Deploying Solaris 11 with EqualLogic Arrays

Step-by-step guide to integrating an Oracle Solaris 11 server with a Dell EqualLogic PS Series Array

Dell Storage Engineering
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Acknowledgements

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Revisions

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<th>Date</th>
<th>Description</th>
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<tr>
<td>February 2014</td>
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Audience

The information in this guide is intended for technology professionals interested in using Dell EqualLogic storage in an Oracle Solaris environment.

Introduction

Storage plays a critical role in today’s business operations. With the ever-growing presence of new applications and data, storage demands continue to grow. EqualLogic provides support for both block storage, with PS Series Firmware, and Network Attached Storage (NAS) with FS Series Firmware, delivering high performance, high availability, scalability and on-demand provisioning in a unified storage environment.

Objective

This document describes how to configure a Solaris iSCSI Initator to discover volumes on an EqualLogic array. It also includes information about the limitations Solaris 11 has using Multipath I/O (MPIO) with EqualLogic arrays.

Table 1  Software and firmware used for this document

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Software Revision</th>
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<tbody>
<tr>
<td>Dell</td>
<td>PS-6110X</td>
<td>7.0.0</td>
</tr>
<tr>
<td>Oracle</td>
<td>SPARC T4-1 Server</td>
<td>Solaris 11.1</td>
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1 Pre-configuration recommendations and requirements

The following are the pre-configuration recommendations and requirements to integrate a Solaris 11.1 server with Dell EqualLogic PS Series arrays.

- Enable Flow Control on all Storage Area Network (SAN) interface cards.
- Enable Jumbo Frames on all SAN interface cards.
- The software package for the iSCSI Management Utilities (system/storage/iscsi/iscsi-initiator) must be installed on the Solaris host. Verify using the following command:
  ```bash
  # pkg list iscsi-initiator
  ```

Figure 1  The iscsi-initiator has been installed

- Separate the iSCSI SAN from the Local Area Network (LAN) by using a different network subnet and different switches. For this example, net0 is set up for the LAN and net1 and net2 are set up for the SAN. They are in separate subnets. Verify using the following command:
  ```bash
  # ipadm show-addr
  ```

Figure 2  net0 is the LAN, net1 and net2 are set up for the SAN

- Verify that each Network Interface Card (NIC) being used for SAN traffic can access the PS Series Group IP address. For this example, the host has two NICs and the Group IP address is 10.10.6.50.
  ```bash
  # ping -i net1 10.10.5.60
  # ping -i net2 10.10.5.60
  ```
Both host SAN NICs can access the array’s Group IP address.

- Verify that the host can also access the PS Series Management IP address (if the Management IP address has been implemented). In this example the Management IP address is 10.124.2.30.

```
# ping 10.124.2.30
```

The Management IP address can be successfully accessed by the host.
2 Integration of a Solaris 11 host and an EqualLogic array

This section gives step-by-step instructions on how to configure the iSCSI initiator, create an iSCSI LUN with a ZFS file system, monitor, and how to remove a discovered iSCSI target. A volume named solaris-vol1 was previously created on the EqualLogic array. For more information about configuring iSCSI on an Oracle Solaris host, see the Oracle Solaris Administration documentation on Devices and File Systems at http://docs.oracle.com/cd/E23824_01/html/821-1459/docinfo.html#scrolltoc.

2.1 Configuring the Solaris 11 iSCSI Initiator

1. Enable the iSCSI initiator service.
   
   ```sh
   # svcadm enable network/iscsi/initiator
   ```

2. Add the array's Group IP address (10.10.6.50) for discovery of volumes.
   
   ```sh
   # iscsiadm add discovery-address 10.10.6.50
   ```

3. Verify that the discovery address was created.
   
   ```sh
   # iscsiadm list discovery-address
   ```

   ![Terminal](image)
   Figure 5 The discovery address 10.10.6.50:3250 was successfully created

4. List potential target volumes for log in. Find iqn and Target Address of the volume, (solaris1-vol1), from the list.
   
   ```sh
   # iscsiadm list discovery-address -v
   ```

5. Configure the target volume to be statically discovered using the iqn and Target Address from the previous step.
   
   ```sh
   # iscsiadm add static-config iqn.2001-05.com.equallogic:0-8a0906-829a54409-128014747b852e94-solaris-vol1,10.10.6.50
   ```

6. Verify the static configuration information.
   
   ```sh
   # iscsiadm list static-config
   ```
7. Enable the static target discovery method. There are two other target discovery methods, sendtargets and iSNS. The iSCSI connection will not be initiated until one of the discovery methods is enabled.
   
   ```bash
   # iscsiadm modify discovery --static enable
   ```

8. Verify the static target discovery method was enabled.
   
   ```bash
   # iscsiadm list discovery
   ```

9. List the currently configured target volume.
   
   ```bash
   # iscsiadm list target -S
   ```

10. It might be necessary to reconfigure the /dev namespace to recognize the iSCSI disk if the previous command does not show the configured target volume.
    
    ```bash
    # devfsadm -i iscsi
    ```
2.2 Accessing iSCSI disks from a Solaris host using ZFS

1. View iSCSI disks on the Solaris host by using the format utility. In the output below, disk2 is the iSCSI LUN.
   
   ```
   # format
   ```
   
   ![Figure 8](image)
   The target volume, solaris-vol1, has been configured and has one connection

2. Create a ZFS storage pool and ZFS file system on the iSCSI LUN. The pool-name is vols and the fs-name is solaris-vol1. The ZFS file system will be automatically mounted when created and will be mounted at boot time.
   
   ```
   # zpool create vols c0t64ED2A35B7A0B05C092A35A0A41A0260d0
   # zfs create vols/solaris-vol1
   ```
   
   ![Figure 9](image)
   List of available disks - disk number 1 was used

3. Verify the file system was created and mounted.
   
   ```
   # df -h
   ```
   
   ![Figure 9](image)
2.3 Information about Multipath I/O

Solaris 11 Multiplexed I/O (MPxIO) gives you the ability to set up multiple redundant paths to a storage system and gives you the benefits of load balancing and failover. Unfortunately, MPxIO is not supported with EqualLogic arrays because EqualLogic arrays do not support bonding/trunking. In order to have true Multipathing on EqualLogic arrays, the Solaris iSCSI initiator would have to support the creation of unique iSCSI sessions from each NIC. Some redundancy can be achieved by combining MPxIO and IP network multipathing (IPMP), but this configuration would not be true MPIO.

2.4 Monitoring the iSCSI configuration

1. Display information about the iSCSI initiator.
   
   ```sh
   # iscsiadm list initiator-node
   ```
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Figure 11  Information about the initiator-node (host)

2. Display information about the Static Configuration Target.
   
   ```
   # iscsiadm list static-config
   ```

Figure 12  This displays the iqn, volume name and group IP address of the array

3. Display enabled discovery methods.
   
   ```
   # iscsiadm list discovery
   ```

Figure 13  The Static target discovery method has been enabled
4. Display information about a specific iSCSI target.
   
   ```bash
   # iscsiadm list target-param -v iqn.2001-05.com.equallogic:0-8a0906-829e54409-128014747b852e94-solaris-voll
   ```

   ![Terminal output showing target parameters](image)

   **Figure 14** List of default and configurable target parameters and configured sessions

5. Display the parameters that were negotiated between the target and the initiator.
   
   ```bash
   # iscsiadm list target -v iqn.2001-05.com.equallogic:0-8a0906-829e54409-128014747b852e94-solaris-voll
   ```
Figure 15  Verbose list of target parameters
2.5 Removing a static iSCSI target

1. Display the ZFS file system to be removed.
   
   ```
   # df -h
   ```

   ![Terminal]
   
   Figure 16 Listing of the mounted file systems

2. Unmount the file system.
   
   ```
   # umount /vols/solaris-voll
   ```

3. Verify that the file system (solaris-voll) has been unmounted.
   
   ```
   # df -h
   ```
Figure 17  The /vols/solaris-vol1 file system has been unmounted

4. Delete the ZFS pool.
   
   # zpool destroy vols

5. Verify that the pool (vols) has been deleted.
   
   # df -h
6. Disable discovery mode.
   
   ```bash
   # iscsiadm modify discovery --static disable
   ```

7. Verify discovery mode has been disabled.
   
   ```bash
   # iscsiadm list discovery
   ```

8. Display information about the Static Configuration Target.
   
   ```bash
   # iscsiadm list static-config
   ```
Remove the Static Configuration Target.

```
# iscsiadm remove static config iqn.2001-05.com.equallogic:0-8a0906-829e54409-1280147b852e94-solaris-vol1,10.10.6.50:3260
```

10. Verify that Static Configuration Target has been removed.

```
# iscsiadm list static-config
```

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**Figure 20** This information is needed to remove the Static Configuration Target

**Figure 21** The Static Configuration Target has been removed