


HP-UX LVM Comparison with Tru64 UNIX LSM

Thomas Aussmann
Consultant Proactive Services
Hewlett-Packard GmbH
thomas.aussmann@hp.com


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Agenda

- Volume Manager Overview
- Logical Volume Manager (LVM)
- Logical Storage Manager (LSM)
- VxVM – LSM Feature Comparison
- Tru64 to HP-UX Migration Solutions
- Resources


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Volume Manger Overview

- Comparison may fail
 - No LVM within Tru64 UNIX
 - Only abstraction Layer within Tru64 UNIX
 - Tru64 UNIX LSM similar to VERITAS VxVM
 - Based on VxVM V2.3 code base


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Volume Manager Overview

- Tru64 UNIX
 - abstraction layer between physical disk and file system
 - Logical volume is implemented through
 - Hardware (RAID)
 - Device driver (partition, LSM)
 - File system (AdvFS)
 - no management for logical volumes needed
 - No LVM commands available
 - Must configure RAID, AdvFS or partitions, though


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Volume Manager Overview

- HP-UX
 - More than abstraction layer
 - Used for managing disk partitions
 - Limitations:
 - No striped mirrors
 - No hotspare
 - No RAID5
 - „whole disk approach“ (no LVM)
 - File system cannot span multiple disks
 - Only one file system partition
 - Difficult to extend


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Logical Volume Manager (LVM)

- LVM naming
 - Physical volume
 - Volume group
 - Logical volume
 - Associated to volume group
 - LVM extent
 - Smallest allocatable unit of space
 - Associated to logical volume


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Logical Volume Manager (LVM)

- LVM commands
 - „pvcreate“, initialize a physical volume
 - Write physical volume reserved area
 - Write volume group reserved area
 - Physical volume is broken into physical extents (PE)
 - „vgcreate“, create volume group
 - Groups logical volumes
 - „lvcreate“, create logical volumes
 - Creates both block and raw LV
 - Consists of sequentially numbered logical extents (LE)
 - LE points to PE on physical volume
 - Contains file system

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Logical Volume Manager (LVM)

- Look at LVM configurations with
 - pvdisplay, vgdisplay, lvdisplay
- Delete LVM configurations with
 - pvremove, vgremove, lvremove
- Extend LVM configurations with
 - vgextend (add physical volumes to group)
 - lvextend (increase space or mirror to volume)
- Reduce LVM configurations with
 - vgreduce (remove physical volumes from group)
 - lvreduce (reduce space or number of mirror copies)


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```

(A) futurama - PowerTerm 525
wallace:~# lvs
--- Logical volumes ---
LV Name      /dev/vg00/lvol2
VG Name      /dev/vg00
LV Permission read/write
Mirror LV Status available/syncd
---snip---
---snip---snip---
PV
--- Distribution of logical volume ---
/d PV Name      LE on PV  PE on PV
/d  /dev/dsk/c1t15d0 750      750
/d  /dev/dsk/c3t15d0 750      750
---
LE
--- Logical extents ---
LE  PV1      PE1  Status 1  PV2      PE2  Status 2
00  00000 /dev/dsk/c1t15d0 00075 current /dev/dsk/c3t15d0 00075 current
00  00001 /dev/dsk/c1t15d0 00076 current /dev/dsk/c3t15d0 00076 current
---snip---
00  00748 /dev/dsk/c1t15d0 00823 current /dev/dsk/c3t15d0 00823 current
00  00749 /dev/dsk/c1t15d0 00824 current /dev/dsk/c3t15d0 00824 current
wallace:~#
wallace:~#

```


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- ## Logical Volume Manager (LVM)
- Additional commands
 - vgchange (activate/deactivate, control membership)
 - Related to ServiceGuard
 - vgcfgbackup (create or update group configuration)
 - vgcfgrestore (display or restore group configuration)
 - Displays only vgcfgbackup info, no life configuration
 - lvsplit, lvmerge (split or merge LVM mirror)
 - vgsync, lvsync (LVM mirror synchronization)
 - Even more commands for:
 - Boot disk preparation, export/import of volume groups, ...
 - [HP-UX LVM Reference](#)



Logical Volume Manager (LVM)

- Things to take care off
 - lvextend adds space, does not notify file system
 - FS superblock and metadata structures need notification
 - umount, extendfs and mount file system
 - Or use fsadm utility for online notification/expansion (license)
 - lvreduce may corrupt data
 - Backup, umount, newfs, mount and restore FS
 - fsadm utility works sometimes
 - Checks for used blocks at end of FS
 - Defragment may help
 - Reducing FS does not reduce logical volume

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Logical Volume Manager (LVM)

- LVM and VERITAS VxVM can co-exist
 - On same system but not on same disk
 - LVM and VxVM configuration data located on disks
- VERITAS VxVM is mandatory for VERITAS CFS
- No need to use LVM for root anymore
 - VERITAS VxVM has rootability
- LVM will continue to be enhanced
 - LVM will remain HP-UX 11i default volume manager

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Logical Volume Manger (LVM)

- LVM Example

- Initialize disk
 - `pvcreate /dev/rdisk/c0t0d0`
- Create pseudo device for LVM subsystem
 - `mkdir /dev/vg01`
 - `mknod /dev/vg01/group c 64 0x030000`
- Create logical volume
 - `lvcreate -L <size> -n <name> /dev/vg01`
- Create and mount file system
 - `newfs <special>`
 - `mount ...`

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Logical Volume Manger (LVM)

- Default system disk layout

<code>/dev/vg00/lvol3</code>	<code>/</code>	<code>vxfs</code>
<code>/dev/vg00/lvol1</code>	<code>/stand</code>	<code>hfs</code>
<code>/dev/vg00/lvol4</code>	<code>/tmp</code>	<code>vxfs</code>
<code>/dev/vg00/lvol5</code>	<code>/home</code>	<code>vxfs</code>
<code>/dev/vg00/lvol6</code>	<code>/opt</code>	<code>vxfs</code>
<code>/dev/vg00/lvol7</code>	<code>/usr</code>	<code>vxfs</code>
<code>/dev/vg00/lvol8</code>	<code>/var</code>	<code>vxfs</code>

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HP invent

Logical Volume Manger (LVM)

```

# vgdisplay
--- Logical volumes ---
VG Name                /dev/vg00/lvol1
VG Write Access        available/syncd
VG Status               available/syncd
Max Logical Size       300
Current LE              75
Open Filesystem        0
Allocated PE           75
Used PV                 1

LV Name                /dev/vg00/lvol2
LV Status               available/syncd
LV Size (Mbytes)       512
Current LE              128
Allocated PE           128
Used PV                 1

LV Name                /dev/vg00/lvol3
LV Status               available/syncd
LV Size (Mbytes)       200
Current LE              50
Allocated PE           50
Used PV                 1

LV Name                /dev/vg00/lvol4
LV Status               available/syncd

```


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HP invent

Logical Storage Manager (LSM)

- Tru64 UNIX LSM based on V2.3 VxVM code
 - VxVM commands and outputs almost equal to LSM
 - Just replace „vol“ with „vx“
- Various shell-level LSM commands available
 - volassist, volclonedg, vold, voldctl, voldg, voldisk, voldiskadd, voldiskadm, voldisksetup, voledit, volencap, volevac, volinfo, volinstall, voliod, vollogcnvt, volmake, volmend, volmigrate, volmirror, volnotify, volplex, volprint, volreattach, volreconfig, volrecover, volrestore, volrootmir, volsave, volsd, volsetup, volstat, voltrace, volume, volunmigrate, volunroot, volwatch
- GUI based commands „lmsa“, „dxlsm“


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Logical Storage Manager (LSM)

- LSM naming
 - Subdisk
 - Logical representation of contiguous disk blocks
 - Compare with LVM PE's
 - Plex
 - Made up of one or more subdisks
 - Instance of volume data
 - Volume
 - Contains at least one plex; two or more for mirror volume
 - Virtual disk device
 - Contains file system
 - Compare with LVM LV's


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Logical Storage Manager (LSM)

- LSM naming cont.
 - Diskgroup
 - Collection of disks belonging to named group
 - Compare with LVM volume group
 - Disk
 - physical disk
 - Equal to LVM physical volume
 - Private region
 - Contains LSM configuration data, compare with VGRA/PVRA
 - Public region
 - Contains either free space or subdisks

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LVM – LSM Comparison

LSM Term	LVM Term
•Physical Disk	•Physical volume
•Subdisk	•Physical extent
•Volume	•Logical volume
•Disk group	•Volume group
•Private region	•PVRA/BDRA/VGRA
•Free space	•Unused physical extent
•Plexes	•Mirrors
•Dirty Region Logging (DRL)	•Mirror Write Cache (MWC)
•Dynamic multipathing*	•PVlinks

* VxVM term, no need for that within Tru64 UNIX V5.*


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VxVM - LSM Feature Comparison

	HP-UX 11i v2 VxVM 3.5	Tru64 5.1B LSM (VxVM 2.3 Code Base)
Layered Volumes	Yes	No
RAID 5	Yes	Yes
VMSA GUI, VEA GUI	Yes	Ismsa
Online Relayout (vxrelayout)	Yes	No
Dirty Region Logging	Yes	Yes
Disassociating a plex for backup (volpex dis plex)	Yes	Yes
Snapshot volumes (volassist snapshot ...)	Yes	Yes
Non-Persistent Fast Resync (Fast Mirror Resynchronization (FMR))	Yes	No
Persistent Fast Resync (Data Change Object (DCO))	Yes	Wildcat 5.1B (Smash and Resilvering Log (SRL))
SmartSync Recovery Accelerator for Databases	Yes	No
Hot Spares / Relocation	Yes	Yes
Dynamic MultiPathing (DMP)	Yes	NA - base OS handles in SCSI/CAM


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VxVM - LSM Feature Comparison

Power Fail Timeout vxpft	Yes	NA - handled in SCSI/CAM
Task Management vxtask	Yes	No
Autoconfig	Yes	Yes
Config load balancing	Yes	Yes
Dynamic IO Sizes	Yes	Yes
Configuration Saving	Yes (dgcfgbackup, dgcfgrestore)	Yes (volsave, volrestore)
Limits: Volume Size	2TB	1TB
Limits: Number of Volumes	None	8189
Limits: Plexes per Volume	32	32
Limits: Plexes	None	8189
Limits: Number of Disks	None	None
Limits: Number of diskgroups	None	None


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Tru64 to HP-UX Migration Solutions

<i>Existing Tru64 Solutions</i>	<i>Equivalent HP-UX Solutions</i>
<i>LSM</i>	<i>VxVM + HP File Mover Tool</i>
<i>AdvFS</i>	<i>VxFS + HP File Mover Tool</i>
<i>AdvFS & LSM</i>	<i>Storage Foundation + HP FMT</i>
<i>TruCluster (v4 and v5)</i>	<i>HP Serviceguard + Storage Foundation (v4) or Storage Foundation CFS (v5)</i>
<i>TruCluster for Oracle customers (v4 and v5)</i>	<i>HP Serviceguard + Storage Foundation (v4) for Oracle or Storage Foundation CFS for Oracle (v5)</i>
<i>TruCluster for Oracle RAC customers (v5)</i>	<i>HP Serviceguard + Storage Foundation CFS for Oracle RAC</i>


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Tru64 to HP-UX Migration Solutions

- HP File Mover Tool (FMT)
 - Designed to assist customers with data migrations
 - In-house application developed by HP
 - Still beta but will be released soon
 - Moves directory contents
 - Source system (Tru64 UNIX) Target system (HP-UX 11i)
 - Will not handle ISV files (database files for instance)
 - Will not handle application binaries
 - Will handle SOME endian issues
 - Incompatible file systems between Tru64 UNIX and HP-UX
 - Endian conversion program for customer specific binary formats

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Tru64 to HP-UX Migration Solutions

- HP File Mover Tool
 - Client Server Design
 - A set of programs that operate in four sequential stages
 - Stage 1: Analysis
 - Stage 2: Transfer
 - Stage 3: Endian Conversion (optional)
 - Stage 4: Verification

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Resources

- HP-UX System and Network Administration Course Material
- [HP-UX LVM online reference](#)
- [Tru64 UNIX Logical Storage Manager](#)
- [Tru64 UNIX HP-UX Transition Tools](#)
- [Tru64 UNIX HP-UX Transition Modules](#)

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