



Solaris

ONTAP SAN Host Utilities

NetApp
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Solaris

Configure Solaris 11.4 for FCP and iSCSI with ONTAP storage

The Solaris Host Utilities software provides management and diagnostic tools for Solaris hosts that are connected to ONTAP storage. When you install the Solaris Host Utilities on a Solaris 11.4 host, you can use the Host Utilities to help you manage FCP and iSCSI protocol operations with ONTAP LUNs.

Step 1: Optionally, enable SAN booting

You can configure your host to use SAN booting to simplify deployment and improve scalability. If your configuration doesn't support SAN booting, you can use a local boot.

SAN boot

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 that is using the FC protocol and running Solaris Host Utilities. The method you use to set up a SAN boot LUN depends on your volume manager and file system.

Steps

1. Use the [Interoperability Matrix Tool](#) to verify that your Solaris OS, protocol, and ONTAP version support SAN booting.
2. Follow the best practices for setting up a SAN boot in the Solaris vendor documentation.

Local boot

Perform a local boot by installing the Solaris OS on the local hard disk, for example, install on an SSD, SATA, or RAID.

Step 2: Install the Solaris Host Utilities

NetApp strongly recommends installing the Solaris Host Utilities to support ONTAP LUN management and assist technical support with gathering configuration data.



Installing the Solaris Host Utilities changes some of the timeout settings on your Solaris host.

[Install Solaris Host Utilities 8.0.](#)

Step 3: Confirm the multipath configuration for your host

You can use multipathing with Solaris 11.4 to manage ONTAP LUNs.

Multipathing enables you to configure multiple network paths between the host and storage systems. If one path fails, traffic continues on the remaining paths. Oracle Solaris I/O Multipathing (MPxIO) is enabled by default for Solaris 11.4 and SPARC systems.

Steps

1. If your host is configured for FC, verify that the default setting in `/kernel/drv/fp.conf` is set to `mpxio-disable="no"`.
2. The Solaris Host Utilities load the NetApp recommended parameter settings for SPARC and x86_64 processors.

Show parameter settings

Parameter	Value
throttle_max	8
not_ready_retries	300
busy_retries	30
reset_retries	30
throttle_min	2
timeout_retries	10
physical_block_size	4096
disksort	false
cache-nonvolatile	true

For additional information about Solaris 11.4 system settings, see Oracle Support DOC ID: 2595926.1.

3. If your storage configuration includes MetroCluster, Oracle Solaris virtualization, or SnapMirror active sync, change the default settings:

MetroCluster

By default, the Solaris OS fails to execute the I/O operations after **20s** if all paths to a LUN are lost. This is controlled by the `fcp_offline_delay` parameter. The default value for `fcp_offline_delay` is the appropriate for standard ONTAP clusters. However, in MetroCluster configurations, you must increase the value of `fcp_offline_delay` to **120s** to ensure that I/O doesn't prematurely time out during operations, including unplanned failovers.

For additional information and recommended changes to default settings for MetroCluster, see the Knowledge Base article [Solaris host support considerations in a MetroCluster configuration](#).

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 are also referred to as "Oracle Virtual Machines".
- You can use multiple options together, for example, a Solaris Container within a particular Solaris Logical Domain.
- NetApp supports the use of Solaris virtualization technologies where the overall configuration is supported by Oracle and any partition with direct access to LUNs is listed on the [IMT](#) in a supported configuration. This includes root containers, LDOM I/O domains, and LDOM using NPIV to access LUNs.
- Partitions or virtual machines that use only virtualized storage resources, such as a `vdisk`, don't need specific qualifications because they don't have direct access to ONTAP LUNs. You only need to verify that the partition or virtual machine that has direct access to the underlying LUN, such as an LDOM I/O domain, is listed on the [IMT](#).

Steps

When LUNs are used as virtual disk devices within an LDOM, the source of the LUN is masked by virtualization and the LDOM doesn't correctly detect the block sizes. To prevent this issue:

- a. Patch the LDOM OS for [Oracle Bug 15824910](#)
- b. Create a `vdc.conf` file that sets the block size of the virtual disk to 4096. See Oracle DOC: 2157669.1 for more information.
- c. Verify the patch installation to ensure that the recommended settings have been configured correctly:
 - i. Create a zpool:

```
zpool create zpool_name disk_list
```

- ii. Run `zdb -C` against the zpool and verify that the value of **ashift** is 12.

If the value of **ashift** isn't 12, re run `zdb -C11`, and verify that the correct patch was installed and recheck the contents of `vdc.conf`.

Don't proceed until **ashift** shows a value of 12.



Patches are available for Oracle bug 15824910 on several Solaris versions. Contact Oracle if you need assistance in determining the best kernel patch.

SnapMirror active sync

Beginning with ONTAP 9.9.1, SnapMirror active sync setting configurations are supported in the Solaris host. To verify that the Solaris client applications are non-disruptive when an unplanned site failover switchover occurs in a SnapMirror active sync environment, you must configure the `scsi-vhci-failover-override` setting on the Solaris host. This setting overrides the failover module `f_tpgs` to prevent the execution of the code path that detects the contradiction.

Steps

- Create the configuration file `/etc/driver/drv/scsi_vhci.conf` with an entry similar to the following example for the NetApp storage type connected to the host:

```
scsi-vhci-failover-override =
"NETAPP LUN", "f_tpgs"
```

- Verify that the override parameter has been successfully applied:

```
devprop
```

```
mdb
```

Show examples

```
root@host-A:~# devprop -v -n /scsi_vhci scsi-vhci-failover-
override      scsi-vhci-failover-override=NETAPP LUN + f_tpgs
root@host-A:~# echo "*scsi_vhci_dip::print -x struct dev_info
devi_child | ::list struct dev_info devi_sibling| ::print
struct dev_info devi_mdi_client| ::print mdi_client_t
ct_vprivate| ::print struct scsi_vhci_lun svl_lun_wwn
svl_fops_name" | mdb -k
```

```
svl_lun_wwn = 0xa002a1c8960 "600a098038313477543f524539787938"
svl_fops_name = 0xa00298d69e0 "conf f_tpgs"
```



After `scsi-vhci-failover-override` has been applied, `conf` is added to `svl_fops_name`. For additional information and recommended changes to default settings, refer to the NetApp Knowledge Base article [Solaris Host support recommended settings in SnapMirror active sync configuration](#).

- Verify that 4KB aligned I/O with zpools using ONTAP LUNs is supported:

a. Verify that your Solaris host is installed with the latest Support Repository Update (SRU):

```
pkg info entire`
```

b. Verify that the ONTAP LUN has `ostype` as "Solaris", independent of the LUN size:

```
lun show -vserver` <vsersver_name>
```

Show example

```
chat-a800-31-33-35-37::*> lun show -vserver solaris_fcp -path
/vol/sol_195_zpool_vol_9/lun -fields ostype
vserver      path          ostype
-----
solaris_fcp  /vol/sol_195_zpool_vol_9/lun  solaris
```

5. Verify the output for your ONTAP LUNs:

```
sanlun lun show
```

You should see an output similar to the following example for an ASA, AFF, or FAS configuration:

Show example

```
root@sparc-s7-55-148:~# sanlun lun show -pv

        ONTAP Path: Solaris_148_siteA:/vol/Triage/lun
        LUN: 0
        LUN Size: 20g
        Host Device:
/dev/rdsk/c0t600A098038314B32685D573064776172d0s2
        Mode: C
        Multipath Provider: Sun Microsystems
        Multipath Policy: Native
```

6. Verify the path status for your ONTAP LUNs:

```
mpathadm show lu <LUN>`
```

The following example outputs show the correct path status for ONTAP LUNs in an ASA, AFF, or FAS configuration. The path priorities are displayed against "Access State" for each LUN in the output.

ASA configurations

An ASA configuration optimizes all paths to a given LUN, keeping them active. This improves performance by serving I/O operations through all paths at the same time.

Show example

```
root@sparc-s7-55-82:~# mpathadm show lu
/dev/rdsk/c0t600A098038313953495D58674777794Bd0s2
Logical Unit: /dev/rdsk/c0t600A098038313953495D58674777794Bd0s2
    mpath-support: libmpscsi_vhci.so
    Vendor: NETAPP
    Product: LUN C-Mode
    Revision: 9171
    Name Type: unknown type
    Name: 600a098038313953495d58674777794b
    Asymmetric: yes
    Current Load Balance: round-robin
    Logical Unit Group ID: NA
    Auto Fallback: on
    Auto Probing: NA

    Paths:
        Initiator Port Name: 100000109bd30070
        Target Port Name: 20b9d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd30070
        Target Port Name: 20b8d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd3006f
        Target Port Name: 20b3d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd3006f
        Target Port Name: 20b4d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no
```

```
Target Port Groups:
  ID: 1003
  Explicit Failover: no
  Access State: active optimized
  Target Ports:
    Name: 20b9d039ea593393
    Relative ID: 8

    Name: 20b4d039ea593393
    Relative ID: 3

  ID: 1002
  Explicit Failover: no
  Access State: active optimized
  Target Ports:
    Name: 20b8d039ea593393
    Relative ID: 7

    Name: 20b3d039ea593393
    Relative ID: 2
```

AFF or FAS configuration

An AFF or FAS configuration should have two groups of paths with higher and lower priorities. Higher priority Active/Optimized paths are served by the controller where the aggregate is located. Lower priority paths are active but non-optimized because they are served by a different controller. Non-optimized paths are only used when optimized paths aren't available.

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

Show example

```
root@chatsol-54-195:~# mpathadm show lu
/dev/rdsk/c0t600A0980383044376C3F4E694E506E44d0s2
Logical Unit: /dev/rdsk/c0t600A0980383044376C3F4E694E506E44d0s2
    mpath-support: libmpscsi_vhci.so
    Vendor: NETAPP
    Product: LUN C-Mode
    Revision: 9171
    Name Type: unknown type
    Name: 600a0980383044376c3f4e694e506e44
    Asymmetric: yes
    Current Load Balance: round-robin
    Logical Unit Group ID: NA
    Auto Fallback: on
    Auto Probing: NA

    Paths:

        Initiator Port Name: 100000109b56c5fb
        Target Port Name: 205200a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109b56c5fb
        Target Port Name: 205000a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Demoted: yes
        Disabled: no

        Initiator Port Name: 100000109b56c5fa
        Target Port Name: 204f00a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Demoted: yes
        Disabled: no

        Initiator Port Name: 100000109b56c5fa
        Target Port Name: 205100a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
```

```

Path State:  OK
Disabled:  no

Target Port Groups:
  ID:  1001
  Explicit Failover:  no
  Access State:  active not optimized
  Target Ports:
    Name:  205200a098ba7afe
    Relative ID:  8

    Name:  205100a098ba7afe
    Relative ID:  7

  ID:  1000
  Explicit Failover:  no
  Access State:  active optimized
  Target Ports:
    Name:  205000a098ba7afe
    Relative ID:  6

    Name:  204f00a098ba7afe
    Relative ID:  5

```

Step 4: Review the known issues

The Solaris 11.4 release for FCP and iSCSI with ONTAP storage has the following known issues:

NetApp Bug ID	Title	Description	Oracle ID
1362435	HUK 6.2 and Solaris_11.4 FC driver binding changes	Refer to Solaris 11.4 and HUK recommendations. FC driver binding is changed from <code>ssd</code> (4D) to <code>sd</code> (4D). Move the existing configuration from <code>ssd.conf</code> to <code>sd.conf</code> as mentioned in Oracle DOC: 2595926.1). The behavior varies across newly installed Solaris 11.4 systems and systems upgraded from Solaris 11.3 or earlier versions.	(Doc ID 2595926.1)

NetApp Bug ID	Title	Description	Oracle ID
1366780	Solaris LIF issue noticed during storage failover (SFO) giveback operation with Emulex 32G host bus adapter (HBA) on x86 Arch	Solaris LIF issue noticed with Emulex firmware version 12.6.x and later on the 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 <code>cfgadm -c configure</code> on Emulex end-to-end configuration results in an I/O error. This is fixed in ONTAP 9.5P17, 9.6P14, 9.7P13, and 9.8P2	Not Applicable
1345622	Abnormal path reporting on Solaris hosts with ASA/PPorts using OS native commands	Intermittent path reporting issues are noticed on Solaris 11.4 with All SAN Array (ASA).	Not Applicable

What's next?

[Learn about using the Solaris Host Utilities tool.](#)

Configure Solaris 11.3 for FCP and iSCSI with ONTAP storage

The Solaris Host Utilities software provides management and diagnostic tools for Solaris hosts that are connected to ONTAP storage. When you install the Solaris Host Utilities on a Solaris 11.3 host, you can use the Host Utilities to help you manage FCP and iSCSI protocol operations with ONTAP LUNs.

Step 1: Optionally, enable SAN booting

You can configure your host to use SAN booting to simplify deployment and improve scalability. If your configuration doesn't support SAN booting, you can use a local boot.

SAN boot

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 that is using the FC protocol and running Solaris Host Utilities. The method you use to set up a SAN boot LUN depends on your volume manager and file system.

Steps

1. Use the [Interoperability Matrix Tool](#) to verify that your Solaris OS, protocol, and ONTAP version support SAN booting.
2. Follow the best practices for setting up a SAN boot in the Solaris vendor documentation.

Local boot

Perform a local boot by installing the Solaris OS on the local hard disk, for example, install on an SSD, SATA, or RAID.

Step 2: Install the Solaris Host Utilities

NetApp strongly recommends installing the Solaris Host Utilities to support ONTAP LUN management and assist technical support with gathering configuration data.



Installing the Solaris Host Utilities changes some of the timeout settings on your Solaris host.

[Install Solaris Host Utilities 6.2](#).

Step 3: Confirm the multipath configuration for your host

You can use multipathing with Solaris 11.3 to manage ONTAP LUNs.

Multipathing enables you to configure multiple network paths between the host and storage systems. If one path fails, traffic continues on the remaining paths.

Steps

1. The Solaris Host Utilities load the NetApp recommended parameter settings for SPARC and x86_64 processors.

Show parameter settings

Parameter	Value
throttle_max	8
not_ready_retries	300
busy_retries	30
reset_retries	30
throttle_min	2
timeout_retries	10
physical_block_size	4096
disksort	false
cache-nonvolatile	true

2. If your storage configuration includes MetroCluster, Oracle Solaris virtualization, or SnapMirror active sync, change the default settings:

MetroCluster

By default, the Solaris OS fails to execute the I/O operations after **20s** if all paths to a LUN are lost. This is controlled by the `fcp_offline_delay` parameter. The default value for `fcp_offline_delay` is the appropriate for standard ONTAP clusters. However, in MetroCluster configurations, you must increase the value of `fcp_offline_delay` to **120s** to ensure that I/O doesn't prematurely time out during operations, including unplanned failovers.

For additional information and recommended changes to default settings for MetroCluster, see the Knowledge Base article [Solaris host support considerations in a MetroCluster configuration](#).

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 are also referred to as "Oracle Virtual Machines".
- You can use multiple options together, for example, a Solaris Container within a particular Solaris Logical Domain.
- NetApp supports the use of Solaris virtualization technologies where the overall configuration is supported by Oracle and any partition with direct access to LUNs is listed on the [IMT](#) in a supported configuration. This includes root containers, LDOM I/O domains, and LDOM using NPIV to access LUNs.
- Partitions or virtual machines that use only virtualized storage resources, such as a `vdisk`, don't need specific qualifications because they don't have direct access to ONTAP LUNs. You only need to verify that the partition or virtual machine that has direct access to the underlying LUN, such as an LDOM I/O domain, is listed on the [IMT](#).

Steps

When LUNs are used as virtual disk devices within an LDOM, the source of the LUN is masked by virtualization and the LDOM doesn't correctly detect the block sizes. To prevent this issue:

- a. Patch the LDOM OS for [Oracle Bug 15824910](#)
- b. Create a `vdc.conf` file that sets the block size of the virtual disk to 4096. See Oracle DOC: 2157669.1 for more information.
- c. Verify the patch installation to ensure that the recommended settings have been configured correctly:
 - i. Create a zpool:

```
zpool create zpool_name disk_list
```

- ii. Run `zdb -C` against the zpool and verify that the value of **ashift** is 12.

If the value of **ashift** isn't 12, re run `zdb -C11`, and verify that the correct patch was installed and recheck the contents of `vdc.conf`.

Don't proceed until **ashift** shows a value of 12.



Patches are available for Oracle bug 15824910 on several Solaris versions. Contact Oracle if you need assistance in determining the best kernel patch.

SnapMirror active sync

Beginning with ONTAP 9.9.1, SnapMirror active sync setting configurations are supported in the Solaris host. To verify that the Solaris client applications are non-disruptive when an unplanned site failover switchover occurs in a SnapMirror active sync environment, you must configure the `scsi-vhci-failover-override` setting on the Solaris host. This setting overrides the failover module `f_tpgs` to prevent the execution of the code path that detects the contradiction.

Steps

- Create the configuration file `/etc/driver/drv/scsi_vhci.conf` with an entry similar to the following example for the NetApp storage type connected to the host:

```
scsi-vhci-failover-override =
"NETAPP LUN", "f_tpgs"
```

- Verify that the override parameter has been successfully applied:

```
devprop
```

```
mdb
```

Show examples

```
root@host-A:~# devprop -v -n /scsi_vhci scsi-vhci-failover-
override      scsi-vhci-failover-override=NETAPP LUN + f_tpgs
root@host-A:~# echo "*scsi_vhci_dip::print -x struct dev_info
devi_child | ::list struct dev_info devi_sibling| ::print
struct dev_info devi_mdi_client| ::print mdi_client_t
ct_vprivate| ::print struct scsi_vhci_lun svl_lun_wwn
svl_fops_name" | mdb -k
```

```
svl_lun_wwn = 0xa002a1c8960 "600a098038313477543f524539787938"
svl_fops_name = 0xa00298d69e0 "conf f_tpgs"
```



After `scsi-vhci-failover-override` has been applied, `conf` is added to `svl_fops_name`. For additional information and recommended changes to default settings, refer to the NetApp Knowledge Base article [Solaris Host support recommended settings in SnapMirror active sync configuration](#).

- Verify that 4KB aligned I/O with zpools using ONTAP LUNs is supported:

a. Verify that your Solaris host is installed with the latest Support Repository Update (SRU):

```
pkg info entire`
```

b. Verify that the ONTAP LUN has `ostype` as "Solaris", independent of the LUN size:

```
lun show -vserver` <vsersver_name>
```

Show example

```
chat-a800-31-33-35-37::*> lun show -vserver solaris_fcp -path
/vol/sol_195_zpool_vol_9/lun -fields ostype
vserver      path          ostype
-----
solaris_fcp  /vol/sol_195_zpool_vol_9/lun  solaris
```

4. Verify the output for your ONTAP LUNs:

```
sanlun lun show
```

You should see an output similar to the following example for an ASA, AFF, or FAS configuration:

Show example

```
root@sparc-s7-55-148:~# sanlun lun show -pv

        ONTAP Path: Solaris_148_siteA:/vol/Triage/lun
        LUN: 0
        LUN Size: 20g
        Host Device:
/dev/rdsk/c0t600A098038314B32685D573064776172d0s2
        Mode: C
        Multipath Provider: Sun Microsystems
        Multipath Policy: Native
```

5. Verify the path status for your ONTAP LUNs:

```
mpathadm show lu <LUN>`
```

The following example outputs show the correct path status for ONTAP LUNs in an ASA, AFF, or FAS configuration. The path priorities are displayed against "Access State" for each LUN in the output.

ASA configurations

An ASA configuration optimizes all paths to a given LUN, keeping them active. This improves performance by serving I/O operations through all paths at the same time.

Show example

```
root@sparc-s7-55-82:~# mpathadm show lu
/dev/rdsk/c0t600A098038313953495D58674777794Bd0s2
Logical Unit: /dev/rdsk/c0t600A098038313953495D58674777794Bd0s2
    mpath-support: libmpscsi_vhci.so
    Vendor: NETAPP
    Product: LUN C-Mode
    Revision: 9171
    Name Type: unknown type
    Name: 600a098038313953495d58674777794b
    Asymmetric: yes
    Current Load Balance: round-robin
    Logical Unit Group ID: NA
    Auto Fallback: on
    Auto Probing: NA

    Paths:
        Initiator Port Name: 100000109bd30070
        Target Port Name: 20b9d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd30070
        Target Port Name: 20b8d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd3006f
        Target Port Name: 20b3d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109bd3006f
        Target Port Name: 20b4d039ea593393
        Logical Unit Number: 0
        Override Path: NA
        Path State: OK
        Disabled: no
```

```
Target Port Groups:
  ID: 1003
  Explicit Failover: no
  Access State: active optimized
  Target Ports:
    Name: 20b9d039ea593393
    Relative ID: 8

    Name: 20b4d039ea593393
    Relative ID: 3

  ID: 1002
  Explicit Failover: no
  Access State: active optimized
  Target Ports:
    Name: 20b8d039ea593393
    Relative ID: 7

    Name: 20b3d039ea593393
    Relative ID: 2
```

AFF or FAS configuration

An AFF or FAS configuration should have two groups of paths with higher and lower priorities. Higher priority Active/Optimized paths are served by the controller where the aggregate is located. Lower priority paths are active but non-optimized because they are served by a different controller. Non-optimized paths are only used when optimized paths aren't available.

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

Show example

```
root@chatsol-54-195:~# mpathadm show lu
/dev/rdsk/c0t600A0980383044376C3F4E694E506E44d0s2
Logical Unit: /dev/rdsk/c0t600A0980383044376C3F4E694E506E44d0s2
    mpath-support: libmpscsi_vhci.so
    Vendor: NETAPP
    Product: LUN C-Mode
    Revision: 9171
    Name Type: unknown type
    Name: 600a0980383044376c3f4e694e506e44
    Asymmetric: yes
    Current Load Balance: round-robin
    Logical Unit Group ID: NA
    Auto Fallback: on
    Auto Probing: NA

    Paths:

        Initiator Port Name: 100000109b56c5fb
        Target Port Name: 205200a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Disabled: no

        Initiator Port Name: 100000109b56c5fb
        Target Port Name: 205000a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Demoted: yes
        Disabled: no

        Initiator Port Name: 100000109b56c5fa
        Target Port Name: 204f00a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
        Path State: OK
        Demoted: yes
        Disabled: no

        Initiator Port Name: 100000109b56c5fa
        Target Port Name: 205100a098ba7afe
        Logical Unit Number: 1
        Override Path: NA
```

```

Path State:  OK
Disabled:  no

Target Port Groups:
  ID:  1001
  Explicit Failover:  no
  Access State:  active not optimized
  Target Ports:
    Name:  205200a098ba7afe
    Relative ID:  8

    Name:  205100a098ba7afe
    Relative ID:  7

  ID:  1000
  Explicit Failover:  no
  Access State:  active optimized
  Target Ports:
    Name:  205000a098ba7afe
    Relative ID:  6

    Name:  204f00a098ba7afe
    Relative ID:  5

```

Step 4: Review the known issues

The Solaris 11.3 release for FCP and iSCSI with ONTAP storage has the following known issues:

NetApp Bug ID	Title	Description	Oracle ID
1366780	Solaris LIF problem during GB with Emulex 32G HBA on x86 Arch	Seen with Emulex Firmware version 12.6.x and later 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 <code>cfgadm -c configure</code> on Emulex end-to-end configurations results in I/O error. This is fixed in ONTAP 9.5P17, 9.6P14, 9.7P13 and 9.8P2	Not Applicable

What's next?

[Learn about using the Solaris Host Utilities tool.](#)

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