority to 255
hdisk2 (path 2): Unoptimized path - Current priority of 1 is correct
hdisk2 (path 3): Unoptimized path - Current priority of 1 is correct
...
Path priority set and/or verified for 22 disks, 86 total paths.
vioserver#
```

- To verify that the host has discovered the LUNs, enter the following command:

```
# sanlun lun show -p
```

Example

This example shows typical output of the `sanlun lun show -p` command for a direct-attached configuration. It also includes the `sanlun lun show -d hdisk9 -v` command to display information about `hdisk9`. The output from this command has been truncated.

```
sanlun lun show -p

ONTAP Path: fas3170-aix03:/vol/ibmbc_aix01b14_fcp_vol8/
ibmbc-aix01b14_fcp_lun0
      LUN: 8
      LUN Size: 3g
      Controller CF State: Cluster Enabled
      Controller Partner: fas3170-aix04
      Host Device: hdisk9
      Mode: 7
      Multipath Provider: AIX Native
      Multipathing Algorithm: round_robin
-----
host    controller  AIX    host    controller  AIX MPIO
path    path          MPIO   host    target      path
state   type          path   adapter port        priority
-----
up      secondary    path0  fcs0    3b          1
up      primary     path1  fcs0    3a          1
up      secondary    path2  fcs0    3a          1
up      primary     path3  fcs0    3b          1
up      secondary    path4  fcs0    4b          1
up      secondary    path5  fcs0    4a          1
up      primary     path6  fcs0    4b          1
up      primary     path7  fcs0    4a          1
up      secondary    path8  fcs1    3b          1
up      primary     path9  fcs1    3a          1
up      secondary    path10 fcs1    3a          1
up      primary     path11 fcs1    3b          1
up      secondary    path12 fcs1    4b          1
up      secondary    path13 fcs1    4a          1
up      primary     path14 fcs1    4b          1
```

up	primary	path15 fcs1	4a	1
----	---------	-------------	----	---


```

sanlun lun show -vd hdisk10

host          lun          device
vserver      lun-pathname filename  adapter
protocol    size    mode
-----
GPFS_p520_FC /vol/GPFS_p520_FC_FlexVol_2/GPFS_p520_FC_LUN_2_4 hdisk10 fcs3
FCP          100g    C
            LUN Serial number: 1k/yM$-ia5HC
            Controller Model Name: N5600
            Vserver FCP nodename: 200200a0980c892f
            Vserver FCP portname: 200a00a0980c892f
            Vserver LIF name: GPFS_p520_FC_2
            Vserver IP address: 10.225.121.100
            Vserver volume name: GPFS_p520_FC_FlexVol_2 MSID::0x000000000000000000000000080000420
            Vserver snapshot name:

```

(PowerVM NPIV) Discovering and configuring LUNs

When you are using PowerVM NPIV, all commands are run on the VIO client. This is the same as running AIX MPIO.

Steps

1. Log in to the VIO client and enter the following command to discover the newly created LUNs:

```
cfgmgr
```

The `cfgmgr` command causes:

- The initiators to log in to the fabric.
- The system to check for new devices.
- The system to create new device entries where the new LUNs are mapped as MPIO devices using the default PCM.

Example

On a VIO server, use the `cfgmgr` command to discover the LUNs.

```
vioclient$ cfgmgr
```

2. To verify that the hdisk MPIO devices were created, enter the following command on the VIO client:

```
lsdev -Cc disk
```

Write down the hdisk instance numbers. You use them when you perform the path configuration in Step 3.

3. Order and prioritize the paths to the storage system LUNs.
 - If you are running the FC protocol and a version of Data ONTAP that supports ALUA, you should have ALUA running on the storage system. ALUA automatically sets the paths.

Note: With Data ONTAP 8.0 and later, ALUA is automatically enabled when you create the igroup. To confirm that ALUA is enabled, run the command `igroup show -v`

igroup_name on the storage system. If it is not enabled, you can use the command `igroup set igroup_name alua yes` to enable it.

- If you are not running ALUA, you must execute the `dotpaths` utility to set the path priorities. The `dotpaths` utility is installed when you install the Host Utilities. If you enter `dotpaths` without any options, it sets the priority for all Data ONTAP LUNs.

Note: Do not use the `dotpaths` utility if ALUA is enabled.

The command line for this utility has the following format:

```
dotpaths [-hqv] [hdiskN ...]
```

You can use the command line options to:

- Specify a set of disks for which you want to set the priority. When you enter a list of `hdisk` names, the utility sets the priority only for those disks.
- Display all the priorities. Enter the `-v` option to enable verbose mode.
- Query all or individual disk priorities. Enter the `-q` option to perform this task.

Example

The following is an example of using the `dotpaths` utility.

```
vioclient# dotpaths -v
hdisk2 (path 0): Optimized path - Setting priority to 255
hdisk2 (path 1): Optimized path - Setting priority to 255
hdisk2 (path 2): Unoptimized path - Current priority of 1 is correct
hdisk2 (path 3): Unoptimized path - Current priority of 1 is correct
...
Path priority set and/or verified for 22 disks, 86 total paths.
vioserver#
```

4. To verify that the host has discovered the LUNs, enter the following command:

```
# sanlun lun show -p
```

Example

This example shows the typical output of the `sanlun lun show -p` command for a direct-attached configuration. It also includes the `sanlun lun show -d hdisk9 -v` command to display information about `hdisk9`. The output from this command has been truncated.

```
# sanlun lun show -p
ONTAP_PATH: sh-960-01:/vol/vol1/vioserver_7
LUN: 7
LUN Size:      250m (262144000)
Host Device:   hdisk9
LUN State:     GOOD
Controller_CF_State: Cluster Enabled
Controller Partner: sh-960-02
Multipath Provider: AIX Native
Multipathing Algorithm: round_robin
-----
```


MPIO path status	Controller path type	AIX MPIO path	host HBA	Controller target port	AIX MPIO path priority
Enabled	primary	path0	fcs0	4a	255
Enabled	primary	path1	fcs0	4b	255
Enabled	secondary	path2	fcs0	4a	1
Enabled	secondary	path3	fcs0	4b	1
...					

```

vioclient# sanlun lun show -d hdisk9
  filer:      lun-pathname      device filename adapter protocol
lun size    lun state
sh-960-01:  /vol/vol1/vioserver_7  hdisk9          fcs0    FCP      250m
(262144000)  GOOD
  Serial number: VrHqko8bg72t
  Filer FCP nodename:500a098083e152d9 Filer FCP portname:500a098193e152d9
  Filer adapter name: v.4a
  Filer IP address: 10.60.240.66
  Filer volume name:vol1 FSID:0xe10152d9
  Filer qtree name:/vol/vol1 ID:0x0
vioclient#

```

The sanlun utility

The `sanlun` utility is a tool provided by the Host Utilities that helps collect and report information about paths to your devices and how they map to LUNs on the storage system. You can also use the `sanlun` command to display information about the host HBAs.

Displaying host LUN information with `sanlun`

You can use the `sanlun` utility to display information about the LUNs connected to the host.

Steps

1. Ensure that you are logged in as root on the host.
2. Change to the `/opt/ontap/santools/bin` directory:

```
cd /opt/ontap/santools/bin
```

3. Enter the `sanlun lun show` command to display LUN information. The command has the following format:

```
sanlun lun show [-v] [-d host device filename | all | storagesystem name  
| storagesystem name:storagesystem pathname] -p
```

`-v` produces verbose output.

`-d` is the device option and can be one of the following:

- *host device filename* specifies the special device file name for the disk on the host.
- *all* lists all storage system LUNs attached to the host.
- *storagesystem name* is the host name of the storage system.
- *storagesystem name:storagesystem pathname* lists is the path name of the LUN on the storage system.

(Multipathing environments only) `-p` provides information about the primary and secondary paths available to the LUN when you are using multipathing. You cannot use the `-d` option if you use `-p`. Use the following format:

```
sanlun lun show -p [storagesystem name:storagesystem pathname |  
storagesystem name | all ]
```

If you enter `sanlun lun show`, `sanlun lun show -p`, or `sanlun lun show -v` without any parameters, the utility responds as if you had included the `all` parameter.

For example, you might enter:

- `sanlun lun show -p`

to display a listing of all the paths associated with the LUN. This information is useful if you need to set up path ordering or troubleshoot a problem with path ordering.

- `sanlun lun show -d /dev/hdisk<x>`
to display the summary listing of the LUN(s) associated with the host device `/dev/hdisk<x>` where `xx` the number of the `hdisk`; for example, you might have `hdisk1` or `hdisk4`.
- `sanlun lun show -v all`
to display verbose output for all the LUN(s) currently available on the host.
- `sanlun lun show toaster`
to display a summary listing of all the LUNs available to the host served by the storage system called `toaster`.
- `sanlun lun show toaster:/vol/vol0/lun0`
to display a summary listing of all the LUNs available to the host served by `lun0` on `toaster`.

Note: The `sanlun lun show` command displays only the LUNs that have been discovered by the host. LUNs that have not been discovered by the host are not displayed.

Explanation of the `sanlun lun show -p` output

The `sanlun lun show -p` command provides details for the MPIO stacks.

- `host path state`: Whether the path is enabled or disabled.
 - `filer path type`: Whether the path to the LUN is primary, secondary, or standby.
 - Primary paths communicate directly using the adapter on the local storage system.
 - Secondary paths are proxied to the partner storage system over the cluster interconnect.
 - Standby occurs when the path is being serviced by a partner storage system in takeover mode.
 - `device filename`: The special device file name for the disk on AIX that represents the LUN.
 - `host HBA`: The name of the initiator HBA on the host.
 - `primary filer port`: The port that provides direct access to a LUN. This is always a primary path.
 - `partner filer port`: The port that provides passive path failover. This is always a secondary path.
- After the failover of a storage system cluster, the `sanlun lun show -p` command reports secondary paths as secondary but enabled, because these are now the active paths.

Displaying host HBA information with `sanlun`

You can use `sanlun` to display information about the host HBA.

Steps

1. Ensure that you are logged in as root on the host.
2. Change to the `/opt/Ontap/SANToolkit/bin` directory.
3. At the host command line, enter the following command to display host HBA information:

```
# sanlun fcp show adapter [ -c | [ -v ] [adapter name] | all ]]
```

-c option produces configuration information that you can use to create igroups.

-v option produces verbose output.

all lists information for all FC adapters.

adapter name lists information for a specified adapter.

Example

The following example displays the type of output you see with the `sanlun fcp show adapter` command line. This example simply displays information on the adapters. The next example includes the `-v` option, which provides more information on the adapter.

```
# sanlun fcp show adapter
fcs0      WWPN:10000000abcde123
fcs1      WWPN:10000000abcde456
```

This example adds the `-v` option to the `sanlun fcp show adapter` command line, which provides more information on the adapter.

```
# sanlun fcp show adapter -v
fcs0      WWPN:10000000abcde123
WWNN:     20000000c936268b
driver name: /usr/lib/drivers/pci/efcdd
model:     df1000f9
model description: FC Adapter
serial number: 1E32909972
hardware version: not available
driver version: 5.1.0.50
firmware version: CD382A1
Number of ports: 1
port type: Fabric
port state: Operational
supported speed: 2 GBit/sec
negotiated speed: 1 GBit/sec
OS device name: fcs0

fcs1      WWPN:10000000c9362687
WWNN:     20000000c9362687
driver name: /usr/lib/drivers/pci/efcdd
model:     df1000f9
model description: FC Adapter
serial number: 1E32909970
hardware version: not available
driver version: 5.1.0.50
firmware version: CD382A1
Number of ports: 1
port type: Fabric
port state: Operational
supported speed: 2 GBit/sec
```

```
negotiated speed: 1 GBit/sec
OS device name:   fcs1
#
```

This example uses the `-c` option with the `sanlun fcp show adapter` command line, which provides more information you need to supply when you create an igroup on the storage system.

```
# sanlun fcp show adapter -c

Enter this controller command to create an initiator group for this
system:
igroup create -f -t aix "p570.gdl.testers.ontap.com" 1000000c974921e
1000000c974921f
```

About the collectinfo command

`collectinfo` is an optional command that collects anonymous support information about system hosts such as HBA types, volume manager configuration and operating system.

When `collectinfo` is executed, this information is pushed to the IBM N series controller. If the IBM N series controller has AutoSupport enabled, this information is part of the payload that is used to ensure that future releases of the Host Utilities meet customer needs. This command must be initiated by the user.

Note: You must be logged as "root" to run `collectinfo`.

The `collectinfo` command has the following format:

- `collectinfo [-controller 7-Mode_Controller_IP_or_Hostname] [-user username] [-password password] [-use_http]`
- `collectinfo [-help|-h|-?]`
- `collectinfo [-version]`

collectinfo options

The `collectinfo` command has several options you can use. These options apply to all environments. This command is executed on the host.

Option	Description
<code>-controller 7-Mode_Controller_IP_or_Hostname></code>	For Data ONTAP operating in 7-Mode: Specify the IP address or hostname of one of the controllers. You will be prompted for this information if it is not specified.
<code>-user <username></code>	Username to connect to the controller. You will be prompted for this information if it is not specified.
<code>-password <password></code>	Password to use when connecting. You will be prompted for this information if it is not specified.

Option	Description
-use_http	Use the HTTP protocol to connect instead of the default protocol of HTTPS. Note: If this option is chosen, information will be sent over the wire to the controller in an unencrypted format.
-help -h -?	Print the usage statement.
-version	Print the program version.

collectinfo command example

The following example takes you through the process of using the `collectinfo` command.

```
#-> /opt/ontap/santools/bin/collectinfo -controller 10.225.121.101 -user
asup_user

Please enter the password for user 'asup_user': *****

Gathering system information

General Info:
=====
Hostid:                               0xae1785a
OS:                                    AIX 7100-01-03-1207
Server Model:                          IBM,9131-52A
File Systems Mounted:                   JFS2

Multipathing Info:
=====
AIX MPIO:                              Installed
AIX MPIO Version:                       7.1.0.0

Native VM and Cluster Info:
=====
AIX LVM:                                Installed
AIX LVM Version:                         7.1.1.2
AIX GPFS:                               Installed
AIX GPFS Version:                       3.4.0.11
AIX PowerHA:                            Not Installed

HBA Info:
=====
Model          Driver          Firmware
=====
LP11000        6.1.0.0         271304
QLE8142        6.1.7.0         010522
```

```
Sending config to the EMS logs on controller '10.225.121.101'
```


SAN boot LUNs in an AIX MPIO environment

You can set up a SAN boot LUN to work in an AIX MPIO environment that is running the AIX Host Utilities with either the FC, or FCoE protocol.

The method you use for creating a SAN boot LUN and installing a new OS image on it in an AIX MPIO environment can vary, depending on which protocol you are using.

The sections that follow provide steps for configuring a SAN boot LUN and installing a new OS image on it. The examples in these sections use a host running AIX. You can apply this procedure to most configurations.

There are also other procedures for creating a bootable LUN, which these sections do not describe. Refer to the appropriate AIX documentation for details about additional configuration methods.

Note:

Solutions and components are qualified on an ongoing basis. To verify that SAN booting is supported in your configuration, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

(AIX MPIO) Important notes about creating a SAN boot LUN

Before you begin the process of creating the SAN boot LUN, make sure your system is set up correctly and you have the information you will need to create the boot LUN.

The following list provides information about the prerequisites for creating a boot LUN:

- You are running the correct version and technology level of the operating system and your host and storage system are configured properly.
- You have confirmed that your configuration supports SAN booting by checking the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).
- You have checked the Release Notes to make sure none of the steps have changed since this guide was produced.
- You have determined the size of the boot LUN. This LUN must be large enough to provide space for the AIX operating system. See the AIX product documentation to determine how much disk space is needed.
- You are logged in as root.
- You have the following documentation available to you as you perform the procedure:
 - This guide, which provides a summary of the key steps.
 - The *SAN Administration Guide* (called *Block Access Management Guide for iSCSI and FC* in Data ONTAP 8.1 and earlier).
 - The AIX product documentation.

Related information

IBM Redbook: SAN Boot Implementation and Best Practices Guide for IBM System Storage

Note: The AIX Host Utilities 6.0 and later version has a post-install script that releases the Single Path Reserve when a boot device with VID=ONTAP is detected during host utilities installation. Therefore the data LUNs have no hard path limit as specified in the 5.1 and earlier versions of AIX host utilities. It is however recommended that number of boot path entries is limited to 4 as a best practice for all AIX SAN Boot deployments.

(AIX MPIO, FC) Creating a SAN boot LUN in an FC environment

Creating a boot LUN in an FC environment involves several tasks that you must perform on the host and the storage system.

Steps

1. Install the AIX operating system on the boot LUN.

Note: For information about installing the AIX operating system, you must follow the instructions in the appropriate AIX documentation.

2. Install the Host Utilities on the boot LUN.
3. Discover the devices (Data ONTAP LUNs).

Starting from the AIX Host Utilities 6.0 release, the pre-install script automatically clears the Single Path Reserve when it detects a SAN booted device from a Data ONTAP LUN. This is performed during installation on LUNs using both FC and FCoE protocols.

4. Reboot the AIX server.
5. Identify any ghost devices left over from the ODM device overlay in the MPIO FC devices or FC devices to Data ONTAP by using the `lsdev` command.

Example

The following example shows ghost devices with two different device handles: Defined and Unknown.

```
lsdev -Cc disk
hdisk0 Available 02-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk1 Defined 02-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk2 Defined 03-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk3 Unknown 05-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk4 Unknown 06-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk5 Available 02-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk6 Available 03-08-01 MPIO ONTAP FCP Default PCM Disk
```

```
hdisk7 Available 05-08-01 MPIO ONTAP FCP Default PCM Disk
hdisk8 Available 06-08-01 MPIO ONTAP FCP Default PCM Disk
```

6. Remove the ghost devices.

- For device handles marked Unknown, use the `odmdelete` command.
- For device handles marked Defined, use the `rmdev` command.

Example

Unknown device handles:

```
odmdelete -q name=hdisk3 -o CuDv
0518-307 odmdelete: 1 objects deleted
```

Defined device handles:

```
rmdev -dl hdisk1
hdisk1 deleted
```

7. Use the command `cfgmgr` to rescan the bus for MPIO FC devices.
8. If you are not using ALUA, set the path priorities by running the `dotpaths` utility that comes with the Host Utilities.

Example

Executing the following command line runs the `dotpaths` utility in verbose mode:

```
AIX_Host> /usr/sbin/dotpaths -v
```

9. Invalidate the current bootlist and create a bootlist that boots only from the primary paths of the boot LUN.

Note: This procedure helps prevent a common boot issue where the bootlist becomes filled with paths that cannot be used during the boot cycle.

You can use the following commands to perform this procedure:

```
bootinfo -b
bootlist -m normal -i
bootlist -m normal <BootDeviceHandle>
```

These commands perform the following tasks respectively:

- Return information on the last boot device.
- Invalidate the normal mode bootlist.
- Set the new boot device to a normal bootlist.

(AIX MPIO, FC) Cloning the root volume group of the AIX operating system

You can install the AIX operating system by cloning the root volume. You use the `alt_disk_install` command to clone the volume and then you can use the `bootlist` and `bootinfo` commands to get information about the new boot device and set it to the boot list.

Steps

1. Enter the `alt_disk_install` command and specify the root volume that you want to clone.

Example

The following command clones `hdisk1`.

```
-> alt_disk_install -C hdisk1
+-----+
ATTENTION: calling new module /usr/sbin/alt_disk_copy. Please see the
alt_disk_copy man page and documentation for more details.
Executing command: /usr/sbin/alt_disk_copy -d "hdisk1"
+-----+
Calling mkszfile to create new /image.data file.
Checking disk sizes.
Creating cloned rootvg volume group and associated logical volumes.
Creating logical volume alt_hd5.
Creating logical volume alt_hd6.
Creating logical volume alt_hd8.
Creating logical volume alt_hd4.
Creating logical volume alt_hd2.
Creating logical volume alt_hd9var.
Creating logical volume alt_hd3.
Creating logical volume alt_hd1.
Creating logical volume alt_hd10opt.
Creating logical volume alt_sysdump_dev.
Creating /alt_inst/ file system.
Creating /alt_inst/home file system.
Creating /alt_inst/opt file system.
Creating /alt_inst/tmp file system.
Creating /alt_inst/usr file system.
Creating /alt_inst/var file system.
Generating a list of files
for backup and restore into the alternate file system...
Backing-up the rootvg files and restoring them to the alternate file
system...
Modifying ODM on cloned disk.
Building boot image on cloned disk.
forced unmount of /alt_inst/var
forced unmount of /alt_inst/usr
forced unmount of /alt_inst/tmp
forced unmount of /alt_inst/opt
forced unmount of /alt_inst/home
```

```
forced unmount of /alt_inst
forced unmount of /alt_inst
Changing logical volume names in volume group descriptor area.
Fixing LV control blocks
Fixing file system superblocks...
Bootlist is set to the boot disk: hdisk1
```

2. Reboot the server.
3. Use the `bootlist` command to create a new boot list that boots only from the primary paths of the boot LUN.

Example

The following example contains commands to perform the following tasks:

- Create a boot list in normal mode that instructs to boot off logical volume `hd5` on `hdisk1` and displays information about the boot.
- Return information on the last boot device.
- Display a `1` if the IPL code in the ROS on the machine running the command is capable of booting from a specified disk.

```
-> bootlist -m normal -o hdisk1 blv=hd5
-> bootinfo -b hdisk1
-> bootinfo -B hdisk1 1
```

4. Use the `ipl_varyon` command to varyon the root volume group.

Example

```
5300-05-00] root@ibmbc-fak01-b4 / -> ipl_varyon -i
PVNAME BOOT DEVICE PVID VOLUME GROUP ID
hdisk0 YES 002006ca49c93e760000000000000000
002006ca0000d000
hdisk1 YES 002006cac6d2a0fe00000000000000000
002006ca0000d000
```

(AIX MPIO) Updating a SAN boot LUN

To update a SAN boot LUN to the latest version of the Host Utilities, you must remove the current version of the Host Utilities and then install the new version. You will have to reboot the server after you install the Host Utilities.

About this task

Each version of the Host Utilities is tested to determine the best values for the parameters. As a result, a new version of the Host Utilities might contain updated ODM stanzas to enhance certain parameters. You cannot update the Host Utilities software containing the new ODM stanzas while

the boot LUN device handle is open. If you do, the new enhancements will not take effect until the device handle is closed and then reopened. Within a SAN boot environment, the boot LUN device handle cannot be closed until you reboot the AIX server.

Steps

1. Determine the current boot device by executing the `bootinfo -b` command.

Example

This example uses `hdisk161` as the boot LUN. This is a FC LUN from a Data ONTAP storage array.

```
-> bootinfo -b
lsdev -Cc          disk          hdisk161

->
hdisk0             Available 01-08-00   SAS Disk Drive
hdisk161          Available 03-02-01   MPIO ONTAP FCP Default
PCM Disk
```

2. Check to see if the Host Utilities for MPIO environments has been installed and, if so, which version is installed. Use the `ls1pp` command to get this information.

You cannot remove the boot device handle `hdisk161` because an open device handle cannot be removed. This is why you must reboot the server after you install the Host Utilities. If you attempt to remove the boot device handle now, the system will display an error message.

```
-> rmdev -dl hdisk161
Method error (/usr/lib/methods/ucfgdevice): 0514-062 Cannot perform
the requested function because the specified device is busy.
```

3. Upgrade the Host Utilities software using either the `installp` command or SMIT.

Example

```
-> installp -ld

Fileset Name                                     Level
I/U Q Content
=====
ontap.MPIO_Host_Utilities_kit.config 6.0.0.0   I b usr
ontap.MPIO_Host_Utilities_kit.fcp   6.0.0.0   I b usr
ontap.MPIO_Host_Utilities_kit.pcmo 6.0.0.0   I b usr

[5300-11-01-0944] root@ibmbc-aix02b6 /tmp/ontap_aix_host_utilities_6.0/MPIO -> installp -aXYd.
Ontap.MPIO_Host_Utilities_kit
+-----+
+-----+ Pre-installation Verification...
+-----+
Verifying selections...done
Verifying requisites...done
Results...
SUCSESSES
```

```

-----
Filesets listed in this section passed pre-installation verification
and will be installed.

Selected Filesets
-----
ontap.MPIO_Host_Utility_kit.config 6.0.0.0
ontap.MPIO_Host_Utility_kit.fcp 6.0.0.0
ontap.MPIO_Host_Utility_kit.pcmo 6.0.0.0

<< End of Success Section >>

:
:
:
Finished processing all filesets. (Total time: 2 secs).

installp: bosboot verification starting...
installp: bosboot verification completed.
installp: bosboot process starting...

bosboot: Boot image is 41489 512 byte blocks.
0503-292 This update will not fully take effect until after a
system reboot.

* * * A T T E N T I O N * * *
System boot image has been updated. You should reboot the
system as soon as possible to properly integrate the changes
and to avoid disruption of current functionality.

installp: bosboot process completed.
+-----+
Summaries:
+-----+

Installation Summary
-----
Name                Level          Part          Event          Result
-----
ontap.MPIO_Host_Utility_kit.pcmo 6.0.0.0      USR           APPLY          SUCCESS
ontap.MPIO_Host_Utility_kit.fcp 6.0.0.0      USR           APPLY          SUCCESS
ontap.MPIO_Host_Utility_kit.conf 6.0.0.0      USR           APPLY          SUCCESS

```

4. Verify that the boot device is a Data ONTAP FC AIX MPIO capable device by executing the `lsdev -Cc disk` command.

Example

This example confirms that the boot device `hdisk161` is correct.

```

-> lsdev -Cc disk
hdisk0      Available    01-08-00    SAS Disk Drive
hdisk161    Available    03-02-01    MPIO ontap FCP Default PCM
Disk

```

5. It is a good practice to verify the boot path list before you reboot the server. You can use the `bootlist` command to check the path list.

Example

This is an example of checking the boot path list.

```

-> bootlist -m normal -o
hdisk161 blv=hd5
hdisk161 blv=hd5
hdisk161 blv=hd5

```

```
hdisk161 blv=hd5  
hdisk161 blv=hd5
```

6. Reboot the server so that the boot device handle is closed and then re-opened at boot time.

Features supported by the Host Utilities

The Host Utilities support a number of features available with AIX hosts and storage systems running Data ONTAP. Your specific environment affects what the Host Utilities support.

Some of the supported features include:

- Multiple paths to the storage system when a multipathing solution is installed
- Dynamic Logical Partitioning
- **(FC)** ALUA
- **(FC)** Cluster failover using single image mode only
- PowerVM Live Partition Mobility on IBM System
- IBM General Parallel File System (GPFS)
- SAN booting
- **(PowerVM)** VIO server/client environment

For information on which features are supported with which environments, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

HBAs and the AIX Host Utilities

The Host Utilities support a number of HBAs.

For information about which HBAs are supported, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

The supported HBAs should be installed before you install the Host Utilities. See your HBA documentation for information on installing the HBAs.

Multipathing and the AIX Host Utilities

The AIX Host Utilities support different multipathing solutions based on your configuration.

Having multipathing enabled allows you to configure multiple network paths between the host and storage system. If one path fails, traffic continues on the remaining paths.

The MPIO and PowerVM environments of the Host Utilities use AIX's native multipathing solution (MPIO).

You can use the Host Utilities `sanlun` command to display the path policy to which the host has access.

(FC) ALUA support with certain versions of Data ONTAP

The AIX Host Utilities running with the FC protocol support both storage systems that have ALUA enabled for active/active storage controllers (clustered storage systems) and those that do not use ALUA. To use ALUA, you must be running a version of Data ONTAP that supports it.

ALUA defines a standard set of SCSI commands for discovering path priorities to LUNs on FC SANs and managing those paths. When you have the host and storage controller configured to use ALUA, it automatically determines which target ports provide optimized (primary) and unoptimized (secondary) access to LUNs.

Stand-alone storage controllers provide symmetric access to LUNs and do not use ALUA.

To determine if ALUA is available for your environment, check your version of Data ONTAP to see if it supports ALUA and check the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6) to see if the Host Utilities support that version of Data ONTAP.

(FC) Specific AIX Host Utilities environments that support ALUA

You can use ALUA if you have an AIX Host Utilities FC environment running AIX MPIO and a version of Data ONTAP that supports ALUA.

The following AIX environments support ALUA when you are using the FC protocol and Data ONTAP 7.3.1 or later:

Host Utilities version	Host requirements
AIX Host Utilities 4.0, 4.1, 5.0, or 5.1 running on a system using either MPIO	<p>One of the following or later:</p> <ul style="list-style-type: none"> • 5.2 TL8 • 5.3 TL9 SP4 with APAR IZ53157 • 5.3 TL10 SP1 with APAR IZ53158 • 6.1 TL2 SP4 with APAR IZ53159 • 6.1 TL3 SP1 with APAR IZ53160 <p>Note: You should use the latest levels of 5.3 TL9 or 6.1 TL2 listed in the support matrix, if you want to use ALUA. ALUA is supported on all AIX Service Streams that have the corresponding APAR (authorized program analysis report) installed. At the time this document was prepared, the Host Utilities supported AIX Service Streams with the APARs listed above as well as with APARs IZ53718, IZ53730, IZ53856, IZ54130, IZ57806, and IZ61549. If an APAR listed here has not been publicly released, contact IBM and request a copy.</p>

SAN booting and the Host Utilities

The Host Utilities support SAN booting with FC and FCoE environments. SAN booting is the process of setting up a SAN-attached disk (a LUN) as a boot device for an AIX host.

Configuring SAN booting on a storage system LUN allows you to:

- Remove the hard drives from your servers and use the SAN for booting needs, eliminating the costs associated with maintaining and servicing hard drives.
- Consolidate and centralize storage.
- Use the reliability and backup features of the storage system.

The downside of SAN booting is that loss of connectivity between the host and storage system can prevent the host from booting. Be sure to use a reliable connection to the storage system.

Note: While SAN booting is not supported with Jumbo frames at this time, solutions and components are qualified on an ongoing basis. To determine whether SAN booting is supported in your configuration, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6).

Support for non-English versions of AIX operating systems

AIX Host Utilities are supported on all language versions of AIX. All product interfaces and messages are displayed in English; however, all options accept Unicode characters as input.

Troubleshooting

If you encounter a problem while running the Host Utilities, here are some tips and troubleshooting suggestions that might help you resolve the issue.

This chapter contains the following information:

- Best practices, such as checking the *Release Notes* to see if any information has changed.
- Suggestions for checking your system.
- Information about possible problems and how to handle them.
- Diagnostic tools that you can use to gather information about your system.

Check the Release Notes

The *Release Notes* contain the most up-to-date information on known problems and limitations. The *Release Notes* also contain information on how to look up information about known issues.

The *Release Notes* are updated when there is new information about the Host Utilities. It is a good practice to check the *Release Notes* before you install the Host Utilities and any time you encounter a problem with the Host Utilities.

If you cannot resolve your problem

If you encounter a problem that you cannot resolve and you do not find a solution in this document or the *Release Notes*, you should contact IBM Support at 1-800- IBM-SERV for assistance.

Make sure you have recorded any error messages displayed on the host or storage system console and the symptoms of the problem and any changes made to the host or storage system just before the problem appeared. In addition, collect the host and storage system log files.

About the troubleshooting sections that follow

The troubleshooting sections that follow help you verify your system setup. Having the correct system setup resolves most problems. These sections also provide tips for diagnosing and fixing issues.

If you have any problems with the Host Utilities, make sure your system setup is correct. As you go through the following sections, keep in mind:

- For more information on AIX commands, see the man pages and operating system documentation.

- For more information on the Data ONTAP commands, see the Data ONTAP documentation, in particular, the *SAN Administration Guide* (called *Block Access Management Guide for iSCSI and FC* in Data ONTAP 8.1 and earlier) for your version of Data ONTAP.
- You perform some of these checks from the host and others from the storage system. In some cases, you must have the Host Utilities SAN Toolkit installed before you perform the check. For example, the SAN Toolkit contains the `san lun` command, which is useful when checking your system.
- To make sure you have the current version of the system components, see the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6). Support for new components is added on an on-going basis. This online document contains a complete list of supported HBAs, platforms, applications, and drivers.

Possible connectivity problems

If your system encounters an I/O error, read/write failures can occur that causes applications to hang, crash, or fail to return requested information.

You can minimize I/O application error on AIX systems by using highly available, multipathing configurations that provide continuous I/O with no single point of failure. If you continue to experience I/O errors, check the following areas for connectivity problems:

- Switch setup (if used)
- Storage system setup
- Host setup
- Storage system connectivity to the switch
- Storage system connectivity to the host
- FC or FCoE connectivity to the host

Storage system checklist

There are several things you can check that pertain to your storage system to ensure that your Host Utilities environment works correctly.

Make sure that the following situations are true:

- The host and the initiator HBAs or the software initiators are set up.
- The storage system and target HBAs are configured.
- The storage system is set up to work with the host:
 - **(FC)** The storage has been cabled to the fabric according to your configuration topology.
 - You have created working volumes and qtrees (if desired) on the storage system.
 - Your protocol is licensed and running.
You can check the status of the FC protocol service with the `fcp status` command.
- All the target ports are in a good state.
- The igroups have the ostype set to AIX.
- The LUNs are:
 - Mapped to host igroups.

- In a good state as indicated by the output from the `sanlun lun show -p` command or the `lspath` command.
- Using AIX as their operating system type.

Host checklist

If you want to ensure that your Host Utilities environment is operating correctly, there are several things you can check.

Make sure that the following situations are true:

- The system meets the Host Utilities requirements.
The installation fails if your system does not meet the requirements.
- The host and the storage system can communicate.
One way to check this is to log in to the storage system remotely from the host. Then enter any command at the storage system prompt to confirm that the host and the storage system can communicate.
- **(FC)** The HBAs are working.
Check the output from the `sanlun fcp show adapter -v` command.
- The host is seeing all of the LUNs and LUN paths that it should.
You can confirm this by running the `lsdev` command or, if you have multipathing, `sanlun lun show -p`.
- **(MPIO)** The paths priorities have been set. If your environment does not use ALUA, you must run the `dotpaths` utility to set the path priorities after having the host discover the LUNs.
- **(MPIO)** Use MPIO commands to check your path state and device availability.

Useful commands and utilities for troubleshooting

There are several commands and utilities you can use to check your system and look for problems.

The following commands and utilities are especially useful in tracking down host related problems:

- The Host Utilities `sanlun` utility
- The AIX `lsdev` command

(sanlun utility) With the `sanlun` utility, you can perform the following tasks:

- Check the status of the
 - HBA
 - LUN
 - Paths to the LUN
- Discover whether a path is up or down

When you have a direct-attached configuration, use the `sanlun lun show` command to get information about your system.

With a multipathing configuration, use the `sanlun lun show -p` command. This version of the command also provides information about the paths to the LUNs.

(lsdev -Cc disk command) The `lsdev -Cc disk` command provides information about the devices and LUNs in your configuration.

Check the version of your host operating system

Make sure you have the correct version of the operating system.

You can use the `oslevel -s` command to display information about your operating system.

This command displays basic information your operating system level and maintenance or technology level. The information might not be complete; you might need additional filesets.

The following command shows the information on your operating system level.

```
#-> oslevel -s
7100-00-02-1041
```

Check the version of the prerequisite filesets

Make sure you have the correct version of the filesets for your operating system installed.

You can use the `lslpp -L` command to display information about all the filesets on the host.

To get information about a specific fileset, use the `lslpp -L fileset_name` command, where *fileset_name* is the name of the fileset you want to check.

The following command line displays information about the fileset `devices.pci.df1000f7.com`.

```
# lslpp -L devices.pci.df1000f7.com
Fileset Level State Type Description
(Uninstaller)
-----
devices.pci.df1000f7.com 5.2.0.40 C F Common PCI FC Adapter
Device Software
State codes:
A -- Applied.
B -- Broken.
C -- Committed.
E -- EFIX Locked.
O -- Obsolete. (partially migrated to newer version)
? -- Inconsistent State...Run lppchk -v.
Type codes:
F -- Installp Fileset
P -- Product
C -- Component
```



```
T -- Feature
R -- RPM Package
```

Confirm that the HBA is supported

The supported HBAs should be installed before you install the Host Utilities software package.

You can use the `lscfg -vpl adapter_name` command to display information about the HBAs. Then you can compare that information with the information in the IBM N series interoperability matrix website (accessed and navigated as described in [Websites](#) on page 6) to determine whether your HBAs are supported.

For information about the type adapter installed, you can use the `lsdev -Cc adapter` command.

Note: If you have an HBA that is not supported, you will need to install a supported HBA. See the documentation that accompanies the HBA for installation instructions.

In this example, the `lsdev -Cc adapter` command displays information on the HBAs. Both `fcs0` and `fcs1` are Fibre Channel adapters.

```
# lsdev -Cc adapter
ent0          Available 03-08 2-Port 10/100/1000 Base-TX PCI-X Adapter (14108902)
ent1          Available 03-09 2-Port 10/100/1000 Base-TX PCI-X Adapter (14108902)
fcs0          Available 05-08 FC Adapter
fcs1          Available 09-08 FC Adapter
ide0          Available 07-08 ATA/IDE Controller Device
sisscsia0    Defined  04-08 PCI-X Dual Channel Ultra320 SCSI Adapter
sisscsial    Available 08-08 PCI-X Dual Channel Ultra320 SCSI Adapter
usbhbc0      Available 02-08 USB Host Controller (33103500)
usbhbc1      Available 02-09 USB Host Controller (33103500)
vsa0         Available LPAR Virtual Serial Adapter
vsa1         Available LPAR Virtual Serial Adapter
```

Check the LUN characteristics

You can display the characteristics of a LUN by executing the `lsattr -El <hdiskname>` command.

This example uses the `lsattr -El` to display information about `hdisk4`.

```
# lsattr -El hdisk4
PCM          PCM/friend/Default          PCM Path Control Module          False
algorithm    round_robin                    Algorithm True
clr_q        no                               Device CLEARS its Queue on error True
dist_err_pcmt 0                               Distributed Error Sample Time    True
dist_tw_width 50                              Distributed Error Sample Time    True
hcheck_cmd   inquiry                         Health Check Command             True
hcheck_interval 30                             Health Check Interval            True
hcheck_mode  nonactive                       Health Check Mode                 True
host_addr    10.60.244.35                    Hostname or IP Address            False
location     Location Label                  Location Label                     True
lun_id       0x0                              Logical Unit Number ID           False
max_transfer 0x40000                          Maximum TRANSFER Size            True
port_num     0xcbc                           PORT Number                       False
pvid         000a105418b0c7ed000000000000000 Physical volume identifier        False
q_err        yes                               Use QERR bit                     True
q_type       simple                           Queuing TYPE                     True
queue_depth  12                               Queue DEPTH                       True
```

reassign_to	120	REASSIGN time out value	True
reserve_policy	no_reserve	Reserve Policy	True
rw_timeout	120	READ/WRITE time out value	True
start_timeout	60	START unit time out value	True
target_name	iqn.1992-08.com.:sn.33610045 Target NAME		False

Check the MPIO disk path information

You can display information about the MPIO disk paths by executing the `lspath` command.

This example uses the `lspath` to display information about the MPIO disk path.

```
#-> lspath -l hdisk3 -F 'path_id name parent connection status'
0 hdisk3 fscsi0 208100a09816f454,2000000000000 Enabled
1 hdisk3 fscsi0 208d00a09816f454,2000000000000 Enabled
2 hdisk3 fscsi0 208500a09816f454,2000000000000 Enabled
3 hdisk3 fscsi1 208400a09816f454,2000000000000 Enabled
4 hdisk3 fscsi1 209200a09816f454,2000000000000 Enabled
5 hdisk3 fscsi1 208c00a09816f454,2000000000000 Enabled
```

Reinstalling if the installation fails due to system requirements

The installation process requires certain minimum system requirements. If the process finds a problem with your system requirements, the installation fails and you must reinstall the Host Utilities.

Steps

1. Check if you are logged in as root.
2. Check the installation logs to determine why the install failed.
The most common problems include missing the required filesets, such as `devices.common.IBM.fc.hba-api` fileset.
3. Correct the problem described in the log.
4. Reinstall the software. You can use SMIT or the `installp` command.

Since the installation failed, you do not need to uninstall the software.

FC troubleshooting tips

The following sections provide tips for working in an MPIO environment that is running the FC protocol.

(FC) Check the ALUA settings on the storage system

If you are using an MPIO environment with FC and you are running a version of Data ONTAP that supports ALUA, you should have ALUA set on the storage system to work with igroups.

To verify that you have ALUA enabled for your igroup, execute the `igroup show -v` command.

Note: If you do not have ALUA set up, but you have already installed the Host Utilities, you must remove the existing LUN handles for the device before you can enable ALUA. Use the `rmdev -dl device_name`. For example, if you needed to remove the `hdisk2` LUN handles, you would enter the following command:

```
rmdev -dl hdisk2
```

In this example, executing `igroup show -v` shows that ALUA is enabled.

```
filerA# igroup show -v
filerA (FCP):
OS Type: aix
Member: 10:00:00:00:c9:4b:e3:42 (logged in on: 0c)
Member: 10:00:00:00:c9:4b:e3:43 (logged in on: vtic)
ALUA: Yes
```

Basic operations take a long time to complete

Sometimes basic operations take hours instead of minutes to complete even though there are no errors and everything appears to be correctly connected.

This could mean that one of the connectors is not firmly attached. This can be the case even when the connector has a link and is reporting information, such as the correct speed.

If you encounter this problem, try disconnecting the connectors and reconnecting them. Check for faulty optical cabling. If you are using FC, check the switch for excessive line errors.

Installing the nSANity data collection program

Obtain and install the nSANity Diagnostic and Configuration Data Collector program when instructed to do so by your technical support representative.

About this task

Contact your technical support representative to obtain the nSANity Diagnostic and Configuration Data Collector program. The nSANity program replaces the diagnostic programs included in previous versions of the Host Utilities. The nSANity program runs on a Windows or Linux system with network connectivity to the component from which you want to collect data. It does not run directly on the AIX host itself.

Steps

1. Obtain the Windows zip or Linux tgz version of the nSANity program from your technical support representative and copy it to the workstation or server that you want to run it on.
2. Change to the directory to which you downloaded the zip or tgz file.
3. Extract all of the files and follow the instructions in the README.txt file. In addition, ensure that you review the RELEASE_NOTES.txt file for any warnings and notices.

After you finish

Run the specific nSANity commands specified by your technical support representative.

Where to find more information

For additional information about host and storage system requirements, supported configurations, best practices, your operating system, and troubleshooting, see the documents listed in the following table.

If you need more information about...	Go to...
Known issues, troubleshooting, operational considerations, and post-release developments	<p>The latest Host Utilities <i>Release Notes</i></p> <p>Note: The <i>Release Notes</i> are updated more frequently than the rest of the documentation. You should always check the <i>Release Notes</i> before installing the Host Utilities to see if there have been any changes to the installation or setup process since this document was prepared. You should check them periodically to see if there is new information on using the Host Utilities. The <i>Release Notes</i> provide a summary of what has been updated and when.</p>
The latest supported configurations	<ul style="list-style-type: none"> • The IBM N series interoperability matrix • <i>IBM System Storage N series Introduction and Planning Guide</i>
A summary of some of the commands you might use with the Host Utilities	The <i>Host Utilities Quick Command Reference</i> for your protocol
Changes to the host settings that are recommended by the Host Utilities	<i>Host Settings Affected by the Host Utilities</i>
Configuring the storage system and managing SAN storage on it	<ul style="list-style-type: none"> • Data ONTAP documentation Index • <i>Best Practices for Reliability: New System Installation</i> • <i>Data ONTAP Software Setup Guide for 7-Mode</i> • <i>Data ONTAP SAN Administration Guide for 7-Mode</i> • <i>Data ONTAP Release Notes</i> • <i>Command Reference</i>
Verifying compatibility of a storage system with environmental requirements	<i>N series Introduction and Planning Guide</i>

If you need more information about...	Go to...
Upgrading Data ONTAP	<i>Data ONTAP Upgrade and Revert/Downgrade Guide for 7-Mode</i>
Migrating the cfmode, if necessary	<i>Changing the Cluster cfmode Setting in Fibre Channel SAN Configurations</i>
Installing and configuring the HBA in your host	Your HBA vendor documentation
Your host operating system and using its features	Refer to your operating system documentation.
PowerVM	Refer to your operating system documentation. Additional documentation on using PowerVM environments is available on the IBM website.
General product information, including support information	The IBM N series interoperability matrix website (accessed and navigated as described in Websites on page 6)

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