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Compellent Storage Center

HP-UX 11.0 and 11i: Basic Setup with Veritas Volume Manager (VxVM)

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The goal of this document is to provide instruction and references for adding physical volumes to the HP-UX 11.00 and 11i operating environments, in conjunction with Veritas Volume Manager (VxVM).

Customer Support

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 Compellent at support@compellent.com. Compellent responds to emails during normal business hours.

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General Syntax

<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;…snipped…&gt;</td>
</tr>
<tr>
<td>Website addresses</td>
<td><a href="http://www.compellent.com">http://www.compellent.com</a></td>
</tr>
<tr>
<td>Email addresses</td>
<td><a href="mailto:info@compellent.com">info@compellent.com</a></td>
</tr>
</tbody>
</table>

Document Revision

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/30/10</td>
<td>A</td>
<td>Released</td>
</tr>
</tbody>
</table>
Background

Veritas Volume Manager is available both as part of the regular operating environment and as a licensed add on extension for HP-UX 11.00 and 11i. While this document does contain some detail, it is by no means complete. All of the procedures contained herein are handled more completely in HP’s documentation which includes the system MAN pages. It is recommended that you obtain documents from HP and familiarize yourself with basic system commands. This document covers basic VxVM functionality ONLY; Dynamic LUN Expansion (DLE) is a licensed product under Veritas Foundation Suite and hence, is not covered here.

Assumptions

- The audience is assumed to be junior to mid-level systems administrators, not necessarily familiar with HP-UX.
- The person who will be attempting to follow these procedures has registered with and has access to the HP Information Technology Resource Center (ITRC) at http://www.itrc.hp.com/. Registration is free and includes access to the patch database.
- Already trained on the usage of the Compellent Storage Center or storage has already been allocated, this is not covered here.
- Familiar with switch zoning or the zoning is already accomplished as this is not covered here.
- Familiarity with the documents referenced in the Background section above.
- HP-UX 11.00 or 11i environment is patched at a reasonable level; i.e. Quality Pack patch sets are not more than six months old OR last best patches are installed in the case of end of life software.
- Firmware or EFI levels on all hardware (servers/HBAs/etc…) is within six months of current levels. Again, this can be obtained via the ITRC.
- This document covers Veritas Volume Manager ONLY! HP’s native Logical Volume Manager (LVM) is covered in another document.
- Server has two Fibre Channel (F/C) HBA (Host Bus Adapter) connections, each connection to a separate F/C fabric. Please reference Compellent documentation on cabling and configuration requirements in a dual fabric environment.
Important Notes

- Under HP-UX 11.0 and HP-UX 11i v1, the Compellent Storage Center is limited to 8 LUNs per HBA, with LUN ID’s 0 to 7. There also must be a LUN 0 and you cannot skip LUN 0 under any circumstance!

- HP-UX 11.0, HP-UX 11i v1 and HP-UX 11i v2 do not have native multi-path Input/Output (MPIO) capabilities; native redundant link failover is built in and is called “PVLINKS”. This will be discussed in this document.

- HP-UX 11i v3 has native MPIO capabilities, referred to as the “Agile” device system. It is required that you use the legacy device file format with VxVM. VxVM has its own multi-path I/O manager called Dynamic Multi-Path (DMP).

- VxVM only supports DLE in version 5.x with a Storage Foundation License.

- Please check for and review any CSTA Alerts for your specific Operating System at Compellent’s Knowledge Center BEFORE attempting any configuration additions or changes.
### Server Setup

1. **On your switches/directors:** Zone each host HBA into separate zones to the same four Front End Primary (FEP) and Front End Reserve (FER) domains if dual fabric.
   - **If you need to find the World Wide Port Name (WWPN) for your F/C HBA's, start by issuing the following command:** 
     ```
     ll /dev/td?
     ```
     or 
     ```
     ll /dev/fcd?
     ```
     in the case of 4GB F/C HBAs. The system should respond with something like:

     ```
     crw-rw-rw- 1 bin   bin   75 0x000000 Nov 23 16:36 /dev/td0
     crw-rw-rw- 1 bin   bin   75 0x000001 Nov 23 16:36 /dev/td1
     ```
   - **Issue the following command against each F/C HBA device file:**
     ```
     fcmsutil /dev/td0
     ```
     the system should respond with:
     ```
     Vendor ID is = 0x00103c
     Device ID is = 0x001029
     XL2 Chip Revision No is = 2.3
     PCI Sub-system Vendor ID is = 0x00103c
     PCI Sub-system ID is = 0x00128c
     Topology = PTTOPT_FABRIC
     Link Speed = 2Gb
     Local N_Port_id is = 0x140e00
     N_Port Node World Wide Name = 0x50060b0000222201
     N_Port Port World Wide Name = 0x50060b0000222200
     Driver state = ONLINE
     Hardware Path is = 1/4/0/0
     Number of Assisted IOs = 1356762
     Number of Active Login Sessions = 1
     Dino Present on Card = NO
     Maximum Frame Size = 2048
     Driver Version = @(#) libtd.a HP Fibre Channel Tachyon XL2 Driver B.11.11.0512 $Date: 2005/09/20 12:22:47 $Revision: r11.11/1
     ```
   - **See the text highlighted in red above.**

2. **After the zoning is complete on the switches/directors, on your server run the following:**
   ```
   ioscan -fn
   ```
   this will put the host HBA WWPN's into the Compellent Storage Center table of known connections.
   - **At this point, if you are running HP-UX 11i v3, issue the command**
     ```
     insf -L
     ```
     to enable legacy device file naming.

3. **On your Compellent Storage Center, initiate a “Create Server” dialog, uncheck the “Show Only Active Connections” box and refresh the screen. You should now be able to create your server object.**
a. If you are using HP-UX 11i v3, as you create your server object make sure to set your Operating System to “HP UX 11i v3”.

b. For any other version of HP-UX, as you create your server object make sure to set your Operating System to “HP UX 11i PVLinks”.

4. Create a 30GB LUN on the Compellent Storage Device.

5. Using the Compellent interface, map the 30GB LUN to both of the hosts HBA’s to the newly discovered HP-UX host server object.

6. If you are not using HP-UX 11i v3, the LUN number must be between zero and seven, with a maximum of eight LUNs per host HBA and if this is the first LUN, it must be zero.

Find new LUN(s)

1. Run the following: “ioscan -fn” to force a rescan of all devices on the system.

2. Run the following: “ioscan -fnC disk” to get a list of all ‘known’ LUNs and disk devices. The system response will look like:

   Class | I H/W Path | Driver | S/W State | H/W Type | Description

   ==========================================================================
   disk   4 0/0/2/0.6.0 | sdisk | CLAIMED | DEVICE | SEAGATE ST318404LC
   /dev/dsk/c16d0 /dev/rdsk/c16d0

   <…snipped…>

   disk   6 1/4/0/0.206.2.255.0.0.0 | sdisk | CLAIMED | DEVICE | COMPELNTCompellent Vol
   /dev/dsk/c27d0 /dev/rdsk/c27d0

   disk   28 1/4/0/0.206.3.255.0.0.0 | sdisk | CLAIMED | DEVICE | COMPELNTCompellent Vol
   /dev/dsk/c28d0 /dev/rdsk/c28d0

   disk   29 1/4/0/0.206.4.255.0.0.0 | sdisk | CLAIMED | DEVICE | COMPELNTCompellent Vol
   /dev/dsk/c29d0 /dev/rdsk/c29d0

   disk   30 1/4/0/0.206.5.255.0.0.0 | sdisk | CLAIMED | DEVICE | COMPELNTCompellent Vol
   /dev/dsk/c30d0 /dev/rdsk/c30d0

3. The new device is in red above. If there is no line containing a “/dev/dsk” entry below your new Compellent LUN, issue the following command: “insf -e”. The system will respond with:

   insf: Installing special files for sctl instance 2 address 0/0/1/0.7.0
   insf: Installing special files for sdisk instance 4 address 0/0/2/0.6.0
   insf: Installing special files for sctl instance 0 address 0/0/2/0.7.0
   insf: Installing special files for sctl instance 1 address 0/0/2/1.7.0
   insf: Installing special files for asio0 instance 0 address 0/0/4/0
   insf: Installing special files for asio0 instance 1 address 0/0/5/0
   insf: Installing special files for sdisk instance 6 address 1/4/0/0.206.2.255.0.0.0
   insf: Installing special files for sdisk instance 7 address 1/4/0/0.206.2.255.0.0.1
   <…snipped…>
   insf: Installing special files for pseudo driver root

   a. Re-run the “ioscan -fnC disk” from above if necessary to get the new device path.
Prepare LUNs for use by VxVM.

1. If this is the first Compellent device added to the system and you have not enabled VxVM, issue the following command: "vxinstall". The system will respond with the following dialogue:

VxVM uses license keys to control access. If you have not yet installed a VxVM license key on your system, you will need to do so if you want to use the full functionality of the product.

Licensing information:
System host ID: 632339303
Host type: 9000/800/N4000-55

Are you prepared to enter a license key [y,n,q] (default: n)
Do you want to use enclosure based names for all disks? [y,n,q,?] (default: n)
Populating VxVM DMP device directories ....

The Volume Daemon has been enabled for transactions.
Starting the relocation daemon, vxrelocd.
Starting the cache daemon, vxcached.
Starting the diskgroup config backup daemon, vxconfigbackupd.

Do you want to setup a system wide default disk group? [y,n,q,?] (default: y) n

a. If you have a "Storage Foundation License" from Veritas, you would enter it here. I took the defaults on all except the last question because I choose to name my disk groups separately; note the red n above.

2. If this is not the first Compellent device added to the system or you have already enabled VxVM, issue the following command: "vxdisk scandisks new". The system will return to the prompt if the command executes correctly; and be patient, this command will take a while.

3. To see the device name of your new device(s) issue the following command: "vxdisk list". The system will respond with:

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>TYPE</th>
<th>DISK</th>
<th>GROUP</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>c16d0</td>
<td>auto:LVM</td>
<td>-</td>
<td>-</td>
<td>LVM</td>
</tr>
<tr>
<td>c27d0</td>
<td>auto:LVM</td>
<td>-</td>
<td>-</td>
<td>LVM</td>
</tr>
<tr>
<td>c28d0</td>
<td>auto:none</td>
<td>-</td>
<td>-</td>
<td>online invalid</td>
</tr>
</tbody>
</table>

d. The new device should appear in this list with a status of "online invalid". There is one caveat to this approach, if the system is running a database and is using raw disk devices for storage, VxVM will show the devices but they will appear unused. You'll have to issue the following command: "ll /dev/rdsk". The system will respond with:

total 0
chrfr----- 1 bin sys 188 0x0000000 Sep 10 08:10 c0t0d0
chrfr----- 1 bin sys 188 0x0a0000 Sep 10 13:48 c10t0d0
chrfr----- 1 bin sys 188 0xb0000 Dec 7 15:29 c27t0d0
chrfr----- 1 bin sys 188 0xc0000 Dec 7 15:29 c28t0d0
chrfr----- 1 bin sys 188 0xd0000 Dec 7 15:29 c29t0d0
a. If the ownership of any of the devices is NOT bin:sys, then your system is probably using raw devices for database space. You must not use any devices that are not owned by bin:sys for VxVM.

5. To initialize the device for use with VxVM, issue the following “vxdisksetup -i c28t0d0 format=hpdisk”. The system will return to the prompt if the command worked correctly. Issue another “vxdisk list” to confirm:

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>TYPE</th>
<th>DISK</th>
<th>GROUP</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>c1t6d0</td>
<td>auto:LVM</td>
<td>-</td>
<td>-</td>
<td>LVM</td>
</tr>
<tr>
<td>c27t0d0</td>
<td>auto:LVM</td>
<td>-</td>
<td>-</td>
<td>LVM</td>
</tr>
<tr>
<td>c28t0d0</td>
<td>auto:hpdisk</td>
<td>-</td>
<td>-</td>
<td>online</td>
</tr>
</tbody>
</table>

a. Disk type “cdsdisk” is not compatible with root, boot, swap, Extensible Firmware Interface (EFI) and mirroring usages. It is recommended that you initialize LUNs as type “hpdisk” which is a ‘simple’ disk type. If the LUN needs to be converted to “cdsdisk” later, it can be via the “vxcdsconvert” command. It is easier to convert to “cdsdisk” from “hpdisk” than vice-versa.

b. If you had presented storage to the server before enabling Veritas, the storage may be initialized to type “cdsdisk”. To fix this, issue the following “vxdisksetup -if c28t0d0 format=hpdisk”.

Create VxVM Disk Group

1. Next, we need to create a disk group; so we issue the following command: “vxdg init testdg c28t0d0 cds=off”. The system will return a prompt. To check for the new disk group, issue “vxprint –h”; the system will respond with:

<table>
<thead>
<tr>
<th>TY</th>
<th>NAME</th>
<th>ASSOC</th>
<th>STATE</th>
<th>STATE</th>
<th>LENGTH</th>
<th>PLOFFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>dg</td>
<td>testdg</td>
<td></td>
<td>testdg</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>dm</td>
<td>c28t0d0</td>
<td>c28t0d0</td>
<td></td>
<td>31454624</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Create and mount VxVM Volume

1. Now, we need to create a volume and since we want to use all of our space, we issue the following command: “vxassist -g testdg maxsize”; the system will respond with:

Maximum volume size: 31454208 (30717Mb)

2. So then the command to create the largest volume we can in ‘testdg’ is: “vxassist -g testdg make testvol 30717m”; the system will return to the prompt, so to check on our new volume, we issue another “vxprint –h”. If everything has gone well to this point, the system will respond with:
### Disk group: testdg

<table>
<thead>
<tr>
<th>TY</th>
<th>NAME</th>
<th>ASSOC</th>
<th>KSTATE</th>
<th>LENGTH</th>
<th>PLOFFS</th>
<th>STATE</th>
<th>TUTIL0</th>
<th>PUTIL0</th>
</tr>
</thead>
<tbody>
<tr>
<td>dg</td>
<td>testdg</td>
<td>testdg</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>dm</td>
<td>c28t0d0</td>
<td>c28t0d0</td>
<td>-</td>
<td>31454624</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>v</td>
<td>testvol</td>
<td>fsgen</td>
<td>ENABLED</td>
<td>31454208</td>
<td>-</td>
<td>ACTIVE</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pl</td>
<td>testvol-01 testvol</td>
<td>ENABLED</td>
<td>31454208</td>
<td>-</td>
<td>ACTIVE</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>sd</td>
<td>c28t0d0-01 testvol-01</td>
<td>ENABLED</td>
<td>31454208</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

3. In order to use the volume, we have to create a filesystem on it. To do that, we issue the following command:

   ```shell
   newfs -F vxfs -o largefiles /dev/vx/rdsk/testdg/testvol
   ```

   Notice the `largefiles` option in the `newfs` command, this is to allow for single files to be larger than 2GB. The system will respond with:

   **version 5 layout**
   31454208 sectors, 31454208 blocks of size 1024, log size 16384 blocks
   unlimited inodes, largefiles supported
   31454208 data blocks, 31429840 free data blocks
   960 allocation units of 32768 blocks, 32768 data blocks
   last allocation unit has 29696 data blocks

4. To mount the filesystem on boot we add the following line to the `/etc/fstab` file:

   ```bash
   /dev/vx/dsk/testdg/testvol /vxtest vxfs largefiles, delaylog 0 2
   ```

5. Again, notice the `largefiles` option in the `/etc/fstab` entry, this is to allow for single files to be larger than 2GB. Issue a `mount -a` command. The system will respond with something like:

   ```bash
   mount: /dev/vgtest/lvol1 is already mounted on /test
   mount: /dev/vg00/lvol8 is already mounted on /var
   mount: /dev/vg00/lvol7 is already mounted on /usr
   mount: /dev/vg00/lvol6 is already mounted on /opt
   mount: /dev/vg00/lvol5 is already mounted on /home
   mount: /dev/vg00/lvol4 is already mounted on /tmp
   mount: /dev/vg00/lvol1 is already mounted on /stand
   ```

6. To check and see if we have the filesystem we are expecting we issue a `bdf`. The system will respond with something like:

   ```bash
   Filesystem kbytes used avail %used Mounted on
   /dev/vg00/lvol3 585728 319360 264344 55% /
   /dev/vg00/lvol1 295024 85168 180352 32% /stand
   /dev/vg00/lvol8 2899968 2097872 796760 72% /var
   /dev/vg00/lvol7 3780608 1828688 1936728 49% /usr
   /dev/vg00/lvol4 204800 61168 142576 30% /tmp
   /dev/vg00/lvol6 4112384 3336128 770216 81% /opt
   /dev/vg00/lvol5 20480 8488 11904 42% /home
   /dev/vx/dsk/testdg/testvol 31454208 24178 29465661 0% /vxtest
   ```