



Solaris

ONTAP SAN Host

NetApp
May 12, 2021

Table of Contents

Solaris 1

 Using Solaris 11.4 with NetApp ONTAP 1

Solaris

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Installing the Solaris Host Utilities

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

Steps

1. Download a copy of the compressed file containing the Host Utilities from the [NetApp Support Site](#) to a directory on your host.
2. Go to the directory containing the download.
3. Uncompress the file.

The following example uncompresses files for a SPARC system. For x86-64 platforms, use the x86/x64 package.

```
gunzip netapp_solaris_host_utilities_6_2N20170913_0304_sparc.tar.gz
```

4. Use the `tar xvf` command to untar the file.

```
tar xvf netapp_solaris_host_utilities_6_2N20170913_0304_sparc.tar
```

5. Add the packages that you extracted from the tar file to your host.

```
pkgadd -d NTAPSANTool.pkg
```

The packages are added to the `/opt/NTAP/SANToolkit/bin` directory.

To complete the installation, you must configure the host parameters for your environment (MPxIO in this case) using `host_config` command.

The `host_config` command has the following format:

```
/opt/NTAP/SANToolkit/bin/host_config <setup> <protocol fcp|iscsi|mixed>  
<multipath mpxio|dmp| non> [-noalua] [-mcc 60|90|120]
```

The `host_config` command does the following:

- Makes setting changes for the Fibre Channel and SCSI drivers for both X86 and SPARC systems
- Provides SCSI timeout settings for both the MPxIO configurations
- Sets the VID/PID information
- Enables or disables ALUA
- Configures the ALUA settings used by MPxIO and the SCSI drivers for both X86 and SPARC systems.
 1. Reboot the host.

SAN Toolkit

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

Example

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

```
#sanlun lun show

controller(7mode) /                               device
host                lun
vserver(Cmode)      lun-pathname                 filename
adapter protocol   size  mode
-----
-----
data_vserver        /vol/vol1/lun1
/dev/rdisk/c0t600A098038314362692451465A2F4F39d0s2  qlc1  FCP      60g  C
data_vserver        /vol/vol2/lun2
/dev/rdisk/c0t600A098038314362705D51465A626475d0s2  qlc1  FCP      20g  C
```

SAN Booting

Before you begin

If you decide to use SAN booting, it must be supported by your configuration. You can use the [NetApp Interoperability Matrix Tool](#) to verify that your OS, HBA, HBA firmware and the HBA boot BIOS, and ONTAP version are supported.

SAN booting is the process of setting up a SAN-attached disk (a LUN) as a boot device for a Solaris host.

You can set up a SAN boot LUN to work in a Solaris MPxIO environment using the FC protocol and running the Solaris Host Utilities. The method you use to set up a SAN boot LUN can vary depending on your volume manager and file system. See the [Solaris Host Utilities Installation and Setup Guide](#) for details on SAN Booting LUNs in an Solaris MPIIO environment.

Multipathing

Multipathing allows you to configure multiple network paths between the host and storage system. If one path fails, traffic continues on the remaining paths. Oracle Solaris I/O Multipathing (MPxIO) is enabled by default for Solaris 11.4. The default setting in `/kernel/drv/fp.conf` changes to `mpxio-disable="no"`

Non-ASA Configuration

For non-ASA configuration there should be two groups of paths with different priorities. The paths with the higher priorities are Active/Optimized, meaning they are serviced by the controller where the aggregate is located. The paths with the lower priorities are active but are non-optimized because they are served from a different controller. The non-optimized paths are only used when no optimized paths are available.

Example

The following example displays the correct output for an ONTAP LUN with two Active/Optimized paths and two Active/Non-Optimized paths:

The path priorities are displayed against the **Access State** section for each LUN in the OS native `mpathadm show lu <LUN>` command.

All SAN Array Configuration

In All SAN Array (ASA) configurations, all paths to a given Logical Unit (LUN) are active and optimized. This means I/O can be served through all paths at the same time, thereby enabling better performance.

Example

The following example displays the correct output for an ONTAP LUN:

The output for the `sanlun` command is the same for ASA and non-ASA configurations.

The path priorities are displayed against the **Access State** section for each LUN in the OS native `mpathadm show lu <LUN>` command.

```
#sanlun lun show -pv sparc-s7-16-49:/vol/solaris_vol_1_0/solaris_lun

          ONTAP Path: sparc-s7-16-
49:/vol/solaris_vol_1_0/solaris_lun
          LUN: 0
          LUN Size: 30g
          Host Device:
/dev/rdisk/c0t600A098038314362692451465A2F4F39d0s2
          Mode: C
          Multipath Provider: Sun Microsystems
          Multipath Policy: Native
```



All SAN Arrays (ASA) configurations are supported beginning in ONTAP 9.8 for Solaris Hosts.

Recommended Settings

Following are some parameter settings that are recommended for Solaris 11.4 SPARC and x86_64 with NetApp ONTAP LUNs. These parameter values are set by Host Utilities. For additional settings for Solaris 11.4 systems, see Oracle DOC ID: 2595926.1

Parameter	Value
throttle_max	8
not_ready_retries	300
busy_retries	30
reset_retries	30
throttle_min	2

Parameter	Value
timeout_retries	10
physical_block_size	4096

Recommended Settings for MetroCluster

By default, the Solaris operating system will fail I/Os after 20 seconds if all paths to a LUN are lost. This is controlled by the `fcg_offline_delay` parameter. The default value for `fcg_offline_delay` is appropriate for standard ONTAP clusters. However, in MetroCluster configurations the value of `fcg_offline_delay` must be increased to **120s** to ensure that I/O does not prematurely time out during operations including unplanned failovers. For additional information and recommended changes to default settings, please refer to NetApp [KB1001373](#).

Oracle Solaris Virtualization

- Solaris virtualization options include Solaris Logical Domains (also called LDOMs or Oracle VM Server for SPARC), Solaris Dynamic Domains, Solaris Zones, and Solaris Containers. These technologies have been rebranded generally as "Oracle Virtual Machines" despite the fact that they are based on very different architectures.
- In some cases, multiple options can be used together such as a Solaris Container within a particular Solaris Logical Domain.
- NetApp generally supports the use of these virtualization technologies where the overall configuration is supported by Oracle and any partition with direct access to LUNs is listed on the xref:[NetApp Interoperability Matrix](#) in a supported configuration. This includes root containers, LDOM IO domains, and LDOM's using NPIV to access LUNs.
- Partitions and/or virtual machines which use only virtualized storage resources, such as a vdisk, do not need specific qualification as they do not have direct access to NetApp LUNs. Only the partition/VM that has direct access to the underlying LUN, such as an LDOM IO domain, must be found in the xref:[NetApp Interoperability Matrix](#).

Recommended Settings for Virtualization

When LUNs are used as virtual disk devices within an LDOM, the source of the LUN is masked by virtualization and the LDOM will not properly detect the block sizes. To prevent this issue the LDOM operating system must be patched for Oracle Bug 15824910 and a `vdc.conf` file must be created that sets the block size of the virtual disk to 4096. See Oracle Doc 2157669.1 for more information.

To verify the patch do the following:

1. Create a zpool.
2. Run `zdb -C` against the zpool and verify that the value of **ashift** is 12.

If the value of **ashift** is not 12, verify that the correct patch was installed and recheck the contents of `vdc.conf`.

Do not proceed until **ashift** shows a value of 12.



Patches are available for Oracle bug 15824910 on various versions of Solaris. Contact Oracle if assistance is required in determining the best kernel patch.

Known Problems and Limitations

NetApp Bug ID	Title	Description	Oracle ID
1362435	HUK 6.2 and Solaris_11.4 FC driver binding changes	Solaris 11.4 and HUK recommendations. FC driver binding is changed from ssd(4D) to sd(4D). Move configuration that you have in ssd.conf to sd.conf. as detailed in Oracle (Doc ID 2595926.1). The behavior varies across Freshly installed Solaris 11.4 system and Upgraded from 11.3 or lower versions	(Doc ID 2595926.1)
1366780	Solaris LIF problem during GB with Emulex 32G HBA on x86 Arch	Seen with Emulex Firmware version 12.6.x and above on x86_64 Platform	SR 3-24746803021
1368957	"Solaris 11.x 'cfgadm -c configure' resulting in I/O error with End-to-End Emulex configuration"	Running "cfgadm -c configure" on Emulex End-to-End configurations results in I/O error. This is fixed in 9.5P17, 9.6P14 , 9.7P13 and 9.8P2	NA
1345622	Abnormal Path reporting on Solaris Hosts with ASA/PPorts using OS native commands	Intermittent path reporting issues on Solaris 11.4 with ASA	NA

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