EQUALLOGIC

Dell EqualLogic Multipathing Extension Module

Installation and User Guide

Version 1.1

For vSphere Version 5.0

November 2011

Part Number: 110-6093-EN-R2

Table of Contents

1 Overview

VMware vSphere provides the Pluggable Storage Architecture (PSA), which enables you to configure multipathing for high availability and increased performance. The modular design of the architecture accepts third-party multipathing plugins that enable enhanced functionality specific to storage device models.

The EqualLogic Multipathing Extension Module (MEM) provides the following enhancements to the existing VMware multipathing functionality:

- Automatic connection management
- Automatic load balancing across multiple active paths
- Increased bandwidth
- Reduced network latency

EqualLogic MEM Architecture

The EqualLogic Multipathing Extension Module consists of:

- The EqualLogic kernel mode Path Selection Plugin (PSP) driver—A kernel mode plugin that is used by the VMware Native Multipathing Plugin (NMP) to select the best path for each I/O to EqualLogic storage devices.
- The EqualLogic Host Connection Manager (EHCM)— A user mode process that runs in a CIM provider and manages the iSCSI sessions to EqualLogic storage devices.

The PSP provides load balancing capabilities that enable you to maximize I/O throughput. The PSP uses its knowledge of the distributed nature of volumes on the PS Series group to route each I/O packet on the optimal path to the volume.

EHCM simplifies management by creating the appropriate number of sessions to an EqualLogic volume. The number of paths created by EHCM depends on the topology of your SAN and the MPIO settings on the VMware ESXi host. Every volume is distributed across one or more members in the PS Series group. The portion of a volume that is located on a single member is referred to as a volume slice. The default EHCM behavior is to create two sessions per volume slice, with a maximum of six sessions per volume. However, you can alter this behavior (see *EHCM Configuration File on page 15*).

When you use the EqualLogic MEM, EHCM distributes iSCSI sessions across all configured adapters and PS Series group Ethernet ports. EHCM does not establish entirely redundant paths (iSCSI sessions that have identical server and array endpoints). Therefore, in configurations that have limited numbers of VMware ESXi and array Ethernet ports, the actual number of sessions created may be less than you specify for the configuration. EHCM monitors the topology of the SAN. If you change the configuration by modifying the number of Ethernet interfaces, or by moving a PS Series volume, or if there is a network outage that affects some of the iSCSI sessions, EHCM automatically reconfigures the iSCSI sessions.

EqualLogic MEM Configuration Model

Figure 1 shows the logical path configuration used by the EqualLogic MEM.

Figure 1: EqualLogic MEM Logical Path Configuration

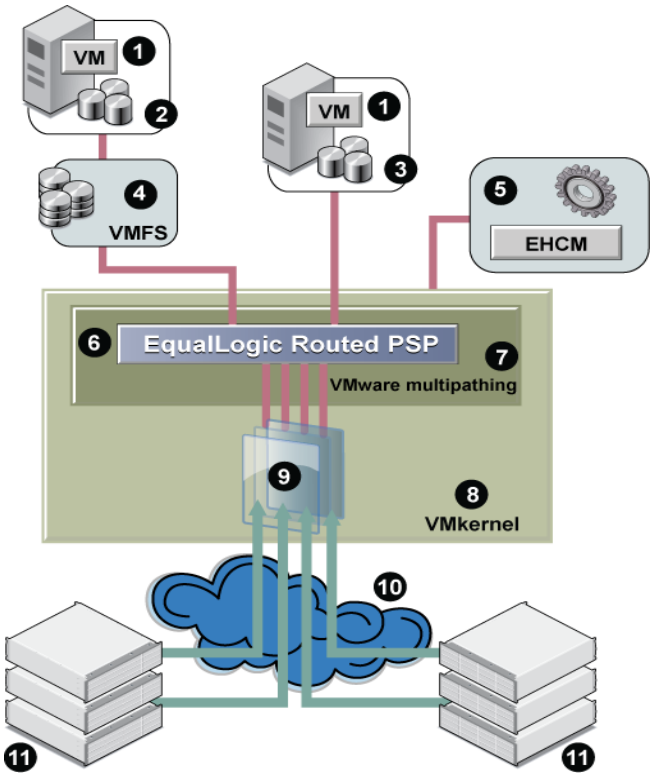

Table 1 describes the components shown in this figure.

Table 1: EqualLogic MEM Logical Path Configuration Details

Callout	Description
1	VMware virtual machines with guest operating system
2	Virtual machine disk format (VMDK)
3	Raw device mapping (RDM) disk
4	VMware file system (VMFS)
5	CIM provider, which hosts EqualLogic Host Connection Management
6	EqualLogic Routed PSP
7	VMware native multipathing, hosting the PSP driver
8	VMkernel, the ESX hypervisor, including network and storage stacks
9	Host Bus Adapter (HBA) or software initiator
10	Network
11	PS Series group members

Related Documentation

It is beyond the scope of this document to provide VMware conceptual information or detailed instructions on configuring VMware vSphere. See the following related documentation.

VMware Documentation

See the VMware documentation web site:

http://www.vmware.com/support/pubs/

Specifically, refer to the following documents:

- *Installing and Administering vSphere Update Manager*
- *vSphere Installation and Setup Guide*
- *iSCSI SAN Configuration Guide*

Dell EqualLogic Tech Report

For information about the benefits of the Dell Multipathing Extension Module, see the Dell EqualLogic technical report number 1074, entitled *Configuring and Installing the EqualLogic Multipathing Extension Module for VMware vSphere 5.0 and PS Series SANs*.

This report is available in the Tech Reports section under Resources on the Dell EqualLogic customer support site.

2 Installing the EqualLogic MEM

Installation topics for the EqualLogic Multipathing Extension Module include the following:

See the *Dell EqualLogic Multipathing Extension Module Release Notes* for installation requirements and information, including:

- Minimum software and firmware prerequisites
- Unsupported VMware environments
- Notes about using the EqualLogic plugin with HBAs

Obtaining the EqualLogic Multipathing Extension Module

The EqualLogic MEM is available from the Technical Support website, packaged as a zip file. The zip file has the following contents:

- `setup.pl`—A configuration script. To use this script, copy it to a vSphere CLI or vSphere Management Assistant (vMA) v.5.0.
- `dell-eql-mem-<version>.zip`—The offline VMware Infrastructure Bundle (VIB) to be installed on an ESX server. This bundle should not be unzipped, as the installation tools expect it in .zip format. This bundle can be installed through vCenter Update Manager or from a vMA with the ESX CLI command `esxcli software vib install`.

Software iSCSI Configuration Requirements

Before you can use the EqualLogic MEM, you must configure VMware ESX iSCSI networking on your server. You must ensure that you complete the configuration tasks identified in Table 2.

EqualLogic has provided a configuration tool to automate this process. See *Configuring Your Network for the MEM Plugin on page 7*.

Table 2: Software iSCSI Configuration Requirements

Task	Action	Description
1	Create a vSwitch	Create a vSwitch to use for iSCSI traffic. Assign physical NICs that will be used for iSCSI traffic to this vSwitch.
2	Enable jumbo frames	If you intend to use jumbo frames, you must enable them for each vSwitch and each VMkernel port (virtual network interface that is used by the VMkernel) interface. You must use the command line to create a VMkernel port with jumbo frames enabled. You can verify that jumbo frames are enabled on the vSwitch and VMkernel ports by using the commands `esxcfg-vswitch -l` and `esxcfg-vmknic -l`. Before enabling Jumbo Frames, check with your hardware vendors to ensure your physical network adapter and other network equipment support Jumbo Frames.
3	Decide on VMkernel ports	For MPIO, the iSCSI daemon uses the VMkernel ports. You can have ports on multiple vSwitches, but each port must be mapped to a single uplink.
4	Create VMkernel ports	Create VMkernel ports for the iSCSI daemon to use. You should create one VMkernel port per physical NIC that will be used for iSCSI multipathing. If you have multiple VMkernel ports sharing the same uplink, only one of them will be used by EHCM, and the excess VMkernel ports will be ignored.
5	Remove extra uplinks	You can use multiple NICs per vSwitch, but each VMkernel port must be mapped to a single uplink (physical NIC). You can verify this by using the command `esxcfg-vswitch -l`, and you can remove extra uplinks with the `esxcfg-vswitch -N` command.
6	Enable VMware iSCSI Initiator	Enable VMware iSCSI Initiator. You must add the PS Series group address to the iSCSI Initiator discovery list.
7	Bind the VMkernel ports	You must bind the VMkernel ports to the iSCSI daemon with the `esxcli iscsi networkportal add` command. It is necessary to rescan for storage devices after you bind VMkernel ports to the iSCSI daemon.

See the *Setting Up Software iSCSI Initiators* section in the *iSCSI SAN Configuration Guide*.The VMware vSphere ESX 5.0 documentation is available at this website: http://www.vmware.com/support/pubs

Note: See the PS Series documentation for group limits on total iSCSI sessions. It may be necessary to reduce the number of sessions created per volume in large configuration.

Using the Setup Script for Network Configuration

The Dell EqualLogic installation script `setup.pl` can be used for network configuration operations.

Prerequisites for setup.pl Script

The `setup.pl` script is designed to be run from the VMware Management Assistant (vMA) virtual appliance. It can also be run from a Linux or Windows host that has the vSphere CLI 5.0 installed. Older versions of the vSphere CLI are not supported.

Note: Dell recommends that you configure vi-fastpass on the vMA. Once vi-fastpass is configured, it is not necessary to specify the username and password when running the setup script, though it is still necessary to identify the ESX server. See the *vSphere Management Assistant Guide*, available from VMware, for more details on configuring vi-fastpass authentication.

Table 3 describes the `setup.pl` script parameters that are common to multiple operations.

Table 3: Commonly Used Parameters with the setup.pl Script

Parameter	Description
--server	ESX/ESXi host or vCenter server on which to run the command.
--username	Administrative user account on host. Not necessary if running on a VMA with vi-fastpass configured.
--password	Password for administrative account on host. Not necessary if running on a VMA with vi-fastpass configured. To install on an ESXi host, it must be configured with an administrative password.
--vihost	ESX/ESXi host. This parameter is required if `--server` refers to a vCenter server.
--viusername	Administrative user account for the vihost. Not necessary if running on a vMA with vi-fastpass configured.
--vipassword	Password for administrative account for the vihost. Not necessary if running on a vMA with vi-fastpass configured.
--chapuser	CHAP user name to be used for connecting volumes on the PS Series group IP.
--chapsecret	CHAP secret to be used for connecting volumes on the PS Series group IP.

Configuring Your Network for the MEM Plugin

Use the following syntax to configure your network for the EqualLogic MEM plugin:

```
setup.pl --configure --server="hostname" [--username="username"]
[--password=password] --nics=NIC1,NIC2,... --ips=IP1,IP2,...
```

```
[--vswitch=vswitchname] [--mtu=mtu] [--vmkernel=vmkernel_prefix ]
[--netmask=subnet_mask] [--enableswiscsi] [--nohwiscsi] [--groupid=PS group IP]
[--vds] [--logfile] [--heartbeat]
```

Table 4 describes the configuration parameters.

Table 4: Parameters for Configuration

Parameter	Description	Default
--nics	Comma separated list of vmnics to use for multipathing.	none
--ips	Comma separated list of IP addresses to assign to VMkernel ports used for multipathing.	none
--vswitch	Name of vSwitch to create. Will use existing vSwitch if one is found.	vSwitchISCSI
--mtu	MTU to use for VMkernel ports and vSwitch used for multipathing.	1500
--vmkernel	Prefix to use for VMkernel ports created for multipathing.	iSCSI
--netmask	Subnet mask used for VMkernel ports created for multipathing.	255.255.255.0
--enableswiscsi	Enable the VMware software iSCSI initiator if not already enabled.	not set
--nohwiscsi	Ignore any supported hardware adapters, and use only the VMware software iSCSI initiator. If the configuration script detects both software and hardware initiators, it will use the hardware initiator by default unless this flag is set.	not set
--groupip	Sets the specified IP address as a Send Targets discovery address for all iSCSI initiators that were used to bind vmknics.	none
--vds	Use a vNetwork Distributed Switch instead of a standard vSwitch.	not set
--logfile	Specify a file to use ro record a log of network configuration actions.	setup.log
--heartbeat	IP address to use for a highly available VMkernel port on the iSCSI subnet. This VMkernel port will be configured to use all physical NICs on the vSwitch, so it will remain online in the event of a single NIC failure.	none

Note: The `--configure` operation can be run in an interactive mode by specifying only the server name parameter. The script then interactively asks the user a series of questions to gather the necessary information for network configuration. For example:

```
setup.pl --configure --server=192.168.XXXX.XXX
```

Installation Considerations

- Installation of the EqualLogic MEM requires you to put the ESXi host in maintenance mode using VMware management tools.
- Configuration through the `setup.pl` script requires connecting directly to the ESXi host. For ESXi hosts this requires you to disable lockdown mode.
- Because installation requires putting the ESXi host in maintenance mode, it is not possible to perform the installation from a vCenter Server, vCenter Update Manager, or VMware Management Assistant that is running as a VM on the ESXi host. The VMs must first be migrated to another ESXi host so they can continue running during the installation.
- For a clean installation of MEM on ESXi, you do not need to reboot ESXi. However, if you upgrade or uninstall MEM, you must reboot the ESXi host for the changes to take effect.

Installing Or Upgrading the EqualLogic MEM On Your VMware ESXi Host

The EqualLogic MEM is packaged as a VMware Infrastructure Bundle (VIB). There are two methods for installing this VIB, as described in Table 5.

Table 5: Installation Methods

Method	Description	Refer To
VMware Update Manager (vUM)	Load the VIB using the Import Patch option.	*Installing the MEM Using vCenter Update Manager on page 10*
ESX CLI install command from vSphere	Use the `esxcli software vib install` command.	*Installing the MEM Plugin Using the ESX CLI on page 10*

Note: You are required to put the VMware ESXi host in maintenance mode when installing the EqualLogic MEM, unless performing an operation that requires a reboot, such as an upgrade install. vCenter Update Manager automatically puts the ESXi host in maintenance mode as part of the installation process.

For network configuration, see *Configuring Your Network for the MEM Plugin on page 7*. To modify the EHCM configuration, see *Chapter 3, Configuring the EqualLogic MEM*. For instructions on uninstallation, see *Removing the EqualLogic Plugin on page 11*.

Tasks Performed During the Installation Process

The installation of the EqualLogic MEM performs the following tasks:

- Registers the PSP.
- Configures EHCM to automatically start when VMware ESX is booted.
- Sets the EqualLogic PSP as the active PSP for all VMware `EQLOGIC iSCSI` disk devices.

- Sets the EqualLogic PSP as the default for any new VMware `EQLOGIC iSCSI` disk devices.

Installing the MEM Using vCenter Update Manager

Use the following steps to install the MEM using the vSphere Update Manager (vUM):

1. Install and configure vUM, according to VMware instructions.
2. Import the MEM offline bundle into the vUM package repository by selecting the "Import Patches" option and browsing to the `dell-eql-mem-<version>.zip`.
3. Create a baseline containing the MEM bundle. Be sure to choose a "Host Extension" type for the baseline.
4. Optionally add the new baseline to a baseline group.
5. Attach the baseline or baseline group to one or more hosts.
6. Scan and remediate to install the MEM on the desired hosts. Update Manager will put the hosts in maintenance mode and reboot if necessary as part of the installation process.

For complete instructions on using vSphere Update Manager, see the *Installing and Administering VMware vSphere Update Manager* documentation available from VMware.

Note: When importing the patch, be sure to import it as a third-party host extension.

Installing the MEM Plugin Using the ESX CLI

Use the following ESX CLI command syntax to install the EqualLogic MEM plugin:

```
esxcli --server="hostname"  software vib install -d bundle
```

The `-d` parameter specifies the path to the offline bundle file containing multipathing plugin (`dell-eql-mem-<version>.zip`).

Note: To install the offline bundle, you must first copy it to a location that is accessible from the ESXi host. The install command can then be run from any esxcli client, giving the full path to the bundle on the host.

For example, if you upload the bundle to a datastore named "datastore1," it can then be installed with the following command:

```
C:\>esxcli --server 192.168.XXX.XXX software vib install --depot /vmfs/
volumes/datastore1/dell-eql-mem-1.1.0.202245.zip

Enter username: root

Enter password:

Installation Result

   Message: Operation finished successfully.

   Reboot Required: false
```

```
   VIBs Installed: Dell_bootbank_dell-eql-host-connection-mgr_1.1.0-202245,Dell_
bootbank_dell-eql-hostprofile_1.0.9-202245, Dell_bootbank_dell-eql-routed-psp_
1.1.0-202245

   VIBs Removed:

   VIBs Skipped:
```

Notes: This bundle should not be unzipped, as the installation tools expect it in .zip format.

Make sure that the path to the bundle you specify is relative to the the ESXi host.

Removing the EqualLogic Plugin

Use the following ESX CLI command syntax to remove the EqualLogic plugin vibs:

```
esxcli --server="hostname" software vib remove -n [bundle]
```

For example:

```
# esxcli software vib list|grep dell
Name                              Version            Vendor  Acceptance Level  Install Date
--------------------------     ------------------  ------  ----------------  ------------
dell-eql-host-connection-mgr     1.0.9-191260         Dell    VMwareCertified   2011-09-21
dell-eql-hostprofile             1.0.9-191260         Dell    VMwareCertified   2011-09-21
dell-eql-routed-psp              1.0.9-191260         Dell    VMwareCertified   2011-09-21
```

To remove the MEM, you must specify all the vibs on the command line:

```
# esxcli software vib remove -n dell-eql-host-connection-mgr
-n dell-eql-hostprofile -n dell-eql-routed-psp
Enter username: root
Enter password:
   Removal Result
    Message: The update completed successfully, but the system needs to be rebooted for the
    changes to be effective.
    Reboot Required: true
    VIBs Installed:
    VIBs Removed: Dell_bootbank_dell-eql-host-connection-mgr_1.0.9-202245, Dell_bootbank_dell-
    eql-hostprofile_1.0.9-202245, Dell_bootbank_dell-eql-routed-psp_1.0.9-202245
    VIBs Skipped:
```

Verifying the Installation

To verify that the installation was successful, use the `setup.pl --query` command.

For example:

```
$ ./setup.pl --server=192.168.XX.XXX --query
Found Dell EqualLogic multipathing package installed: DELL-eql-mem-1.0.0.111844
Default PSP for EqualLogic devices is DELL_PSP_EQL_ROUTED
No supported iSCSI adapters found.
```

Enabling and Disabling the EqualLogic Plugin

Use the setup.pl script to enable and disable the EqualLogic MEM plug-in.

Enabling the EqualLogic Plugin

Enabling the plugin sets the PSP as the active PSP for all existing EqualLogic disk devices, and sets it as the default PSP for all new EqualLogic disk devices. Use the following syntax to enable the EqualLogic MEM plugin:

```
setup.pl --disable --server="hostname" [--username=username] [--password=password]
```

The plugin is automatically enabled when it is installed.

Disabling the EqualLogic Plugin

Disabling the plugin sets VMW_PSP_FIXED as the active PSP for all existing EqualLogic disk devices, and sets it as the default PSP for all new EqualLogic disk devices.

Use the following syntax to disable the EqualLogic MEM plugin:

```
setup.pl --enable --server="hostname" [--username=username] [--password=password]
```

Using the EqualLogic MEM With AutoDeploy

The Dell EqualLogic MEM supports the new AutoDeploy feature in ESX 5 that allows building images for automatically deploying ESX hosts. In order to add the MEM to the boot image you must perform the following additional steps while preparing the image profile using the PowerCLI:

1. Import the MEM offline bundle using the `Add-EsxSoftwareDepot` command. For example,

```
Add-EsxSoftwareDepot <depot>.zip
```

2. Add the three VIBs in the MEM to the image profile. For example:

```
Add-EsxSoftwarePackage -imageprofile <name> -SoftwarePackage dell-eql-routed-psp
Add-EsxSoftwarePackage -imageprofile <name> -SoftwarePackage dell-eql-host-con-
nection-mgr
Add-EsxSoftwarePackage -imageprofile <name> -SoftwarePackage dell-eql-hostprofile
```

See the *vSphere Installation and Setup* documentation available from VMware for more information about AutoDeploy.

3 Configuring the EqualLogic MEM

EHCM Configuration

The runtime behavior of EHCM is controlled by several configuration values. Table 6 describes these configuration values.

Table 6: EHCM Configuration Parameters

Value	Default	Maximim	Minimum	Description
TotalSessions	512	1024	64	Maximum total sessions created to all EqualLogic volumes. You can lower this limit in large configurations to keep the session count within VMware ESX and PS group limits.
VolumeSessions	6	12	1	Maximum number of sessions created to each EqualLogic volume. You can lower this limit in large configurations to keep the session count within VMware ESX and PS group limits.
MemberSessions	2	4	1	Maximum number of sessions created to each volume slice (portion of a volume on a single member).
MinAdapterSpeed	1000	10000	10	Minimum adapter speed (in Mb/s) used for MPIO sessions.

When determining how many sessions to create to a volume, EHCM chooses a value that meets all constraints specified by the `totalsessions`, `volumesessions` and `membersessions` values.

See the PS Series documentation for group limits on total iSCSI sessions. It may be necessary to reduce the number of sessions created per volume in large configurations.

EHCM Configuration File

The configuration file, located on the ESX host at `/etc/cim/dell/ehcmd.conf`, stores the configuration parameters.

The preferred method of making changes is through the esxcli command `esxcli equallogic param set`, but this file can also be edited directly.

Each line in the file uses the format `param=<value>`. Table 6 shows available options and their values.

EqualLogic MEM Configuration Using ESX CLI Commands

You can use the ESX CLI to configure and inspect the EqualLogic MEM.

For a full description of the ESX CLI commands, see the VMware documentation.

Viewing Configuration Values

To view the current configuration parameters, use the following ESX CLI command syntax:

```
esxcli equallogic param list
```

For example:

```
$esxcli  equallogic param list

Name             Value  Max    Min  Description
---------------  -----  -----  ---  -------------------------------------------
TotalSessions    512    1024   64   Max number of sessions per host.
VolumeSessions   6      12     1    Max number of sessions per volume.
MemberSessions   2      4      1    Max number of sessions per member per volume.
MinAdapterSpeed  1000   10000  10   Minimum adapter speed for iSCSI multipathing.
```

Listing Statistics

To view statistics, use the following ESX CLI command syntax:

```
esxcli equallogic stat {detail | summary} [--device=<device>] [--path]
```

The following options can be used:

- The `device` parameter allows filtering to display just stats for one device.
- The `path` parameter will cause stats to be reported for each path.
- The `detail` parameter will cause detailed statistics to be reported instead of summary statistics.

For example:

```
$ esxcli  equallogic stat summary

DeviceId                          VolumeName                          PathCount  Reads  Writes   KBRead  KBWritten
--------------------------------  ----------------------------------  ---------  -----  ------  -------  ---------
6090A088F0DEBAD3AFDE24050000E054  esx5vm4                                     4    334       0        1          0
6090A088F0DEFACBDCDDA400000060F7  vss-control                                 2    123       0        0          0
6090A088F0DEAAD1AFDEE404000000A3  esx5vm2                                     4    343       0        1          0
6090A088F0DE6A89E0DD24030000D0CC  olu4clustervol1                             4    343       0        1          0
6090A088F0DE9ABFAFDEA40400007008  esx5datastore                               4  15275     409  3861733        204
6090A088F0DE9AD2AFDE04050000B055  esx5vm3                                     4    352       0        1          0
6090A088F0DE8A8BE0DD440300000019  olu4clustervol2                             4    352       0        1          0
6090A088F06EF47A50E194040000808D  esx5vm1-2011-07-06-21:11:11.1.1             4    352       0        1          0
6090A088F0DE5AD0AFDEC40400007065  esx5vm1                                     4    361       0        1          0
6090A088F0DE6AD4AFDE44050000B0B1  esx5vm5                                     4    361       0        1          0
```

Listing Adapters

To view adapters, use the following ESX CLI command syntax:

```
esxcli equallogic adapters
```

For example:

```
$ esxcli  equallogic adapters
VMKernel: vmk1
Ip: 192.168.xxx.xx
Status: Normal
NIC: vmnic1
Speed: 1000
MAC: 00:1e:c9:b5:04:75
HBA: vmhba33
Vendor: VMware:iSCSI Software Adapter

VMKernel: vmk2
Ip: 192.168.xxx.xx
Status: Normal
NIC: vmnic2
Speed: 1000
MAC: 00:1b:21:23:61:00
HBA: vmhba33
Vendor: VMware:iSCSI Software Adapter
```

Listing Sessions

To list sessions, use the following ESX CLI command syntax:

```
esxcli equallogic sessions
```

For example:

```
$esxcli equallogic sessions
VolumeName           SrcIp              TgtIp
-------------------- --------------     -------------
esx5datastore      192.168.XXX.61    192.168.XX.212
esx5datastore      192.168.XXX.62    192.168.XX.221
esx5datastore      192.168.XXX.62    192.168.XX.211
esx5datastore      192.168.XXX.61    192.168.XX.222
esx5vm1            192.168.XXX.62    192.168.XX.222
esx5vm1            192.168.XXX.61    192.168.XX.221
esx5vm1            192.168.XXX.61    192.168.XX.212
esx5vm1            192.168.XXX.62    192.168.XX.211
esx5vm2            192.168.XXX.61    192.168.XX.221
esx5vm2            192.168.XXX.62    192.168.XX.211
esx5vm2            192.168.XXX.61    192.168.XX.222
esx5vm2            192.168.XXX.61    192.168.XX.212
esx5vm3            192.168.XXX.61    192.168.XX.212
esx5vm3            192.168.XXX.62    192.168.XX.211
esx5vm3            192.168.XXX.61    192.168.XX.222
esx5vm3            192.168.XXX.61    192.168.XX.222
esx5vm4            192.168.XXX.61    192.168.XX.221
esx5vm4            192.168.XXX.61    192.168.XX.222
esx5vm4            192.168.XXX.62    192.168.XX.212
esx5vm4            192.168.XXX.62    192.168.XX.221
esx5vm5            192.168.XXX.62    192.168.XX.211
esx5vm5            192.168.XXX.61    192.168.XX.221
esx5vm5            192.168.XXX.61    192.168.XX.212
esx5vm5            192.168.XXX.62    192.168.XX.222
```

Setting Configuration Values

To configure the EqualLogic MEM, use the following ESX CLI command syntax:

```
esxcli equallogic param set --name="parameter_name" --value="parameter_value"
```

For example:

```
$ esxcli equallogic param set -n=VolumeSessions -v=3
```

EqualLogic MEM Configuration Using Host Profiles

In vSphere 5.0, Host Profiles are extended to support third party providers. The EqualLogic MEM contains such a host profile provider, that allows management of some MEM configuration parameters through the Host Profile framework. Support Host Profile operations include:

- Extract current MEM configuration from a host
- Edit the configuration settings in an existing host profile
- Check compliance of a host against a host profile
- Apply a host profile to one or more hosts

See the vSphere Host Profiles documentation available from VMware for more information about using Host Profiles.

4 Troubleshooting

This chapter discusses topics relating to troubleshooting the Dell EqualLogic MEM.

Log Files

Table 7 shows the log file used by the EqualLogic MEM.

Table 7: Log Files

Log File Name	Description
`/var/log/equallogic/ehcmd.log`	Contains EHCMD log messages for ESX and ESXi
`/var/log/vmkernel.log`	Includes PSP log messages (ESX)

Error messages are also sent to syslog.

To produce a dump of the details of the current MPIO configuration to a file, use the following command from the ESX CLI service console:

```
/usr/sbin/ehcmcli -d -o <filename>
```

Troubleshooting Common Issues

Table 8 identifies common issues for the Dell EqualLogic MEM.

Table 8: Troubleshooting the Dell EqualLogic MEM

Problem	Possible Cause/Solution
Cannot install the MEM bundle	• The VIB was unzipped before installation • The VIB was not first copied to the ESXi location
iSCSI logins cannot be seen from any vmknics	Do not bind vmknics to the iSCSI initiator. See *Software iSCSI Configuration Requirements on page 5*.
iSCSI logins cannot be seen from all vmknics	Volume access is not properly set for all vmknics to login. **Note:** Broadcom iSCSI offload uses a different IQN for each port.
Array limits of iSCSI sessions exceeded	Session limits on ESX server need to be lowered, using `esxcli equallogic param set -n totalsessions`. See *Setting Configuration Values on page 18*.
Logins from Broadcom NIC with iSCSI offload cannot be seen	The Broadcom iSCSI offload does not support jumbo frames. vmknic and vswitch MTU must be set to 1500.
Do not see the expected number of sessions for Broadcom NIC with iSCSI offload	The Broadcom iSCSI offload has a low limit on iSCSI sessions (64 or 128). In addition, the EHCM will leave two empty slots so additional iSCSI targets can be discovered.
esxcli equallogic commands are not recognized	The `hostd` daemon was not restarted after the plugin installation.

A Sample Configuration Commands

This appendix provides examples of using the setup.pl script to configure networking for multipathing.

Configuring a 4-Port Nic Using the VMware Software iSCSI Initiator

```
$./setup.pl --server=192.168.XXX.130
--configure --ips=192.168.XXX.131,192.168.XXX.132,192.168.XXX.133,192.168.XXX.134
--nics=vmnic2,vmnic3,vmnic4,vmnic5 --enableswiscsi --nohwiscsi
Configuring networking for iSCSI multipathing:
      vSwitch = vSwitchISCSI
      mtu = 1500
      nics = vmnic2 vmnic3 vmnic4 vmnic5
      ips = 192.168.XXX.131 192.168.XXX.132 192.168.XXX.133 192.168.XXX.134
      netmask = 255.255.255.0
      vmkernel = iSCSI
      enableswiscsi = 1
Creating vSwitch vSwitchISCSI.
Setting vSwitch MTU to 1500.
Creating portgroup iSCSI0 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.131 to iSCSI0.
Creating portgroup iSCSI1 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.132 to iSCSI1.
Creating portgroup iSCSI2 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.133 to iSCSI2.
Creating portgroup iSCSI3 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.134 to iSCSI3.
Creating new bridge.
Adding uplink vmnic2 to vSwitchISCSI.
Adding uplink vmnic3 to vSwitchISCSI.
Adding uplink vmnic4 to vSwitchISCSI.
Adding uplink vmnic5 to vSwitchISCSI.
Setting new uplinks for vSwitchISCSI.
Setting uplink for iSCSI0 to vmnic2.
```

```
Setting uplink for iSCSI1 to vmnic3.
Setting uplink for iSCSI2 to vmnic4.
Setting uplink for iSCSI3 to vmnic5.
Enabling SW initiator.
Enabled SW initiator.
Bound vmk0 to vmhba35.
Bound vmk1 to vmhba35.
Bound vmk3 to vmhba35.
Bound vmk4 to vmhba35.
Configuration finished.
```

Resulting configuration:

```
$ esxcfg-vswitch -l --server 192.168.XXX.130 --username root --password <secret>

Switch Name     Num Ports       Used Ports      Configured Ports    MTU     Uplinks
vSwitch0        128             3               128                 1500    vmnic0
PortGroup Name                VLAN ID   Used Ports      Uplinks
VM Network                    0         0               vmnic0
Service Console               0         1               vmnic0

Switch Name     Num Ports       Used Ports      Configured Ports    MTU     Uplinks
vSwitchISCSI    128             9               128                 1500   vmnic2,vmnic3,
                                                                            vmnic4, vmnic5
PortGroup Name                VLAN ID   Used Ports      Uplinks
iSCSI3                        0         1               vmnic5
iSCSI2                        0         1               vmnic4
iSCSI1                        0         1               vmnic3
iSCSI0                        0         1               vmnic2
```

Configuring a Two-Port Broadcom Enabled For iSCSI Offload

```
$ ./setup.pl --server=192.168.XXX.160 --con-
figureips=192.168.XXX.161,192.168.XXX.162 --nics=vmnic4,vmnic5


Configuring networking for iSCSI multipathing:
      vSwitch = vSwitchISCSI
      mtu = 1500
      nics = vmnic4 vmnic5
```

```
      ips = 192.168.XXX.161 192.168.XXX.162
      netmask = 255.255.255.0
     vmkernel = iSCSI
Creating vSwitch vSwitchISCSI.
Setting vSwitch MTU to 1500.
Creating portgroup iSCSI0 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.161 to iSCSI0.
Creating portgroup iSCSI1 on vSwitch vSwitchISCSI.
Assigning IP address 192.168.XXX.162 to iSCSI1.
Creating new bridge.
Adding uplink vmnic4 to vSwitchISCSI.
Adding uplink vmnic5 to vSwitchISCSI.
Setting new uplinks for vSwitchISCSI.
Setting uplink for iSCSI0 to vmnic4.
Setting uplink for iSCSI1 to vmnic5.
Bound vmk0 to vmhba34.
Bound vmk1 to vmhba35.
Configuration finished.
```

Resulting configuration:

```
$ esxcfg-vswitch -l --server 192.168.XXX.160 --username root --password <secret>
Switch Name     Num Ports       Used Ports      Configured Ports    MTU     Uplinks
vSwitch0        128             3               128                 1500    vmnic0
PortGroup Name                VLAN ID   Used Ports      Uplinks
VM Network                    0         0               vmnic0
Service Console               0         1               vmnic0
Switch Name     Num Ports       Used Ports      Configured Ports    MTU     Uplinks
vSwitchISCSI    128             5               128                 1500    vmnic4,vmnic5
PortGroup Name                VLAN ID   Used Ports      Uplinks
iSCSI1                        0         1               vmnic5
iSCSI0                        0         1               vmnic4
```

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