IBM System Storage N series

# VMWare ESX Host Utilities 5.2.1 Installation and Setup Guide

GC53-1173-03
NA 210-05158_A0

# Contents

# 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 at the following Web site:

*www.ibm.com/storage/support/nas/*

A listing of currently available N series products and features can be found at the following Web site:

*www.ibm.com/storage/nas/*

# Getting information, help, and services

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.

**Next topics**



## Before you call

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

- Check all cables to make sure that they are connected properly.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.

## Using the documentation

Information about N series hardware products is available in printed documents and a documentation CD that comes with your system. The same documentation is available as PDF files on the IBM NAS support Web site:

*www.ibm.com/storage/support/nas/*

Data ONTAP software publications are available as PDF files on the IBM NAS support Web site:

*www.ibm.com/storage/support/nas/*

## Web sites

IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates.

- For NAS product information, go to the following Web site:
  *www.ibm.com/storage/nas/*
- For NAS support information, go to the following Web site:
  *www.ibm.com/storage/support/nas/*
- For AutoSupport information, go to the following Web site:
  *www.ibm.com/storage/support/nas/*
- For the latest version of publications, go to the following Web site:
  *www.ibm.com/storage/support/nas/*

## Accessing online technical support

For online Technical Support for your IBM N series product, visit the following Web site:

*www.ibm.com/storage/support/nas/*

## Hardware service and support

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

*www.ibm.com/planetwide/*

## Supported servers and operating systems

IBM N series products attach to many servers and many operating systems. To determine the latest supported attachments, follow the link to the Interoperability Matrices from the following Web site:

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

## Firmware updates

As with all devices, it is recommended that you run the latest level of firmware, which can be downloaded by visiting the following Web site:

*www.ibm.com/storage/support/nas/*

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support. See the *Data ONTAP Upgrade Guide* for your version of Data ONTAP for more information on updating firmware.

# How to send your comments

Your feedback is important in helping us provide the most accurate and high-quality information. If you have comments or suggestions for improving this document, send us your comments by e-mail 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: March 2011

Several changes have been made to this document since it was published for the ESX Host Utilities 5.2 release.

This document has been updated for ESX Host Utilities 5.2.1 to add the following information:

- The config_mpath script works for all supported storage adapters, not just Emulex and QLogic adapters.
- The mbralign program function to preserve the Windows drive letter mapping has been enhanced.
- The mbralign program has new command options to support copy offload for NFS.
- The 1-TB size limit on VMDKs from previous versions of the mbralign program has been removed.
- Additional requirements and limitations for using the mbralign program.

### Related concepts

*Some supported storage adapters might require manual configuration* on page 31
*VMDK partition alignment with mbralign overview* on page 59
*Offloading VMDK data copying improves performance for NFS* on page 61

### Related tasks

*Checking VMDK partition alignment with mbralign* on page 58

# Introduction to Host Utilities

This section introduces the Host Utilities and what they contain.

**Next topics**



## What the Host Utilities are

The Host Utilities are a set of software programs and documentation that enable you to connect host computers to IBM N series storage systems.

The Host Utilities include the following components:

- An installation program that sets required parameters on the host computer and on certain host bus adapters (HBAs).
- A program (`mbralign`) to detect and correct master boot record (MBR) partition alignment problems for virtual machines. The mbralign program now also includes the function provided by the mbrscan program in earlier Host Utilities versions.
- Guest OS scripts to set disk timeouts for Linux, Solaris, and Windows guest operating systems.
- This documentation, which describes how to install the Host Utilities and troubleshoot common problems.

## What the Host Utilities contain

The Host Utilities package has a number of software components.

When you install the Host Utilities package, the following scripts and associated man pages are installed on the ESX host. The default script location is `/opt/ontap/santools/`.

| | |
|---|---|
| **config_hba** | Sets the required HBA timeout settings. |
| **config_mpath** | Sets the path selection policy and determines the primary paths. For the FIXED policy, config_mpath sets the preferred path to one of the primary paths. |

| | |
|---|---|
| **config_nfs** | Sets the recommended NFS heartbeat settings. |
| **fcp_inquiry** | Support script for use by other configuration scripts only. |
| **install** | Installs the Host Utilities software, opens the required firewall port, and then runs config_hba, config_mpath, and config_nfs. |
| **mbralign** | Tests and fixes master boot record (MBR) partition misalignment. Includes the function previously provided by mbrscan. |
| **NOTICE.TXT** | Text document provides copyright and license information on third-party products used in ESX Host Utilities. |
| **sanlun** | Displays information about the HBAs and LUNs currently mapped to your host. |
| **san_version** | Displays the version of the Host Utilities running on your system. |
| **uninstall** | Removes the Host Utilities from this system. |

The Host Utilities installs ISO images of the guest operating system timeout scripts on the ESX host. The default location is `/opt/ontap/gos/`

| | |
|---|---|
| **linux_gos_timeout-install.iso** | Sets timeouts for virtual machines running supported versions of Linux, including RHEL 4, RHEL 5, SLES 9, SLES 10, and SLES 11. |
| **solaris_gos_timeout-install.iso** | Sets timeouts for virtual machines running supported versions of Solaris, including Solaris 10. |
| **windows_gos_timeout.iso** | Sets timeouts for virtual machines running supported versions of Windows, including Windows XP, Windows 2000 Server, Windows Server 2003, and Windows Server 2008. |

Additional Host Utilities support files are installed by default in `/opt/ontap/`.

#### Related tasks

*Setting timeout values for guest operating systems* on page 41

# ESX configurations that support ALUA

ALUA (asymmetric logical unit access) is supported for certain combinations of ESX, Data ONTAP, and guest operating system configurations.

You should enable ALUA when you have a supported configuration. ALUA is enabled on the igroup mapped to IBM N series LUNs used by the ESX host. Currently, the default setting in Data ONTAP software for ALUA is disabled.

ALUA requires ESX 4.0 or later.

ALUA requires Data ONTAP 7.3.1 or later. The single_image cfmode setting is required for Fibre Channel.

ALUA is *NOT* supported with guest operating systems in a Microsoft cluster configuration. This includes both MSCS on Windows Server 2003 and Windows failover clusters on Windows Server 2008 guests.

# Protocols supported by the Host Utilities

The Host Utilities provide support for Fibre Channel, Fibre Channel over Ethernet, iSCSI, and NFS connections to the storage system.

#### Next topics

*Data ONTAP and Fibre Channel* on page 19
*Data ONTAP and Fibre Channel over Ethernet* on page 20
*Data ONTAP and iSCSI* on page 21

## Data ONTAP and Fibre Channel

The Fibre Channel (FC) protocol for SCSI is one method for enabling the host to access data on storage systems that run supported versions of Data ONTAP software.

Fibre Channel connections require one or more supported host bus adapters (HBAs) in the host.

The storage system is an FC target device. The Fibre Channel service must be licensed and running on the storage system.

Each HBA port is an initiator that uses FC to access logical units of storage (LUNs) on a storage system to store and retrieve data.

On the host, a worldwide port name (WWPN) identifies each port on an HBA. The host WWPNs are used as identifiers when creating initiator groups on a storage system. An initiator group permits host access to specific LUNs on a storage system.

### Supported FC configurations

The Host Utilities support fabric-attached SAN network configurations and direct-attached configurations.

The following configurations are supported:

- Fabric-attached storage area network (SAN). Two variations of fabric-attached SANs are supported:
  - A single-host FC connection from the HBA to the storage system through a single switch. A host is cabled to a single FC switch that is connected by cable to redundant FC ports on an active/active storage system configuration. A fabric-attached single-path host has one HBA.
  - Two (or more) FC connections from the HBA to the storage system through dual switches or a zoned switch. In this configuration, the host has at least one dual-port HBA or two single-

port HBAs. The redundant configuration avoids the single point of failure of a single-switch configuration.

- Direct-attached. A single host with a direct FC connection from the HBA to stand-alone or active/active storage systems.

ALUA (asymmetric logical unit access) is supported with ESX 4.0 and ESX 4.1. ALUA requires a supported version of Data ONTAP software. At the time of publication, Data ONTAP 7.3.1 or later is required. See the ESX Host Utilities *Release Notes* for the latest ALUA requirements.

**Note:** Use redundant configurations with two FC switches for high availability in production environments. However, direct FC connections and switched configurations using a single zoned switch might be appropriate for less critical business applications.

**Note:** Loop mode is allowed from the storage system side but not from the VMware ESX server host side.

For more detailed information about the supported Fibre Channel topologies, including diagrams, see the *Fibre Channel and iSCSI Configuration Guide* for your version of Data ONTAP.

For more information about using Fibre Channel on your storage system, see the *Data ONTAP Block Access Management Guide for iSCSI and FC* for your version of Data ONTAP.

#### Related information

*Fibre Channel and iSCSI Configuration Guide - http://www.ibm.com/storage/support/nas/*

## Data ONTAP and Fibre Channel over Ethernet

The Fibre Channel over Ethernet (FCoE) protocol for SCSI is one method for enabling the host to access data on storage systems that run supported versions of Data ONTAP software.

Fibre Channel over Ethernet (FCoE) is a new model for connecting hosts to storage systems. FCoE is very similar to traditional Fibre Channel (FC), as it maintains existing FC management and controls, but the hardware transport is a lossless 10-Gb Ethernet network.

Setting up an FCoE connection requires one or more supported converged network adapters (CNAs) in the host, connected to a supported data center bridging (DCB) Ethernet switch. The CNA is a consolidation point and effectively serves as both an HBA and an Ethernet adapter.

As an HBA, the presentation to the host is FC targets and all FC traffic is sent out as FC frames mapped into Ethernet packets (FC over Ethernet). The 10-Gb Ethernet adapter is used for IP traffic, such as iSCSI, NFS, and HTTP. Both FCoE and IP communications through the CNA run over the same 10-Gb Ethernet port, which connects to the DCB switch.

In general, you configure and use FCoE connections just like traditional FC connections.

**Note:** See the Interoperability Matrix for the specific configurations that support FCoE. Be sure to check for SAN boot support.

### Supported FCoE configurations

The Host Utilities support fabric-attached SAN network configurations, but direct-attached configurations are not supported.

#### FCoE adapter configuration

The converged network adapters (CNA) must be directly cabled to a supported data center bridging (DCB) switch. No intermediate Ethernet switches may be connected between the CNA end point and the DCB switch. The CNA is a consolidation point and effectively serves as both an HBA and an Ethernet adapter.

Updating the drivers and firmware for a CNA is just like updating them for a traditional FC HBA. Check the Interoperability Matrix for the supported firmware versions.

The CNA uses the same timeout parameters as a traditional FC HBA. The ESX Host Utilities installation program detects the FC HBA portion of the CNA and sets the required parameters. If you install a CNA after installing the Host Utilities, run the `config_hba --configure` command to configure the CNA parameters.

#### FCoE cabling configuration

FCoE cabling information and diagrams are included in the *Fibre Channel and iSCSI Configuration Guide* for your version of Data ONTAP software.

#### FCoE switch configuration

The DCB switch requires special setup steps for FCoE. See the documentation supplied by the switch manufacturer. For example, the steps for a Cisco 5020 are included in the *Cisco Nexus 5000 Series Switch Fabric Manager Software Configuration Guide*.

You zone the DCB switch for FCoE just like you zone a traditional FC switch.

##### Related information

*NAS Interoperability Matrices Web site - www.ibm.com/systems/storage/network/interophome.html*

*Cisco Nexus 5000 Series Switch Fabric Manager Software Configuration Guide - www.cisco.com/en/US/products/ps9670/tsd_products_support_series_home.html*

## Data ONTAP and iSCSI

The iSCSI protocol is one method for enabling the host to access data on storage systems that run supported versions of Data ONTAP software.

iSCSI connections can use a software initiator over the host's standard Ethernet interfaces, or one or more supported host bus adapters (HBAs).

The iSCSI protocol is a licensed service on the IBM N series storage system that enables you to transfer block data to hosts using the SCSI protocol over TCP/IP. The iSCSI protocol standard is defined by RFC 3720 (www.ietf.org).

The storage system is an iSCSI target device. A host running the iSCSI Initiator software or an iSCSI HBA uses the iSCSI protocol to access LUNs on a storage system.

The connection between the initiator and target uses a standard TCP/IP network. No special network configuration is needed to support iSCSI traffic. The network can be a dedicated TCP/IP network, or your regular public network. The storage system listens for iSCSI connections on TCP port 3260. For more information on using iSCSI on your storage system, see the *Data ONTAP Block Access Management Guide for iSCSI and FC* for your version of Data ONTAP.

### Supported iSCSI configurations

Supported iSCSI configurations include direct-attached and network-attached topologies.

Both software iSCSI initiators and iSCSI host bus adapters (HBAs) are supported.

For more detailed information about the supported iSCSI topologies, including diagrams, see the *Fibre Channel and iSCSI Configuration Guide* for your version of Data ONTAP.

#### Related information

*Fibre Channel and iSCSI Configuration Guide - http://www.ibm.com/storage/support/nas/*

## ESX firewall ports opened by Host Utilities

The Host Utilities installation program opens ports in the ESX firewall needed by the Host Utilities components.

During installation, you are prompted to allow the Host Utilities installer to open the following port in the ESX firewall:

- 80/TCP (outgoing) if not using SSL
- 443/TCP (incoming) if using SSL

This port is used for communication with the storage system. If you do not allow the installation program to open this port, the scripts used to install and configure Host Utilities cannot run.

You can choose to close the firewall port after successfully installing the Host Utilities. If you close the port, you need to open is again to enable running Host Utilities scripts.

#### Related tasks

*Opening and closing the firewall ports* on page 0

# ESX host settings set by ESX host utilities

ESX host utilities sets ESX host timeouts and other settings to ensure best performance and successful failover.

ESX host utilities sets the following values on an ESX host.

### NFS Settings

| | |
|---|---|
| **Net.TcpipHeapSize** | Set to 30 for all NFS configurations. |
| **Net.TcpipHeapMax** | Set to 120 for all NFS configurations. |
| **NFS.MaxVolumes** | Set to 64 for all NFS configurations. |
| **NFS.HeartbeatMaxFailures** | Set to 10 for all NFS configurations. |
| **NFS.HeartbeatFrequency** | Set to 12 for all NFS configurations. |
| **NFS.HeartbeatTimeout** | Set to 5 for all NFS configurations. |

### FC/FCoE Settings

| | |
|---|---|
| **Path selection policy** | Set to RR (round robin) for ESX 4.0 and 4.1 FC paths with ALUA enabled. Set to FIXED for all other configurations.<br>For FC paths to new LUNs created after the Host Utilities are installed, the default is set to the same values as above. |
| **Disk.QFullSampleSize** | Set to 32 for all configurations. |
| **Disk.QFullThreshold** | Set to 8 for all configurations. |
| **Emulex FC HBA timeouts** | For ESX 4.0 or 4.1 with Data ONTAP 7.2.4 or later, uses the default value.<br>For ESX 3.5 hosts, if all storage systems are running Data ONTAP 7.2.4 or later and single_image cfmode, set to 10 seconds.<br>For all other configurations, set to 120 seconds. |
| **QLogic FC HBA timeouts** | For ESX 4.0 or 4.1 with Data ONTAP 7.2.4 or later, uses the default value.<br>For ESX 3.5 hosts, if all storage systems are running Data ONTAP 7.2.4 or later and single_image cfmode, set to 5 (10 seconds).<br>For all other configurations, set to 60 (120 seconds). |

### iSCSI Settings

| | |
|---|---|
| **Path selection policy** | Set to RR (round robin) for all iSCSI paths.<br>For iSCSI paths to new LUNs created after the Host Utilities are installed, no default is set. You must run the config_mpath script. |
| **Disk.QFullSampleSize** | Set to 32 for all configurations. |
| **Disk.QFullThreshold** | Set to 8 for all configurations. |
| **QLogic iSCSI HBA IP_ARP_Redirect** | Set to ON for all configurations. |
| **QLogic iSCSI HBA timeouts** | ql4xportdownretrycount (qla4022 driver), ka_timeout (qla4xxx driver), and KeepAliveTO timeout settings are set to 14 for iSCSI SAN booted ESX hosts, and set to 60 for non-SAN-boot configurations. |

## Where to find more information

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

| **If you need more information about...** | **Go to...** |
|---|---|
| Known issues, system requirements, and last minute updates | The latest Host Utilities *Release Notes* |
| The latest supported configurations | • The Interoperability Matrix.<br>• System Configuration Guide. |
| Configuring the storage system | • The *Data ONTAP Software Setup Guide*<br>• The *Data ONTAP Block Access Management Guide for iSCSI and FC* |
| Supported SAN topologies | The *FC and iSCSI Configuration Guide* for your version of Data ONTAP software |
| Installing and configuring the HBA in your host | Your HBA vendor documentation |
| Configuring the ESX host | The VMware *Fibre Channel SAN Configuration Guide*, *iSCSI SAN Configuration Guide*, and *Server Configuration Guide* for your version of ESX. |

| If you need more information about... | Go to... |
|---|---|
| Managing SAN storage on the storage system | • *Data ONTAP Commands: Manual Page Reference, Volume 1* and *Data ONTAP Commands: Manual Page Reference, Volume 2*<br>• The *Data ONTAP Block Access Management Guide for iSCSI and FC*<br>• The FilerView online Help |
| General product information, including support information | See the IBM NAS support site at *www.ibm.com/storage/support/nas/* |

**Related information**

*NAS Interoperability Matrices Web site - www.ibm.com/systems/storage/network/interophome.html*

*FC and iSCSI Configuration Guide - www.ibm.com/storage/support/nas/*

*VMware product documentation - www.vmware.com/support/pubs/vi_pubs.html*

# Installing and Configuring Host Utilities

This section describes how to install and configure the Host Utilities and how to perform related tasks.

### Next topics



## Installing and configuring the Host Utilities (high level)

The following steps provide a high-level overview of what is involved in installing the Host Utilities and configuring your system to work with that software.

### Before you begin

You can install the product software 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 NAS support Web site.

### About this task

This section is for people familiar with this operating system and storage systems. If you need more information, see the detailed instructions for the steps.

### Steps

1. Verify that all components of your host and storage system configuration are listed as supported in the Interoperability Matrix.
2. Check the publication matrix page for important alerts, news, interoperability details, and other information about the product before beginning the installation.
3. Install optional host bus adapters (HBAs) with a supported firmware version.
4. Obtain the product software by downloading the software as follows:
   a. Go to the IBM NAS support Web site.

**b.** Sign in with your IBM ID and password.

If you do not have an IBM ID or password, or if you are adding new N series machines and serial numbers to an existing registration, click the **Register** link, follow the online instructions, and then sign in.

**c.** Select the N series software you want to download, and then select the **Download** view.

**d.** Use the **Software Packages** link on the Web page presented and follow the online instructions to download the software to a working directory on your ESX host.

5. Log in as root and extract and run the Host Utilities installation program.
6. Reboot the VMware host when prompted.

#### Related information

*IBM NAS Support Web site - www.ibm.com/storage/support/nas/*

## Installation prerequisites

Before beginning installation and setup, you must satisfy certain prerequisites.

- The combination of all components of your storage system and host configuration are listed as supported in the Interoperability matrix. This includes the following components.
  - ESX software version
  - Data ONTAP software version
  - Host bus adapter (HBA) model and firmware version
  - Fibre Channel switch model and firmware version
  - Guest operating system (GOS) software version
  - Whether the system is SAN booted
- The appropriate Data ONTAP protocol licenses are installed: Fibre Channel, iSCSI, and NFS.
- The storage system host names can be resolved in DNS.
- If you plan to use the SSL option when installing the Host Utilities, each storage system controller has SSL support enabled.
- If you do not use the SSL option when installing the Host Utilities, you should enable hosts.equiv authentication or add the ESX host using the `options trusted.hosts` command on each storage system controller.
- If you do not want to use root access to the storage system, create a new user role on the storage system for the ESX host using RBAC.
- If you do not want to enter the storage system user name and password when running Host Utilities scripts, each storage system controller has the ESX host names added to its `/etc/hosts.equiv` file and the storage system option `httpd.admin.hostsequiv` is enabled.
- You can log into the ESX host as root.

### Related information

*NAS Interoperability Matrices Web site - www.ibm.com/systems/storage/network/interophome.html*

# Configuring role-based access control (RBAC)

The `config_hba` and `config_mpath` scripts, and the Host Utilities installation program can use RBAC user names. RBAC enables the ESX host to communicate with the storage system without requiring root access to the storage system.

### Before you begin

For more information about roles, see the *System Administration Guide* for your version of Data ONTAP software.

### Steps

1. Create the new role by enter the following command on the storage system controller. Enter the command as a single line with no spaces in the list of capabilities following the `-a` option.

   **useradmin role add *role_name* -a api-system-get-info,login-http-admin, api-volume-get-root-name,api-system-cli,api-file-read-file, api-igroup-list-info,api-ipspace-list-info,api-lun-config-check-info, api-lun-config-check-cfmode-info,api-lun-list-info,api-portset-list-info, cli-version,cli-cf,cli-df,cli-exportfs,cli-fcp, cli-ifconfig,cli-ifstat,cli-ipsec,cli-iscsi,cli-license,cli-netstat, cli-nfs,cli-nfsstat,cli-options,cli-qtree, cli-quota,cli-rdfile,cli-sis,cli-snap,cli-snapmirror, cli-sysconfig,cli-vfiler,cli-vif,cli-vlan,cli-vol,login-console**

   *role_name* is the name you select for the role.

2. Create a user group that has the role you created by enter the following command:

   **useradmin group add *group_name* -r *role_name***

   *group_name* is the name of the group you are creating.

   *role_name* is the name of the role you created in the previous step.

3. Create a user in the group you created by enter the following command:

   **useradmin user add *user_name* [-p *password*] -g *group_name***

   *user_name* is the name of the user you are creating.

   *password* is the password for this user. If you do not specify a password, the system prompts for one.

   *group_name* is the name of the group you created in the previous step.

4. Verify that the user was created correctly by entering the following command:

**useradmin user list *user_name***

The user and group information is displayed.

5. Repeat for the other storage controllers in your configuration.

In the following example, the first command is truncated for clarity. Be sure to enter the entire list of role capabilities without any spaces.

```
ss1> useradmin role add vmwarerole -a api-system-get-info,login-http-
admin,...,login-console
Role <vmwarerole> added.

ss1> useradmin group add vmwaregroup -r vmwarerole
Group <vmwaregroup> added.

ss1> useradmin user add vmwareuser -g vmwaregroup
New password:
Retype new password:
User <vmwareuser> added.
```

### After you finish

Use the new user name and password when running `config_hba`, `config_mpath`, and `install`.

# Enabling hosts.equiv authentication

Enable hosts.equiv authentication to allow running ESX Host Utilities scripts without having to provide the storage system user name and password.

### Before you begin

You must be able to edit storage system configuration files. Both storage controllers in an active/active configuration or cluster must have the same hosts.equiv entries for the ESX host.

### Steps

1. Enable HTTP administration commands from authorized hosts by entering the following command on each storage system controller:

   **options httpd.admin.hostsequiv.enable on**

2. Add the host name of each ESX host to the `/etc/hosts.equiv` file on each storage system controller.

   For more information, see the na_hosts.equiv man page on the storage system.

# Some supported storage adapters might require manual configuration

The config_hba script included in ESX Host Utilities sets parameters for most supported QLogic and Emulex adapters. Other adapters might require manual configuration.

The config_hba script detects and configures most supported Emulex and QLogic adapters. You might have to set certain parameters on other adapters manually.

The notes in the Interoperability Matrix for the specific adapter identify any required configuration steps and point you to the information you need to complete the configuration. If no special configuration steps are noted, then the adapter has been qualified using the adapter's default settings.

Note that while config_hba sets parameters for only QLogic and Emulex adapters, the config_mpath script sets the paths for all supported adapters.

# Installing the Host Utilities

Run the Host Utilities installation script to install the scripts, configure optimized HBA and NFS heartbeat settings, and configure preferred paths.

### Before you begin

Be sure you have installed any FC or iSCSI HBAs with a supported firmware version and that they appear under **Storage Adapters** on the **Configuration** tab of vSphere client for your ESX host.

If you plan to use an iSCSI software initiator, be sure software iSCSI is enabled. The **Software Initiator Properties** field must show Status: Enabled on the **General** tab of the iSCSI Software Adapter properties. The iSCSI Software Adapter is listed under **Storage Adapters** on the **Configuration** tab of vSphere client for your ESX host.

Decide whether you want to use the secure installation option.

You can install the product software 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 NAS support Web site.

### Steps

1. Check the publication matrix page for important alerts, news, interoperability details, and other information about the product before beginning the installation.
2. Obtain the product software by downloading the software as follows:
   a. Go to the IBM NAS support Web site.
   b. Sign in with your IBM ID and password.

If you do not have an IBM ID or password, or if you are adding new N series machines and serial numbers to an existing registration, click the **Register** link, follow the online instructions, and then sign in.

**c.** Select the N series software you want to download, and then select the **Download** view.

**d.** Use the **Software Packages** link on the Web page presented and follow the online instructions to download the software to a working directory on your ESX host.

3. Log into the ESX console as root and change to the working directory where you downloaded the software package.
4. Extract the installation files using the following command:

   **`tar -zxf ibm_esx_host_utilities_5_2_1.tar.gz`**

5. Change to the directory where the files are extracted. The default is the `ibm_esx_host_utilities_5_2_1` subdirectory of your working directory.
6. Start the Host Utilities installation program using the following command:

   **`./install [--expert] [--secure] [--access`** ***`controller`*****`:`*****`login`*****`:[`*****`password`*****`]]`**

   The `--expert` option installs the Host Utilities components but does not set timeouts or paths. This option should be used only by expert users who need to set timeouts and paths manually. Incorrect settings can cause downtime; allowing the installation program to automatically set timeouts and paths is strongly recommended. A reboot is not needed if you specify the `--expert` option because no settings are changed.

   The `--secure` option specifies that the installation program use a secure connection (SSL) when communicating with the storage controllers.

   `--access` enables you to enter storage controller credentials on the command line. Repeat this option for each storage controller. The installation program prompts for credentials if you do not use the `--access` option.

   *`controller`* is the host name or IP address of a storage controller.

   *`login`* is the user name for the storage controller. You can use the root login, or a custom user name created using RBAC.

   *`password`* is the password for the user name. If you do not specify the password, the system prompts you to enter it. If the password contains non-alphanumeric (special) characters, you must escape the characters on the command line by preceding each character with a backslash (\). For example, to enter the password "pa$$word" on the command line, you must enter "pa\$\$word". You do not need to escape special characters when you enter the password in response to being prompted by the system.

   For more information about the install command syntax, you can run the `./install --help` command.

7. When prompted, enter **`yes`** to use the SSL installation option or enter **`no`** to not use SSL.

8. When prompted, enter **yes** to provide storage controller credentials.

   The installation program lists each storage controller that currently provides storage to the ESX host and prompts you for a user name and password.

9. When prompted, enter **yes** to open the required firewall ports.

10. When prompted, reboot the ESX host.

#### Related concepts

*SecureAdmin and SSL overview* on page 73

#### Related information

*IBM NAS Support Web site - www.ibm.com/storage/support/nas/*

## Uninstalling the Host Utilities

Run the uninstall script to remove the Host Utilities from your system.

#### Steps

1. Log in to the ESX host as root.
2. Change to the `/opt/ontap/santools` directory.
3. Enter the following command:

   **`./uninstall`**

# Configuring for Fibre Channel and iSCSI

You must configure both the host and the storage system to enable storage access using Fibre Channel or iSCSI connections.

Configuring for FC and iSCSI includes the following tasks.

- Recording host identifiers needed by the storage system.
- Provisioning storage, including creating volumes, LUNs, and initiator groups (igroups), and mapping the LUNs to the igroups.
- Setting up the ESX host.
- Adjusting ESX settings for guests in a Microsoft cluster (MSCS) configuration.

#### Next topics



## What are FC and iSCSI identifiers

The storage system identifies hosts that are allowed to access LUNs based on the FC worldwide port names (WWPNs) or iSCSI initiator node name on the host.

Each Fibre Channel port has its own WWPN. A host has a single iSCSI node name for all iSCSI ports. You need these identifiers when manually creating initiator groups (igroups) on the storage system.

The ESX host requires the iSCSI node name of the storage system for static discovery. The storage system's iSCSI node name is not needed if you choose dynamic discovery.

#### Next topics

## Recording the WWPN

Record the worldwide port names (WWPNs) of all host FC ports that connect to the storage system.

### Steps

1. Open the VMware vSphere client and connect to your ESX host.
2. On the **Configuration** tab, select **Hardware > Storage Adapters**
3. Select the first Fibre Channel adapter listed, and record the second value from the **WWN** column.

   **Example**
   In the following example output:

   ```
   vmhba1 Fibre Channel 20:00:00:e0:8b:88:ca:35 21:00:00:e0:8b:88:ca:35
   ```

   The WWPN is 21:00:00:e0:8b:88:ca:35. The first value is the worldwide node name (WWNN), which is not used by Data ONTAP software.
4. Repeat for each port on each Fibre Channel adapter listed.

## Recording the host iSCSI initiator node name

Record the iSCSI initiator node name of the ESX host.

### Steps

1. Open the VMware vSphere client and connect to your ESX host.
2. On the **Configuration** tab, select **Hardware > Storage Adapters**
3. Select the iSCSI Software Adapter or the optional iSCSI HBA, and record the value from the **iSCSI Name** field.

   **Example**
   In the following example output:

   ```
   vmhba33 iSCSI iqn.1998-01.com.vmware:server1-0f920c31
   ```

   The initiator node name is iqn.1998-01.com.vmware:server1-0f920c31.

## Recording the storage system target iSCSI node name

Record the iSCSI node name for each storage controller used by the ESX host.

### About this task

The target iSCSI node name is required only if you use static discovery for iSCSI on the ESX host.

### Steps

1. On the storage system console, enter the following command:

   **`iscsi nodename`**

2. Record the value displayed.
3. Repeat for each storage controller.

```
ss1> iscsi nodename
iSCSI target nodename: iqn.1992-08.com.ibm:sn.123456789
```

# LUN type guidelines

LUNs must be created with the correct LUN type.

If the LUN will be configured with VMFS, then use the LUN type **`vmware`** for Data ONTAP 7.1.x or later.

If the LUN will be configured with RDM, then use the guest OS for the LUN type. For example, if the RDM LUN will have NTFS, use the **`windows`** LUN type. If the RDM LUN will have EXT2/EXT3, use the **`linux`** LUN type.

# Provisioning storage

To configure your storage systems to connect to virtual machines (VMs) running on VMware ESX, you must create new volumes, LUNs, and igroups and then map the LUNs to the igroups.

### Before you begin

You need the FC or iSCSI identifiers of the ESX host.

For detailed instructions on the following steps, see the *Data ONTAP Block Access Management Guide for iSCSI and FC* for your version of Data ONTAP software.

### Steps

1. Create an initiator group (igroup) for each VMware ESX server using the **`vmware`** igroup type.

   Use the WWPNs for all FC HBAs in the ESX host, or the iSCSI initiator node name of the ESX host when creating the igroup.

   For ESX 4.0 and 4.1 configurations that support ALUA, enable the ALUA option on the igroup.

   **Note:** Do not enable ALUA for LUNs used by guest operating systems in a Microsoft cluster (Windows Server 2003 MSCS or Server 2008 failover cluster) configuration. If ALUA is

enabled, the cluster loses its persistent reservations during storage faults, causing the cluster service to be unavailable.

2. Create the storage for each virtual machine.
   a. Create one or more volumes to contain the LUNs.

      FlexVol volumes are recommended in general, and are required if you are using Snapshot copies.

   b. Create a LUN for the VM's root disk.
   c. Create any additional LUNs needed for the VM's application data.
   d. Map all of the LUNs to the igroup for the ESX host.

      If you plan to use VMotion to move your guest operating systems from one VMware ESX host to another, map the LUN to all hosts in the cluster. The LUN IDs must be identical.

### After you finish

Optionally, verify and if necessary correct the alignment of the VMDK partitions.

Sometimes partition misalignment problems can arise, which can lead to performance degradation under very heavy I/O. Depending on your configuration, you might need to align your VMDK partitions to avoid subsequent performance problems.

Note that if you use RDM, and you use the correct guest OS for the LUN type, you should not experience alignment problems.

### Related concepts

*LUN type guidelines* on page 37
*How to identify and fix VMDK partition alignment issues* on page 57
*ESX configurations that support ALUA* on page 18

## How to set up VMware ESX

After creating the necessary LUNs and igroups, and after mapping the LUNs to the igroups, you must configure your host.

For guests in a Microsoft Windows cluster (MSCS) configuration only, you also need to change the path selection policy.

For more information about setting up ESX, see the following documents for your version of ESX:

- *ESX Server Configuration Guide*
- *iSCSI SAN Configuration Guide*
- *Fibre Channel SAN Configuration Guide*

### Next topics

*Configuring the VMware ESX host* on page 39
*Manually setting the path selection policy for Microsoft cluster configurations* on page 39

### Related information

*VMware product documentation - www.vmware.com/support/pubs/vi_pubs.html*

## Configuring the VMware ESX host

Configuring the VMware ESX host requires rescanning the bus, creating a datastore, and creating a new VM.

### Before you begin

You need to create the required LUNs before starting this task.

Detailed task information is available in the ESX Server *Configuration Guide*.

### Steps

1. Rescan the SCSI bus to discover the new LUNs.
   a. Open the VMware vSphere Client and connect to your ESX host.
   b. On the **Configuration** tab, select **Hardware > Storage Adapters**
   c. Click **Rescan**.
2. Create a VMFS datastore on the LUN.
3. Create a new VM or add a new disk to an existing VM.

## Manually setting the path selection policy for Microsoft cluster configurations

For guest operating systems in a Microsoft cluster (MSCS for Windows Server 2003 or failover cluster for Server 2008) configuration, disable ALUA on the igroup and change the path selection policy to FIXED.

### About this task

For Microsoft Windows guest operating systems in a cluster configuration, always use the FIXED path selection policy and disable ALUA on the igroup for the LUNs. This might require you to manually set the path selection policy.

If ALUA is enabled, the Windows cluster loses its persistent reservations during storage faults, causing the cluster service to be unavailable. When ALUA is disabled, the FIXED path selection policy is required to avoid sending I/O over proxy paths.

The default path selection policy set by the Host Utilities should be used if the ESX host does *NOT* have guest operating systems in a Windows cluster (MSCS or failover cluster) configuration. For

ESX 4.0 and 4.1 systems, the path selection policy is set to round robin (RR) for ALUA FC configurations and all iSCSI configurations, and set to FIXED for non-ALUA configurations. For ESX 3.5, the default policy is FIXED.

### Steps

1. To manually change the path selection policy, enter the following command on the ESX host:

   **`config_mpath --primary --policy fixed --loadbalance --persistent`**

   The `--persistent` option is not used for ESX 4.0 or 4.1.

2. To disable ALUA for an igroup, enter the following command at a Data ONTAP command prompt:

   **`igroup set`** ***`igroup_name`*** **`alua no`**

### Related tasks

*Setting the path selection policy and preferred path using config_mpath* on page 46

# Setting timeout values for guest operating systems

Use the Guest OS (GOS) timeout scripts to set the SCSI I/O timeout values for supported Linux, Solaris, and Windows guest operating systems. The timeout values ensure correct failover behavior.

#### Next topics



## How to mount the ISO image in a GOS

Before you can run the timeout scripts, the appropriate ISO image must be mounted in the GOS.

An ISO image is a disk image of an optical disc using the standard International Organization for Standardization (ISO) format. ISO images are used to store programs on the ESX host that can be installed directly on virtual machines.

ISO images of the guest operating system (GOS) timeout scripts are installed on the ESX host by the Host Utilities installation script.

The exact procedure for mounting the ISO image varies, depending on whether the CD-ROM device already exists in the VM.

#### Next topics



### Mounting the ISO image if the CD-ROM exists in the VM

If the CD-ROM exists in the VM, use it to mount the ISO image in the GOS.

#### Steps

1. In the vSphere client, select the desired VM and click the **CD/DVD Connections** icon.
2. Select **CD/DVD Drive 1 > Connect to ISO image on a datastore** .

   The Browse Datastores windows is displayed.
3. Select **vmimages > gos-timeout_isoimages**.

4. Select the appropriate script for the guest operating system version and click **OK**.

### Mounting the ISO image if the CD-ROM does NOT exist in the VM

If the CD-ROM does NOT exist in the VM, you must power off the VM and add the CD-ROM device before you can mount the ISO image.

#### Steps

1. In the vSphere client, select the desired VM and power it off.
2. Right-click the virtual machine and select **Edit Settings**.
3. On the **Hardware** tab, click **Add**.
4. Select **CD/DVD Drive** and then click **Next**.
5. Click **Use ISO image**.
6. Click **Browse**.

   The Browse Datastores windows is displayed.
7. Select **vmimages > gos-timeout_isoimages**.
8. Select the appropriate script for the guest operating system version and click **OK**. Follow the instructions on the screen, accepting the default values, and then click **Finish**.

## Running the GOS timeout scripts for Linux

Run the timeout script to set the SCSI I/O timeout settings for RHEL4, RHEL5, SLES9, SLES10, or SLES11. After upgrading to a new version of Linux, be sure to run the script again.

#### Before you begin

You must mount the ISO image containing the Linux script before you can run it in the virtual machine.

#### Steps

1. Open the console of the Linux virtual machine and log in to an account with root privileges.
2. Run the `linux_gos_timeout-install.sh` script.

#### Result

For RHEL4 or SLES9, a message similar to the following is displayed:
Restarting udev... this may take a few seconds.
Setting I/O Timeout (190s) for /dev/sda - SUCCESS!

For RHEL5, a message similar to the following is displayed:

patching file /etc/udev/rules.d/50-udev.rules
Hunk #1 succeeded at 333 (offset 13 lines).
Restarting udev... this may take a few seconds.
Starting udev: [ OK ]
Setting I/O Timeout (190s) for /dev/sda - SUCCESS!

For SLES10 or SLES11, a message similar to the following is displayed:
patching file /etc/udev/rules.d/50-udev-default.rules
Hunk #1 succeeded at 114 (offset 1 line).
Restarting udev ...this may take a few seconds.
Updating all available device nodes in /dev: done

#### After you finish

Unmount the ISO image by clicking the **CD/DVD Connections** icon in the vSphere Client and selecting **CD/DVD Drive 1 > Disconnect from datastore image**.

## Running the GOS timeout scripts for Solaris

This script sets the SCSI I/O timeout settings for Solaris 10.

#### Before you begin

You must mount the ISO image containing the Solaris script before you can run it in the virtual machine.

#### Steps

1. Open the console of the Solaris virtual machine and log in to an account with root privileges.
2. Run the `solaris_gos_timeout-install.sh` script.

#### Result

For Solaris 10, a message similar to the following is displayed:
Setting I/O Timeout for /dev/s–a - SUCCESS!

#### After you finish

Unmount the ISO image by clicking the **CD/DVD Connections** icon in the vSphere Client and selecting **CD/DVD Drive 1 > Disconnect from datastore image**.

# Running the GOS timeout script for Windows

Run the Windows GOS timeout script to set the SCSI I/O timeout settings for Windows guest operating systems. You must reboot the Windows guest OS for the settings to take effect.

### Before you begin

You must mount the ISO image containing the Windows script before you can run it in the virtual machine.

### Steps

1. Open the console of the Windows virtual machine and log in to an account with Administrator privileges.
2. If the script does not automatically start, open the CD drive and run `windows_gos_timeout.reg`.

   The Registry Editor dialog is displayed.
3. Click **Yes** to continue.

   The following message is displayed: `The keys and values contained in D:\windows_gos_timeout.reg have been successfully added to the registry.`
4. Reboot the Windows guest OS.

### After you finish

Unmount the ISO image by clicking the **CD/DVD Connections** icon in the vSphere Client and selecting **CD/DVD Drive 1 > Disconnect from datastore image**.

# Updating the ESX host configuration

If you make any changes to your ESX host environment, you need to update the configuration to ensure reliable access to storage.

Changes that affect the configuration include any of the following. This is not a comprehensive list. When in doubt, run the configuration scripts.

- Adding or changing iSCSI LUNs and igroups, and LUNs used by guests in Microsoft clusters
- Adding or removing HBAs or updating drivers
- Updating the Data ONTAP software on the storage systems
- Updating the ESX software on the host
- Changing the FC fabric zoning

You can run the Host Utilities `config_hba`, `config_mpath`, and `config_nfs` programs again, or you can set the required parameters manually. Using the scripts is recommended.

The `config_hba` program sets required HBA parameters for Emulex and QLogic storage adapters.

The `config_mpath` program identifies primary (optimized, or non-proxy) paths to a LUN and sets the preferred path to a primary path. It also sets the appropriate path selection policy used to manage the paths.

The `config_nfs` program sets the recommended NFS heartbeat settings.

If you choose to set parameters manually, be sure to set the values listed in this guide.

**Next topics**

*Setting HBA timeouts using config_hba* on page 46
*Setting the path selection policy and preferred path using config_mpath* on page 46
*Setting NFS heartbeat values using config_nfs* on page 48
*How to manually set the optimized HBA timeout values* on page 49
*Manually setting timeouts for iSCSI using 10 Gb NIC* on page 54
*Displaying LUN information using sanlun* on page 54

# Setting HBA timeouts using config_hba

When you first install the Host Utilities, the `config_hba` script automatically sets the required HBA timeout settings for Emulex and QLogic adapters. You must run the `config_hba` script again if you install a new HBA after you install the Host Utilities.

### Step

1. Enter the following command at the ESX host command prompt:

   **`/opt/ontap/santools/config_mpath --configure --access`**
   **`controller_1:login:[password] --access controller_2:login:[password]`**

   *`controller_1`* and *`controller_2`* are the host names of the storage system controllers.

   *`login`* and *`password`* are the user name and password needed to access the storage controller. If you do not specify the password on the command line, the script prompts you for the password.

   If the password contains non-alphanumeric (special) characters, you must escape the characters on the command line by preceding each character with a backslash (\). For example, to enter the password "pa$$word" on the command line, you must enter "pa\$\$word". You do not need to escape special characters when you enter the password in response to being prompted by the system.

```
[root@esxhost1 ~]# /opt/ontap/santools/config_hba --configure
          --access ss1:root:password --access ss2:root:password
Checking for installed HBAs.............................DONE
Verifying firewall ports are open.......................DONE
Determining IBM N series storage systems OS versions.....DONE
Setting HBA timeout setting for lpfc820.................DONE
Updating BOOT RAM disk..................................DONE
```

### Related concepts

*Some supported storage adapters might require manual configuration* on page 31

# Setting the path selection policy and preferred path using config_mpath

When you first install the Host Utilities, the `config_mpath` script automatically sets the path selection policy and determines your primary paths and selects a preferred path from the available

primary paths. You must run the script again if you modify your SAN topology after installing the Host Utilities. A reboot is not required.

### Before you begin

For ESX 4.0 and 4.1 with ALUA enabled on FC paths, the round robin (RR) policy is used. The round robin policy is also used for all iSCSI paths. The `config_mpath` script does not set a preferred path for these configurations.

For ESX 3.5 and all configurations with Microsoft guest OS clustering (MSCS or failover clusters), the FIXED policy must be used.

The ESX Host Utilities set a default policy for FC paths. For ESX 4.0 and 4.1 with ALUA enabled on FC paths, the round robin (RR) policy is used. For all other FC paths, the default is the FIXED policy. You do not need to run `config_mpath` for FC paths if these defaults are what you need.

### Step

1. Enter the following command at the ESX host command prompt:

   **`/opt/ontap/santools/config_mpath --primary --loadbalance [--policy mru] [--persistent] --access`** ***`controller_1`*****`:`**`login`**`:[`***`password`***`] --access`** ***`controller_2`*****`:`**`login`**`:[`***`password`***`]`**

   *`controller_1`* and *`controller_2`* are the host names of the storage system controllers.

   *`login`* and *`password`* are the user name and password needed to access the storage controller. If you do not specify the password on the command line, the script prompts you for the password.

   If the password contains non-alphanumeric (special) characters, you must escape the characters on the command line by preceding each character with a backslash (\). For example, to enter the password "pa$$word" on the command line, you must enter "pa\$\$word". You do not need to escape special characters when you enter the password in response to being prompted by the system.

   Specify the path selection `--policy` option as `fixed` for ESX hosts with Microsoft cluster (MSCS) guest operating systems. For all other configurations, do not specify the `--policy` option and accept the default value.

   The `--persistent` option is not needed on ESX 4.0 or 4.1 systems.

```
[root@esxhost1]#  /opt/ontap/santools/config_mpath --primary
    --loadbalance  --access ss1:root:password --access
ss2:root:password
Determining Primary/Proxy paths for LUN=naa.
60a9800043346536534a5041434d6e34
PATH=vmhba2:C0:T1:L0 is a PRIMARY path active
PATH=vmhba2:C0:T0:L0 is a PROXY path active
PATH=vmhba1:C0:T1:L0 is a PRIMARY path active
PATH=vmhba1:C0:T0:L0 is a PROXY path active
PSP Policy for ALUA LUN naa.60a9800043346536534a5041434d6e34 is now
set to VMW_PSP_RR.
```

```
ALUA automatically uses preferred paths.
The path policy has been set for your configuration.
```

#### Related tasks

*Manually setting the path selection policy for Microsoft cluster configurations* on page 39

## Setting NFS heartbeat values using config_nfs

When you first install the Host Utilities, the `config_nfs` script automatically sets the recommended NFS heartbeat values. You can run `config_nfs` again to verify or set the NFS Heartbeat values if your NFS configuration changes.

#### Steps

1. Enter the following command at the ESX host command prompt to display the current values:

   **`/opt/ontap/santools/config_nfs --query`**

2. Enter the following command at the ESX host command prompt to set the required values:

   **`/opt/ontap/santools/config_nfs --configure`**

```
[root@esxhost1 /]# /opt/ontap/santools/config_nfs --query
Net.TcpipHeapSize.............30
Net.TcpipHeapMax..............120
NFS.MaxVolumes................64
NFS.HeartbeatMaxFailures......10
NFS.HeartbeatFrequency........12
NFS.HeartbeatTimeout..........5

[root@esxhost1 /]# /opt/ontap/santools/config_nfs --configure
Setting Net.TcpipHeapSize.....................DONE
Setting Net.TcpipHeapMax......................DONE
Setting NFS.MaxVolumes........................DONE
Setting NFS.HeartbeatMaxFailures..............DONE
```

```
Setting NFS.HeartbeatFrequency.................DONE
Setting NFS.HeartbeatTimeout...................DONE
```

# How to manually set the optimized HBA timeout values

When you install the Host Utilities, the config_hba script automatically configures most Emulex and QLogic HBA timeout values to the recommended settings for use with the storage systems in your topology. However, you can also manually configure these settings.

For ESX 4.0 or 4.1 hosts with Emulex or QLogic FC HBAs and storage systems running Data ONTAP 7.2.4 or later software, you do not need to set HBA timeout values. The default values should be used.

Whenever you change your SAN topology you should run the config_hba and config_mpath scripts. You can also manually update timeout values, but the scripts are recommended. Topology changes that could affect HBAs include installing a new HBA, updating HBA firmware, updating Data ONTAP software, and updating ESX software.

### Next topics

*Manually setting the Emulex FC HBA timeout values* on page 49
*Manually setting the QLogic FC HBA timeout values* on page 51
*Manually setting the QLogic iSCSI HBA timeout values* on page 52

### Related concepts

*Some supported storage adapters might require manual configuration* on page 31

## Manually setting the Emulex FC HBA timeout values

If you are using an Emulex FC HBA with ESX 3.5, you can manually set the HBA timeout value to either 10 or 120 seconds, depending on your storage system configuration.

### Before you begin

For ESX 3.5 hosts, if all storage systems are running Data ONTAP 7.2.4 or later and single_image cfmode, the Emulex FC HBA timeouts must be set to 10 seconds.

For ESX 3.5 with any other storage configuration, the timeouts must be set to 120 seconds.

For ESX 4.0 or ESX 4.1 with Data ONTAP 7.2.4 or later, you do *NOT* need to change the default timeout values.

### Steps

1. Query the Emulex HBA settings by entering the following command on the ESX host console:

   **`/usr/sbin/esxcfg-module -g driver`**

*driver* is lpfc_740 for ESX 3.5.

The current settings are displayed. For ESX 3.5:

```
lpfc_740 enabled = 1 options = 'lpfc_nodev_tmo=120'
```

2. Enter the following command to set a new timeout value:

   **/usr/sbin/esxcfg-module -s "*parm_name*=*value*" *driver***

   *parm_name* is lpfc_nodev_tmo for driver lpfc_740.

   *value* is either 10 or 120.

   *driver* is lpfc_740 for ESX 3.5.

   **Example**

   ```
   /usr/sbin/esxcfg-module -s "lpfc_devloss_tmo=10" lpfc820
   ```

3. Enter the following command to update the boot configuration with the new timeout value:

   **/usr/sbin/esxcfg-boot -b**

4. Reboot the ESX host.

## Manually restoring Emulex HBA default timeouts

If you upgrade to ESX 4.0 or 4.1 and are running Data ONTAP 7.2.4 or later, you should restore the default HBA timeout values.

### About this task

You can automatically set the correct HBA timeout values by running the config_hba script instead.

### Steps

1. Enter the following command to restore the default HBA parameter values:

   **/usr/sbin/esxcfg-module -s "" *driver***

   *driver* is lpfc820 for ESX 4.0 or 4.1.

   **Example**

   ```
   /usr/sbin/esxcfg-module -s "" lpfc820
   ```

2. Query the Emulex HBA settings and verify that no options are listed:

   **/usr/sbin/esxcfg-module -g *driver***

   *driver* is lpfc820 for ESX 4.0 or 4.1.

   **Example**

   ```
   [root@esxhost1 ~]# /usr/sbin/esxcfg-module -g lpfc820
   lpfc820 enabled = 1 options = ''
   ```

3. Enter the following command to update the boot configuration with the new timeout values:

   **/usr/sbin/esxcfg-boot -b**

4. Reboot the ESX host.

## Manually setting the QLogic FC HBA timeout values

If you are using a QLogic FC HBA with ESX 3.5, you can manually set the HBA timeout value to either 10 or 120 seconds, depending on your storage system configuration.

### Before you begin

For ESX 3.5 hosts, if all storage systems are running Data ONTAP 7.2.4 or later and single_image cfmode, the QLogic FC HBA timeouts must be set to 10 seconds.

For ESX 3.5 with any other storage system configuration, the timeouts must be set to 120 seconds.

For ESX 4.0 or 4.1 with Data ONTAP 7.2.4 or later, you do *NOT* need to change the default timeout values.

**Note:** You enter the value "5" for 10 seconds, and the value "60" for 120 seconds.

### Steps

1. Query the QLogic HBA settings by entering the following command on the ESX host console:

   **/usr/sbin/esxcfg-module -g *driver***

   *driver* is qla2300_707_vmw for ESX 3.5.

   The current settings are displayed:

   ```
   qla2300_707_vmw enabled = 1 options = ''
   ```

2. Enter the following command to set a new timeout value:

   **/usr/sbin/esxcfg-module -s "qlport_down_retry=*value*" *driver***

   *value* is either 5 or 60.

   *driver* is qla2300_707_vmw for ESX 3.5 or qla2xxx for ESX 4.0.

   **Example**

   ```
   [root@esxhost1 ~]# /usr/sbin/esxcfg-module -s "qlport_down_retry=5"
   qla2300_707_vmw
   ```

3. Enter the following command to update the boot configuration with the new timeout value:

   **/usr/sbin/esxcfg-boot -b**

4. Reboot the ESX host.

### Manually restoring QLogic HBA default timeouts

If you upgrade to ESX 4.0 or 4.1 and are running Data ONTAP 7.2.4 or later, you should restore the default HBA timeout values.

#### About this task

You can automatically set the correct HBA timeout values by running the config_hba script instead.

#### Steps

1. Enter the following command to restore the default HBA parameter values:

   **/usr/sbin/esxcfg-module -s "" *driver***

   *driver* is qla2xxx for ESX 4.0 or ESX 4.1.

   **Example**

   ```
   /usr/sbin/esxcfg-module -s "" qla2xxx
   ```

2. Query the QLogic HBA settings and verify that no options are listed:

   **/usr/sbin/esxcfg-module -g *driver***

   *driver* is qla2xxx for ESX 4.0 or ESX 4.1.

   **Example**

   ```
   [root@esxhost1 ~]# /usr/sbin/esxcfg-module -g qla2xxx
   qla2xxx enabled = 1 options = ''
   ```

3. Enter the following command to update the boot configuration with the new timeout values:

   **/usr/sbin/esxcfg-boot -b**

4. Reboot the ESX host.

## Manually setting the QLogic iSCSI HBA timeout values

If you are using a QLogic iSCSI HBA, you can manually set the required parameters. The specific values used vary depending on whether the ESX host is iSCSI SAN booted.

#### Before you begin

For iSCSI SAN booted ESX hosts, the ql4xportdownretrycount (qla4022 driver), ka_timeout (qla4xxx driver), and KeepAliveTO timeout settings are 14. For other systems, both timeouts must be set to 60.

The IP_ARP_REDIRECT and KeepAliveTO values are set using the QLogic SANsurfer iSCSI Command Line Interface (iscli).

### Steps

1. Query the QLogic iSCSI HBA settings by entering the following command on the ESX host console:

   **/usr/sbin/esxcfg-module -q *driver***

   *driver* is qla4022 for ESX 3.5 or qla4xxx for ESX 4.0.

   The current settings are displayed.

2. Enter the following command to set a new timeout value:

   **/usr/sbin/esxcfg-module -s "*parm_name=value*" *driver***

   *parm_name* is ql4xportdownretrycount for the qla4022 driver or ka_timeout for the qla4xxx driver.

   *value* is either 14 (SAN boot) or 60 (non-SAN boot).

   *driver* is qla4022 for ESX 3.5 or qla4xxx for ESX 4.0.

   **Example**

   ```
   [root@esxhost1 ~]# /usr/sbin/esxcfg-module -s "ka_timeout=60" qla4xxx
   ```

3. Enter the following command to update the boot configuration with the new timeout value:

   **/usr/sbin/esxcfg-boot -b**

4. Reboot the ESX host.
5. If iscli is not already installed on the ESX host, download the QLogic SANsurfer iscli from the QLogic support web site. Search the page for "iscli" to locate the download.
6. Run `iscli`.
7. Select **Port Level Info & Operations Menu**.
8. Select **Edit Configured Port Settings Menu**.
9. Select **Select Port Firmware Settings Menu**.
10. Select **Configure Advanced Settings**.

    The current settings are displayed.

11. Set IP_ARP_Redirect = ON.
12. Select **Configure Device Settings**.
13. Set KeepAliveTO = 14 for iSCSI SAN booted systems and KeepAliveTO = 60 for other systems.
14. Exit iscli.

### Related information

*QLogic support web site - support.qlogic.com/support/os_detail.asp?productid=964&osid=26*

# Manually setting timeouts for iSCSI using 10 Gb NIC

You can manually set the required timeout parameters for the ESX 3.x iSCSI software initiator using 10 Gb NICs. These values are also set by the config_hba program.

### Steps

1. Make a backup copy of `/etc/vmkiscsi.conf`.
2. Edit `/etc/vmkiscsi.conf` and set the following values.
   - LoginTimeout = 190
   - AuthTimeout = 190
   - ConnFailTimeout = 190
   - DiskCommandTimeout = 190

# Displaying LUN information using sanlun

Run the `sanlun` command to display information about LUNs that are mapped to your host and about FC HBAs.

### Before you begin

The sanlun command is installed in the /opt/ontap/santools directory by the Host Utilities installation script.

### Steps

1. Enter the following command at the ESX host command prompt to display information about LUNs mapped to the host:

   **`sanlun lun show [-v]`**

   Use the verbose (`-v`) option to display additional information about the LUNs.

   Enter `man sanlun` to see other command options.

2. Enter the following command to display information about FC HBAs in the host:

   **`sanlun fcp show adapter [ -v ]`**

   For QLogic and Emulex FC cards, use the verbose (`-v`) option to display additional information about the card and firmware/driver versions. This information is not available from other supported adapters.

In the following example output, the columns have been truncated to fit the page.

```
[root@esxhost1 /]# sanlun lun show
controller  lun-pathname    device  adapter protocol size state...
 ss1:      /vol/esx2/esx2  /dev/sdf vmhba33 iSCSI    40g  GOOD...
 ss2:      /vol/esx2/esx2  /dev/sde vmhba33 iSCSI    40g  GOOD...
 ss1:      /vol/esx1/esx1  /dev/sda vmhba1  FCP      25g  GOOD...
 ss2:      /vol/esx1/esx1  /dev/sdb vmhba1  FCP      25g  GOOD...

[root@esxhost1 /]# sanlun fcp show adapter
vmhba0             WWPN:210000e08b88ca35
vmhba1             WWPN:210100e08ba8ca35
```

# How to identify and fix VMDK partition alignment issues

In some cases, VMDK partitions can become misaligned, leading to performance degradation.

For more information about partition alignment, see *Technical report: Storage Block Alignment with VMware Virtual Infrastructure and IBM System Storage N series - Correctly aligning LUNs and virtual disk files*.

**Note:** This issue may be serious enough to warrant action, but the performance degradation depends on your I/O load and configuration. In many cases, the decrease in performance will be negligible.

Also note that this problem is not unique to IBM N series storage platforms.

VMDK partitions need to be aligned at both the VMFS and guest OS levels. For example, you can align the partitions at the VMFS level by selecting the vmware LUN type when creating your LUNs. By doing so, the partitions are aligned to sector 128 or sector 0, depending on whether you use vCenter or vmkfstools to create the VMFS. Regardless, the partitions will be aligned as both are multiples of 4 KB, thereby fulfilling the WAFL read/write requirements.

However, because some operating systems implement sector offsets that are not aligned to 4 KB boundaries, the partitions might still not be aligned at the guest OS level. Therefore, you must manually align the .vmdk files at the guest OS level for VMFS and NFS datastores.

**Note:** If you use RDM and create the LUN with the correct guest OS for the LUN type, then you should not experience alignment issues with the RDM LUNs. The base VMDK might still have an alignment issue.

### Next topics

*Checking VMDK partition alignment with mbralign* on page 58
*Checking VMDK partition alignment with fdisk and diskpart* on page 59
*VMDK partition alignment with mbralign overview* on page 59
*Fixing VMDK partition alignment manually* on page 65

### Related information

*Storage Block Alignment with VMware Virtual Infrastructure and IBM System Storage N series - ftp://service.boulder.ibm.com/storage/isv/NS3593-0.pdf*

# Checking VMDK partition alignment with mbralign

You can use the mbralign tool included with ESX Host Utilities to check VMDK partition alignment.

### About this task

The mbralign tool is effective on -flat.vmdk and fixed .vhd files that are partitioned using a master boot record (MBR) partition table.

The mbralign tool now provides the function previously provided by the mbrscan tool.

If you do not want to shut down the VM, take either a Data ONTAP Snapshot copy of the volume containing the Datastore LUN or NFS Datastore, or take a VMware snapshot of the VM in question, and then run mbrscan against the copy.

### Steps

1. On the ESX host console, change to the directory where mbralign is installed. The default location is `/opt/ontap/santools`.
2. Enter the following command on the ESX host console:

   **`./mbralign { --scan all | `*`filename`*` }`**

   The `--scan all` option scans all -flat.vmdk files.

   *`filename`* specifies the name of a single file to scan.

   The command displays whether the VMDK partition is correctly aligned.

```
# /opt/ontap/santools/mbralign --scan all
Building file list...
/vmfs/volumes/4c604abb-e41943c0-a81f-001b7845166c/
win2k3sp2_64v_esx-09/
  win2k3sp2_64v_esx-09_1-flat.vmdk P1 lba:63 Aligned: No

/vmfs/volumes/4c604abb-e41943c0-a81f-001b7845166c/
win2k3sp2_64v_esx-09/
  win2k3sp2_64v_esx-09_2-flat.vmdk P1 lba:63 Aligned: No
```

# Checking VMDK partition alignment with fdisk and diskpart

You can use the fdisk tool for Linux guest operating systems and the diskpart.exe tool for Windows guest operating systems to check VMDK partition alignment.

### Step

1. Follow the instructions in the technical report *Best Practices for File System Alignment in Virtual Environments*.

   **Note:** This technical report contains information about NetApp products that IBM licenses and in some cases customizes. Technical reports might contain information about models and features that are not supported by IBM.

### Related information

*Best Practices for File System Alignment in Virtual Environments - media.netapp.com/documents/tr-3747.pdf*

# VMDK partition alignment with mbralign overview

The mbralign tool enables you to correct misaligned VMDK partitions.

The mbralign tool works on primary VMDK partitions with a master boot record (MBR) partition table. If there are multiple partitions, the partitions must be in order on the disk.

Starting with the mbralign tool in ESX Host Utilities 5.2.1, the 1-TB size limit on VMDKs has been removed. You can use mbralign with any VMDK size supported by VMware.

The mbralign tool has the following requirements:

- The destination datastore must have enough free space for a full copy of the `-flat.vmdk` file.
- GRUB-booted Linux guest operating systems need to have GRUB reinstalled after aligning the boot partition.
- The virtual machine using the VMDK must be shut down when running mbralign. If you use the feature to preserve Windows drive letter mapping, the mbralign program shuts down the VM after collecting drive letter information.
- For ESX clusters, you must run the mbralign program on the ESX host where the VM is currently registered. For NFS datastores, the mbralign program cannot detect if the VM is powered down if the VM is running on another ESX host.

The mbralign tool has the following limitations:

- Large NFS filesystems mounted on the ESX host can greatly increase the time required to run mbralign, because mbralign scans them for VMDKs. Temporally unmounting large filesystems that do not contain VMDKs needing alignment should improve performance.
- VMDKs containing Windows dynamic disks or GPT partitions are not supported. The Windows operating system must be installed on the C: drive.
- VMDKs containing Linux LVM are not supported.
- All VMware snapshots and linked clones must be removed from the VM using the disk being aligned.
- The alignment process consumes snap reserve. Snapshot copies can grow very large if taken during the alignment process.
- Media devices, such as CD-ROM or DVD drives used by the VM might not map to their Windows original drive letters after running the mbralign program. This can happen when there are multiple media drives or when the drive contains media.
- Do not use the `--force` option of the mbralign command on VMDKs for virtual machines running Windows 7, Windows Server 2008, or Windows Server 2008 R2. This can corrupt the boot LUN.
- Do not use mbralign with Solaris guest operating systems; it cannot correctly align them. Solaris ZFS file systems should not have alignment issues.

Starting with the mbralign tool in ESX Host Utilities 5.2.1, you can now preserve the original drive mapping of Windows disks. Earlier versions of mbralign could only ensure that the C:\ drive mapped to the correct partition.

- The Windows virtual machine must be running when you start mbralign so that mbralign can collect the drive letter mapping information. The mbralign program prompts lead you through the process of shutting down the VM after collecting drive letter information and then starting the actual alignment process.
- The Windows operating system folder must be on the C:\ drive. For example, C:\Windows.
- The VMware tools package must be installed on the VM. Be sure to use the version of VMware tools that matches the ESX version on which the VM is running. See your VMware documentation for instructions on installing the VMware tools in the guest operating system.
- For Windows Server 2000, you must install the Windows 2000 Resource Kit Tools for administrative tasks, which includes the diskpart program. Be sure to take the default installation location.
- For 64-bit Windows Server 2003 and Windows XP guests, install Windows hotfix KB 942589 on the VM.
- Note that this drive letter mapping process does not apply to Linux virtual machines.

The performance of VMFS datastores can be improved by increasing the default 8 KB block size to a larger value (16, 32, 64, 128, or 1024) using the `--bs` option of the `mbralign` command.

To see all of the command options, you can use `mbralign --help` command, or you can refer to the mbralign man page.

### Next topics

*Offloading VMDK data copying improves performance for NFS* on page 61
*Fixing VMDK partition alignment using mbralign* on page 61
*Reinstalling GRUB for Linux guests after running mbralign* on page 63

### Related information

*Windows 2000 Resource Kit Tools (KB 927229) - support.microsoft.com/kb/927229*
*Hotfix KB 942589 - support.microsoft.com/kb/942589*

## Offloading VMDK data copying improves performance for NFS

For NFS datastores, the mbralign program can offload data copying to the storage controller. The data copy from the old VMDK to the new, correctly aligned VMDK is much faster because it does not pass through the ESX host.

The copy offload feature of the mbralign program takes advantage of new functionality in the Data ONTAP software. The copy offload feature is available with storage controllers running Data ONTAP 7.3.5 and later or Data ONTAP 8.0.1 and later software.

You must supply storage controller credentials on the mbralign command line to use the copy offload feature. You can either supply the root credentials, or you can use role-based access control to create a custom user account. You use the `--access` option of the mbralign command to enter the storage controller credentials.

The copy offload feature works only for aligning VMDKs on NFS datastores. If a VM has VMDKs accessed by NFS and FC or iSCSI, do not use the copy offload feature.

### Related tasks

*Configuring role-based access control (RBAC)* on page 29

## Fixing VMDK partition alignment using mbralign

If a VMDK partition is misaligned, you can align the partition using the `mbralign` tool included in ESX Host Utilities.

### Before you begin

Expect `mbralign` to run for 1 to 2 minutes per gigabyte of storage in the affected files.

### Steps

1. Remove any VMware snapshots from the VM that is to be realigned.
2. Temporarily unmount large NFS filesystems that do not contain VMDKs needing alignment from the ESX host.
3. Shut down the VM.

4. For Linux VMs, and Windows VMs with only a C:\ drive, shut down the VM.

   For a Windows VM with multiple drive letters mapped, the VM must be running so that mbralign can collect the drive letter information.

5. On the ESX host console, change to the directory containing the .vmdk file for the VM.

6. Enter the following command:

   ***path*/mbralign *name*.vmdk**

   *path* is the path where the mbralign program is installed. The default path is `/opt/ontap/santools`.

   *name* is the name of the VMDK file being aligned.

7. If prompted, enter **yes** for a Windows VM to automatically collect and restore drive letters. Enter the Windows Administrator credentials for the VM.

   The VM is automatically shut down after the drive letter information is collected.

8. When prompted `Are you sure that no snapshots/linked clones exist for this vmdk?` Enter **y**.

   **Attention:** The use of mbralign on a VMDK file that has a snapshot or linked clone associated with it can result in unrecoverable data loss or data corruption.

9. For Windows guest operating systems for which you are not using the drive letter restore feature, restart the VM and verify that the guest operating system boots successfully.

10. For Linux guest operating systems using the GRUB boot loader, reinstall GRUB before restarting the VM.

11. After verifying the VM has booted and is operating correctly, delete the backup files created by `mbralign`.

    These files are saved in the same directory as the .vmdk file and have names ending in `-mbralign-backup`.

In the following example, some output has been deleted for clarity and the lines have been truncated to fit the page.

```
[root@esxhost1 VM2]# /opt/ontap/santools/mbralign VM2_1.vmdk
The vmdk file looks like it belongs to a Windows Virtual Machine: VM2.
Would you like to automatically align the vmdk and restore the
original drive letters?
If this is not a Windows Virtual Machine, or if this is a VM part of
a Microsoft Cluster,
select no (yes/no) yes
This VM also has the following vmdk files associated to it that also
need to be aligned.
 /vmfs/volumes/4bb1f98a-a2c428cc-f253-001e4f2f3dd3/VM2/VM2.vmdk
 /vmfs/volumes/4bb1f98a-a2c428cc-f253-001e4f2f3dd3/VM2/VM2_2.vmdk
Do you want to also align /vmfs/volumes/4bb1f98a-a2c428cc-
f253-001e4f2f3dd3/VM2/VM2.vmdk? (yes/no/all) yes
```

```
Do you want to also align /vmfs/volumes/4bb1f98a-a2c428cc-
f253-001e4f2f3dd3/VM2/VM2_2.vmdk? (yes/no/all) yes
Checking the power state of the VM.....................ON
Please provide Administrator credentials or [enter] to skip:
ESX Server Username: root
ESX Server Password:
VM Domain:
VM Username: Administrator
VM Password:
...
Alignment complete for VM2_1.vmdk
The next vmdk to align is: /vmfs/volumes/4bb1f98a-a2c428cc-
f253-001e4f2f3dd3/VM2/VM2_2.vmdk
...
Press enter when you are ready to power on the VM [enter]
Powering on the VM.....................................DONE
Establishing connection to VM..........................DONE
Collecting volume information..........................DONE
Setting drive letters..................................DONE
Removing temporary files...............................DONE
```

```
[root@esxhost1 V_M_2]# /opt/ontap/santools/mbralign V_M_2.vmdk
 Part  Type  old LBA  New Start LBA  New End LBA   Length in KB
   P1    83       63             64       208846         104391
   P2    8e   208845         208856     16771871        8281507

NOTICE:
This tool does not check for the existence of Virtual Machine
snapshots or linked clones.
The use of this tool on a vmdk file that has a snapshot or linked
clone associated with it
can result in unrecoverable data loss and/or data corruption.
Are you sure that no snapshots/linked clones exist for this vmdk? (y/
n)y

Creating a backup of V_M_2.vmdk
Creating a backup of ./V_M_2-flat.vmdk
Creating a copy the Master Boot Record
Working on partition P1 (2): Starting to migrate blocks from 32256 to
32768.
...
```

#### Related tasks

*Reinstalling GRUB for Linux guests after running mbralign* on page 63

## Reinstalling GRUB for Linux guests after running mbralign

After running `mbralign` on disks for Linux guest operating systems using the GRUB boot loader, you must reinstall GRUB to ensure the guest operating system boots correctly.

#### Before you begin

The `mbralign` program has completed on the on the .vmdk file for the virtual machine.

### About this task

This topic applies only to Linux guest operating systems using the GRUB boot loader.

### Steps

1. Mount the ISO image of Disk 1 of the installation CDs for the correct version of Linux for the virtual machine.
2. Check the box for **Connected** (if the VM is running) or **Connect at power on** (if the VM is not running).
3. Open the vSphere Client remote console for the VM.
4. If the VM is running and hung at the GRUB screen, click in the display area to make sure it is active, then press Ctrl-Alt-Insert to reboot the VM. If the VM is not running, start it, and then immediately click in the display area to make sure it is active.
5. As soon as you see the VMware BIOS splash hit escape once.

   The boot menu is displayed.
6. At the boot menu, select CD-ROM.
7. At the Linux boot screen, enter

   **`:linux rescue`**
8. Take the defaults for Anaconda (the blue/red configuration screens). Networking is optional.
9. Launch GRUB by entering:

   **`grub`**
10. If there is only one virtual disk in this VM, or if there are multiple disks, but the first is the boot disk, then run the following GRUB commands:

    **`root (hd0,0)`**

    **`setup (hd0)`**

    **`quit`**
    If you have multiple virtual disks in the VM, and the boot disk is not the first disk, or you are fixing GRUB by booting from the misaligned backup VMDK, enter the following command to identify the boot disk:

    **`find /boot/grub/stage1`**
    Run the following commands:

    **`root (`*`boot_disk`*`,0)`**

    **`setup (`*`boot_disk`*`)`**

    **`quit`**

    *`boot_disk`* is the disk identifier of the boot disk.

**11.** Press Ctrl-D to log out.

Linux rescue shuts down and then reboots.

### Related tasks

*Fixing VMDK partition alignment using mbralign* on page 61

## Fixing VMDK partition alignment manually

If a VMDK partition is misaligned, you can create a correctly-aligned partition manually using fdisk or diskpart.

### Steps

**1.** For Linux guest operating systems, use the `fdisk` command in Expert mode to move the beginning of the partition to a 4KB-divisible block.

See the technical report *Best Practices for File System Alignment in Virtual Environments* for more information.

**Note:** This technical report contains information about NetApp products that IBM licenses and in some cases customizes. Technical reports might contain information about models and features that are not supported by IBM.

**2.** For Windows guest operating systems, use `diskpart.exe` to offset the beginning of the NTFS partition to a 4KB-divisible block.

See the technical report *Best Practices for File System Alignment in Virtual Environments* and the Microsoft article *How to Align Exchange I/O with Storage Track Boundaries* for more information.

### Related information

*Best Practices for File System Alignment in Virtual Environments - media.netapp.com/documents/tr-3747.pdf*

*How to Align Exchange I/O with Storage Track Boundaries - technet.microsoft.com/en-us/library/aa995867.aspx*

*Storage Block Alignment with VMware Virtual Infrastructure and IBM System Storage N series - ftp://service.boulder.ibm.com/storage/isv/NS3593-0.pdf*

# Troubleshooting

The scripts and information included in the Host Utilities help you identify and resolve problems with your storage system, ESX host, and related components.

**Next topics**



## About the diagnostic scripts

The diagnostic scripts provided with earlier versions of ESX Host Utilities have been replaced by the nSANity Diagnostic and Configuration Data Collector program starting with ESX Host Utilities 5.2.

The following diagnostic programs are no longer included in ESX Host Utilities. The data that was collected by these programs is now collected by the nSANity Diagnostic and Configuration Data Collector program.

**Note:** Unlike the diagnostic scripts, the nSANity program does not run directly on the ESX host. It runs on a Windows or Linux system with network connectivity to the ESX host or other component from which you are collecting diagnostic data.

- `controller_info`
- `brocade_info`, `cisco_info`, `mcdata_info`, and `qlogic_info`
- esx_info

The following scripts are still included with ESX Host Utilities:

- `san_version`. The `san_version` program displays the version number of the Host Utilities programs installed on the host.
- `sanlun`. The `sanlun` program displays information about LUNs and FC adapters.

**Next topics**

## Installing the nSANity data collection program

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

### Before you begin

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 ESX host itself.

### About this task

You can install the product software 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 NAS support Web site.

### Steps

1. Check the publication matrix page for important alerts, news, interoperability details, and other information about the product before beginning the installation.
2. Obtain the product software by downloading the software as follows:
   a. Go to the IBM NAS support Web site.
   b. Sign in with your IBM ID and password.

      If you do not have an IBM ID or password, or if you are adding new N series machines and serial numbers to an existing registration, click the **Register** link, follow the online instructions, and then sign in.

   c. Select the N series software you want to download, and then select the **Download** view. Select the Windows zip or Linux tgz version of the nSANity program, depending on the workstation or server you want to run it on.
   d. Use the **Software Packages** link on the Web page presented and follow the online instructions to download the software.
3. Change to the directory to which you downloaded the zip or tgz file.
4. Extract all of the files and follow the instructions in the README.txt file. Also be sure to 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.

#### Related information

*IBM NAS support web site - /www.ibm.com/storage/support/nas*

## Collecting diagnostic data using nSANity

Run the nSANity Diagnostic and Configuration Data Collector program when instructed by technical support to collect diagnostic data about your host, storage system, and Fibre Channel switches.

#### Before you begin

Download and install the latest version of nSANity on a Windows or Linux host. Be sure you have the user IDs and passwords of the components for which you need to collect data. In general, you need Administrator or root credentials to collect diagnostic data.

#### Steps

1. Open the Windows or Linux command prompt and change to the directory where you installed the nSANity program.
2. Enter the following command to display the nSANity command options:

   ```
   nsanity --help
   ```

3. Enter the commands specified by your technical support representative.

#### After you finish

Send the file or files generated by the nSANity program to your technical support representative.

# Displaying the Host Utilities version number

If you are having a problem, technical support might ask you to run `san_version` to determine which version of the Host Utilities you are using.

#### Steps

1. Change to the directory where the Host Utilities scripts are installed.

   The default directory is `/opt/ontap/santools`.

2. Enter the following command at an ESX host prompt:

   ```
   ./san_version [-v]
   ```

   The `-v` displays the versions of individual Host Utilities components.

```
[root@esxhost1 santools]# ./san_version
VMware(R) ESX Host Utilities 5.2.1
```

# Solving VMware ESX server connectivity problems

In some cases, VMware ESX might not start when connecting to a storage system. This could be due to stale persistent bindings in the VMware ESX console OS.

#### Step

1. Rescan the SCSI bus to clear stale bindings.
   a. Open the VMware vSphere client and connect to your ESX host.
   b. On the **Configuration** tab, select **Hardware > Storage Adapters**
   c. Click **Rescan**.

# FC partner path misconfigured problems

If your FC partner path is misconfigured, the storage system displays an error message.

Proxy paths are intended for use when certain storage system resources are not available.

An active/active storage system configuration has both primary and proxy FC paths. Proxy paths have higher overhead and possibly lower performance. To prevent performance problems, make sure the FC paths are configured so that proxy paths are only used when there is a failure.

If your FC paths are not configured correctly, routine traffic can flow over a proxy path. The storage system measures FC traffic over primary and proxy paths. If it detects significant traffic on a proxy path, the storage system issues a log message and triggers an AutoSupport message.

The message is similar to the following:
Sun Apr 24 08:34:43 CDT [ss2: scsitarget.partnerPath.misconfigured:error]: FCP Partner Path Misconfigured

There are two typical causes of misconfigured paths:

- There is some kind of connectivity problem, such as zoning, cabling, or switch port problem, where the host cannot access any of the local paths.
- The host is not correctly configured, which usually indicates that the host multipathing software is selecting the wrong path.

## Fixing misconfigured FC partner paths

Verify your overall FC configuration, and then run the `config_mpath` script to ensure FC data uses the correct paths.

### Steps

1. Verify your FC configuration is supported and correctly cabled and zoned. See the *FC and iSCSI Configuration Guide* for your version of Data ONTAP software.
2. Run the `config_mpath` script to update the FC paths.

### Related tasks

*Setting the path selection policy and preferred path using config_mpath* on page 46

### Related information

*FC and iSCSI Configuration Guide - www.ibm.com/storage/support/nas/*

# Appendix

# A

## SecureAdmin and SSL overview

**Topics:**



SecureAdmin improves the security of your storage system by making it very difficult for someone to intercept a storage system administrator's password over the network because the password and all administrative communication are encrypted.

SecureAdmin also provides a secure communication channel between a host and the storage system by using the Secure Sockets Layer (SSL) protocol.

> **Note:** For added security, you must specify a user name and password using the `--access` option. Otherwise the default name of root with no password is used.

SSL improves security by encrypting the administrator's password and all administrative communication and by providing a digital certificate that authenticates storage systems and allows encrypted data to pass between the controller and the host. Installing a digital certificate on the storage system enables the SSL capabilities between controller and host.

For detailed information regarding using SecureAdmin and SSL with systems running Data ONTAP software, see the *Data ONTAP System Administration Guide* for your version of Data ONTAP.

# Installation of the Host Utilities using SSL

There are two methods you can use to enable SSL secure installation in the ESX Host Utilities.

- Enter

  **`yes`**
  when prompted during the installation of ESX Host Utilities.
- Add the `-s` option to the installation command.

```
[root@esxhost1 ibm_esx_host_utilities_5_2]# ./install -s
Secure installation enabled.
...
```

# Use of SSL with the Host Utilities scripts

Some of the Host Utilities scripts have a `--secure` option that specifies that a secure connection (SSL) should be used to communicate with the storage system.

The following scripts have a secure option:

- `config_hba`
- `config_mpath`

For more information on these scripts and their command syntax, use the `--help` command option or see the man page for the script.

### Related tasks

*Setting HBA timeouts using config_hba* on page 46
*Setting the path selection policy and preferred path using config_mpath* on page 46

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## Trademark information

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# Index

## H



## I



## L



## M



## N



## P

## Q



## R



## S



## T



## U



## V

## W

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