Dell Compellent Linux on POWER

Best Practices

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General syntax

Table 1. Conventions

<table>
<thead>
<tr>
<th>Item</th>
<th>Convention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu items, dialog box titles, field names, keys</td>
<td>Bold</td>
</tr>
<tr>
<td>Mouse click required</td>
<td>Click</td>
</tr>
<tr>
<td>User Input</td>
<td>Monospace Font</td>
</tr>
<tr>
<td>User typing required</td>
<td>Type:</td>
</tr>
<tr>
<td>System response to commands</td>
<td>Blue</td>
</tr>
<tr>
<td>Output omitted for brevity</td>
<td>&lt;snip&gt;</td>
</tr>
<tr>
<td>Website addresses</td>
<td><a href="http://www.dell.com">http://www.dell.com</a></td>
</tr>
<tr>
<td>Email addresses</td>
<td><a href="mailto:name@dell.com">name@dell.com</a></td>
</tr>
</tbody>
</table>

Document Revision

Table 2. Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4/2/2013</td>
<td>A</td>
<td>Initial Draft</td>
</tr>
</tbody>
</table>
Icons

Notes are used to convey special information or instructions.

Timesavers are tips specifically designed to save time or reduce the number of steps.

Caution indicates the potential for risk including system or data damage.

Warning indicates that failure to follow directions could result in bodily harm.
Preface

Customer support
Dell Compellent provides live support 1-866-EZSTORE (866.397.8673), 24 hours a day, 7 days a week, 365 days a year. For additional support, email Dell Compellent at support@compellent.com. Dell Compellent responds to emails during normal business hours.
Introduction
This document presents useful information on a wide variety of AIX topics not covered in other Dell Compellent documentation.

While this document may contain significant detail, it is by no means a comprehensive or complete representation of every AIX method or function (nor is it intended to be). All of the procedures contained herein are handled more thoroughly and completely in IBM/AIX documentation which also includes system MAN pages ET. AL.

In this scenario, we would be using two Power710 machines setup as dual VIOS named queen-vio1 and queen-vio2 respectively managed by an HMC named hmc7. We will also be using a single Lpar named dellstud_lpar3 as the target destination of the Linux on POWER installation and using RHEL 6.3 Beta PPC as the installation media.
Setting Up the VIOS profile
Each of the VIOS is set up as follows.

Note the Server SCSI Adapter ID 22 is mapped to the lpar (dellstud_lpar3) Adapter ID 2 (queen-vio1) and 3 (queen-vio2) respectively.

Capture from queen-vio1
Remember to COLD BOOT your VIOS and LPAR accordingly for it to inherit/adopt any profile changes.
Setting Up the LPAR profile
The lpar dellstud_lpar3 is setup as follows.

Using vSCSI device as your target boot device
Note the Client SCSI Adapter ID 2 and 3 mapped to queen-vio1 and queen-vio2 respectively. Additionally, the Client SCSI Adapter IDs NEED TO BE in the range of 2 thru 9 inclusive ONLY (since IDs 0 and 1 are typically reserved for Server Serial devices) and anything beyond 9 is un-addressable as a boot device (Virtual Optical Device) from the SMS console.

Capture from dellstud_lpar3
Using vFC device as your target boot device
The target boot device may also be presented as vFC instead of vSCSI. Regardless the Client SCSI adapters still needs to be created (as above) to present a Virtual Optical Device which presents the IBM Installation Toolkit for PowerLinux ISO boot media. If using a vFC device, you would additionally need to configure your Virtual Storage Management via the HMC to map your VIOS adapters accordingly via the interface shown below.

Note
Remember to COLD BOOT your VIOS and LPAR accordingly for it to inherit/adopt any profile changes.
Locating the ISO
The IBM Installation Toolkit for PowerLinux as of the v5.3 release supports these Linux distros.

- SUSE Linux Enterprise Server 11 SP1 and SP2
- SUSE Linux Enterprise Server 10 SP4
- Red Hat Enterprise Linux 6.2 and 6.3
- Red Hat Enterprise Linux 5 Update 7 and 8

This paper outlines the installation of RHEL 6.3 on POWER ONLY. The installation of other supported Linux distros may demonstrate slight variations from the procedures included here.

There are two ISOS required for this procedure. They are the

IBM Installation Toolkit for PowerLinux ISO

RHEL 6.3 for PPC ISO
https://rhn.redhat.com/rhn/software/downloads/SupportedISOs.do
... this latter one requires a login to the Redhat Customer Portal with your respective credentials

Download these ISOS and keep them aside and available for now.
Establishing the VM Library on the VIO

The AIX VM Library allows the VIOS to present virtual media (ISOS etc.) to the lpars. The procedures outlined below represent what was setup in the lab environment to accomplish a Linux on POWER installation. Additionally, the VM Library is created on only 1 of the 2 VIOS in the lab. These procedures may need to be adapted accordingly to your respective environments.

Create a 16GB VM Library

On queen-vio1 (as the padmin ID) … the following command is issued.

$ mkrep -sp rootvg -size 16G

Virtual Media Repository Created

Repository created within "VMLibrary" logical volume

This creates and mounts a new mount point as shown below.

$ df

Filesystem 512-blocks Free %Used lused %Iused Mounted on
[snip]
/dev/hd10opt 2621440 816136 69% 8631 9% /opt
/dev/livedump 524288 523552 1% 4 1% /var/adm/ras/livedump
/dev/VMLibrary 33554432 33417600 1% 4 1% /var/vio/VMLibrary

We would now promote to the power user environment via oem_setup_env command. In this promoted environment, you would cd into the /var/vio/VMLibrary folder and then copy/move the ISOS previously downloaded into this folder (via scp or otherwise from whichever remote location you have these ISOS located). When complete, exit this promoted environment back to the padmin shell.

Finally, validate that your VM Library is setup correctly and that these ISOS are visible with the following command.

$ lsrep

<table>
<thead>
<tr>
<th>Name</th>
<th>File Size</th>
<th>Optical</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM_Installation_Toolkit_53.iso</td>
<td>1006</td>
<td>dellstud3_cd0</td>
<td>rw</td>
</tr>
<tr>
<td>ReleaseNotes_IBMIT_53.pdf</td>
<td>1</td>
<td>None</td>
<td>rw</td>
</tr>
<tr>
<td>UsersManual_IBMIT_53.pdf</td>
<td>1</td>
<td>None</td>
<td>rw</td>
</tr>
<tr>
<td>dlmgr.pro</td>
<td>1</td>
<td>None</td>
<td>rw</td>
</tr>
<tr>
<td>rhel-server-6.3-beta-ppc64-boot.iso</td>
<td>223</td>
<td>None</td>
<td>rw</td>
</tr>
<tr>
<td>rhel-server-6.3-beta-ppc64-dvd.iso</td>
<td>3605</td>
<td>dellstud3_cd1</td>
<td>rw</td>
</tr>
</tbody>
</table>
Locate your LPAR vhost Device
In the padmin shell, issue this command to locate the Available vhost device. vhost0 is the device used.

```
$ lsdev | grep vhost
```

```
vhost0       Available   Virtual SCSI Server Adapter
vhost1       Defined     Virtual SCSI Server Adapter
vhost2       Defined     Virtual SCSI Server Adapter
vhost3       Defined     Virtual SCSI Server Adapter
```

Create & Map the Virtual Optical Devices
In this scenario, two Virtual Optical devices would be needed (one to house/present the IBM Toolkit ISO and the other to house/present the RHEL 6.3 ISO).

The following commands are issued to create & map these VOpt devices to vhost0.

```
$ mkvdev -fbo -dev dellstud3_cd0 -vadapter vhost0.
dellstud3_cd0 Available
```

```
$ mkvdev -fbo -dev dellstud3_cd1 -vadapter vhost0
dellstud3_cd1 Available
```

Issuing the lsmap command below would display these new VOpt devices. They are seen as Available though no ISOS are currently presented via these devices to the lpar.

```
$ lsmap -vadapter vhost0
```

```
SVSA            Physloc                                 Client Partition ID
--------------- -------------------------------------------- ------------------
vhost0          U8231.E2B.068426P-V2-C22                     0x00000017
VTD                  dellstud3_cd0
Status                Available
LUN                   0x8300000000000000
Backing device
Physloc
Mirrored              N/A
```

```
VTD                  dellstud3_cd1
Status                Available
LUN                   0x8400000000000000
Backing device
Physloc
Mirrored              N/A
```
**Presenting the ISOS**
The `loadopt` command is used to associate the ISOS with their respective VOpt device.

```
$ loadopt -f -vtd dellstud3_cd0 -disk IBM_Installation_Toolkit_53.iso
$ loadopt -f -vtd dellstud3_cd1 -disk rhel-server-6.3-beta-ppc64-dvd.iso
```

Issuing the `lsmap` command again would display these VOpt devices which are now presenting their respective ISOS to the lpar.

```
$ lsmap -vadapter vhost0

<table>
<thead>
<tr>
<th>SVSA</th>
<th>Physloc</th>
<th>Client Partition ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>vhost0</td>
<td>U8231.E2B.068426P-V2-C22</td>
<td>0x00000017</td>
</tr>
</tbody>
</table>

VTD: `dellstud3_cd0`
Status: Available
LUN: 0x8300000000000000
Backing device: `/var/vio/VMLibrary/IBM_Installation_Toolkit_53.iso`
Physloc: N/A
Mirrored: N/A

VTD: `dellstud3_cd1`
Status: Available
LUN: 0x8400000000000000
Backing device: `/var/vio/VMLibrary/rhel-server-6.3-beta-ppc64-dvd.iso`
Physloc: N/A
Mirrored: N/A
### Presenting the Boot Volume from Dell Compellent Storage

#### Using vSCSI

If using vSCSI devices, then map the Dell Compellent volume to the WWPN addresses of the VIOS Server Cluster Object as shown below. In this scenario, the Boot Volume (LoP_100G_Boot) is defined as 100GB in size.

Subsequently, issuing the `cfgmgr` command on the VIOS will rescan the bus and configure any new devices it located. In this instance, `hdisk1` is the new 100GB Boot Volume just presented to the VIOS as shown below.

```
$ lsdev | grep hdisk

hdisk0   Available  Compellent FC SCSI Disk Drive
hdisk1   Available  Compellent FC SCSI Disk Drive
hdisk2   Defined   Compellent FC SCSI Disk Drive
hdisk3   Defined   Compellent FC SCSI Disk Drive
```
Using vFC
If using vFC devices, then map the Dell Compellent volume to the respective WWPN address of the lpar directly.

Presenting the Boot Volume to the lpar
Issuing the following command will map the hdisk1 device to the lpar dellstud_lpar3.

```
$ mkvdev -vdev hdisk1 -vadapter vhost0 -dev linux_dellstud3
```

Issuing the lsmap command again would display the VOpt devices in addition to the Boot Volume which was just mapped to the lpar.

```
$ lsmap -vadapter vhost0

<table>
<thead>
<tr>
<th>SVSA</th>
<th>Physloc</th>
<th>Client Partition ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>vhost0</td>
<td>U8231.E2B.068426P-V2-C22</td>
<td>0x000000017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit</th>
<th>Name</th>
<th>Status</th>
<th>LUN</th>
<th>Backing device</th>
<th>Physloc</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTD</td>
<td>dellstud3_cd0</td>
<td>Available</td>
<td>0x8300000000000000</td>
<td>/var/vio/VMLibrary/IBM_Installation_Toolkit_53.iso</td>
<td></td>
</tr>
<tr>
<td>VTD</td>
<td>dellstud3_cd1</td>
<td>Available</td>
<td>0x8400000000000000</td>
<td>/var/vio/VMLibrary/rhel-server-6.3-beta-ppc64-dvd.iso</td>
<td></td>
</tr>
<tr>
<td>VTD</td>
<td>linux_dellstud3</td>
<td>Available</td>
<td>0x8100000000000000</td>
<td>hdisk1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physloc</th>
<th>Mirrored</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>U78AB.001.WZSG9ZN-P1-C3-T2-W5000D3100000670B-L2000000000000000</td>
<td>false</td>
<td></td>
</tr>
</tbody>
</table>
```
Booting from ISO

Starting in SMS
Open a terminal console to the lpar. From the HMC, start the lpar to boot into SMS mode as shown below.

From this SMS Main Menu, navigate down the Option Tree 5, 1, 3, 1, 1, 1, 2, 1 to instruct the lpar to attempt booting from its first known SCSI CD-ROM device.
If this boot attempt is successful from the IBM Installation Toolkit for PowerLinux ISO, you will then observe the lpar attempt to load the linux bootstrap as seen below.

Upon successfully loading the bootstrap, you would then be presented with this menu as below. Note the IP Address (as obtained via a DHCP Lease Request) presented at the top of the console window.
Configure & Setup
At this time, you may then leave the terminal console open while you plug this IP Address into your preferred browser.

LClick the “I agree” button then LClick the “Install Linux” link.
In this subsequent screen, configure the pulldown options as shown below. Using the options “Red Hat Enterprise Linux 6 (Update 3)”, “Full”, “mpatha (sda,sdb)” & “No” accordingly. Then LClick “Next”.

LClick the “Next” button again and do not select any of the Workload options.
On this screen below, LClick the “Next” button and leave the default source locations as shown “CD/DVD-ROM”.

In this subsequent screen, we have configured the FQDN as well as the IP Address of the DNS server in the local domain. You would configure this accordingly to your network environment.
We also LClick the “Configure” button and configure one of the two network interfaces as shown below. Again you would configure this accordingly to your network environment. LClick the “Save” button when done.

On this screen, we would configure the TZ parameters and the system Root password as desired, LClick the “Next” button when done.
Configure the next few screens as shown and LClick the “Next” button when appropriate to proceed accordingly.
LClick on the “Next” button will start the Linux installation as shown below. The progress of the installation can be observed from the terminal console as shown in the following screen. There is no further interaction required from this point until the installation is complete.
Wrapping Up
When the installation is complete, the lpar will reboot into its Text Mode Setup Utility as shown below. Navigate this menu and adjust any configurations as needed. Select the “Quit” button when complete.
The final installation steps are then performed and you will be returned to the terminal console login prompt as seen below.

![Terminal Console Login Prompt](image-url)
Validation & Conclusion

Device Definition & Multipath

The Dell Compellent volumes are abstracted as they are managed by the VIO layer of this architecture. As such, the Dell Compellent volumes as seen by the RHEL lpar are not identified as COMPELNT devices but instead seen as “AIX, VDASD” devices instead as shown below.

Additionally, multipathd will identify the volumes accurately by their Dell Compellent serial numbers and create the correct /dev/mapper/mpathX devices as below.
Linux Tools
The Linux tools work as intended in identifying and correlating the devices to the respective Dell Compellent volumes as shown below.

AIX Systems and Storage Management
As with any AIX systems and storage management principles, the following AIX tenets should be maintained when presenting Dell Compellent volumes to the RHEL lpars accordingly.

- Establish sound and repeatable principles for SCSI and FC ID reservations in profile management
- COLD BOOT your lpar and hmc when making any profile changes
- Remember to create the matching vdev devices on all VIOS (dual VIOS is assumed)