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Performing MySQL Backups using LVM Snapshots

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Session content

- Introduction to LVM
Features, Benefits, Terminology, Tools
- LVM Snapshots
Overview, Features, Use case
- Backing up MySQL using Snapshots
Benefits, Procedure, Caveats
- mylvmbackup
- Practical hints & recommendations
- Related tools & technologies

Introduction to LVM

- Storage Virtualisation / Abstraction for Linux
- Initially developed by Sistina (now Red Hat)
- More flexible than partitioned disks:
 - Online adding/removing of volumes
 - Online resizing/moving of volumes
 - Grouping of volumes
- Beneficial for both large and small storage systems

Terminology

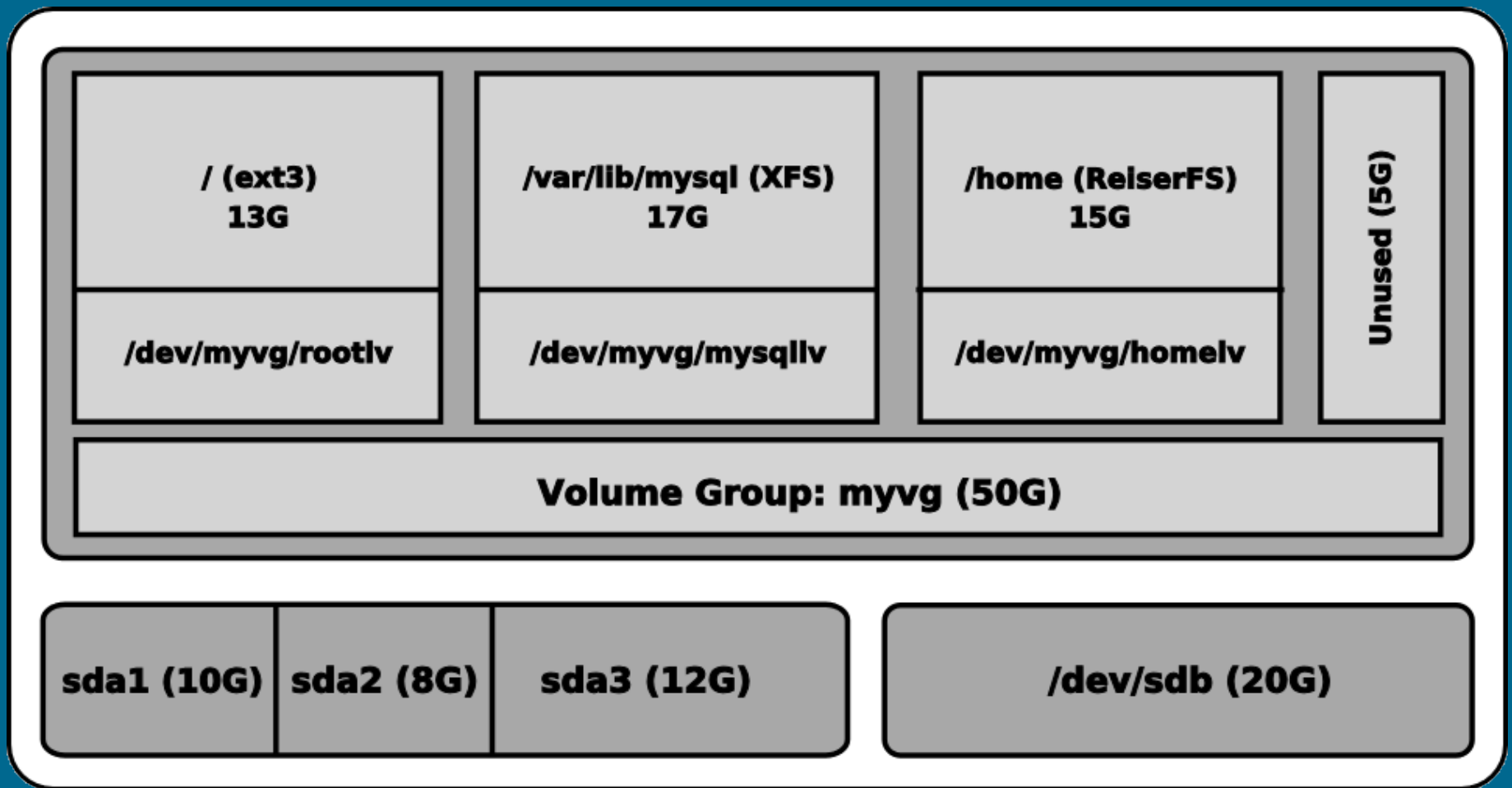
- Logical Volume (LV)
- Logical Extent (LE)
- Volume Group (VG)
- Physical Volume (PV)
- Physical Extent (PE)

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Overview



- **Commandline**
PVs: pvcreate, pvdisplay, pvmove, pvresize ...
VGs: vgcreate, vgdisplay, vgextend, vgreduce ...
LVs: lvcreate, lvdisplay, lvextend, lvreduce...
- **YaST2 (openSUSE/SLES)**
- **Disk Setup & system-config-lvm (Fedora/RHEL)**
- **IBM EVMS tools (GUI, CLI)**
- **LVM GUI (Java)**

LVM Snapshots

- Atomic, instant & exact copy of another LV
- Low disk space requirements (COW)
- LVM2 provides read & write access on snapshots
 - useful for testing purposes (e.g. software updates)
 - or cloning Xen DomU instances

Benefits of MySQL snapshot backups

- “Almost hot” (no downtime)
- Supports all storage engines
- Fast, low overhead
- Easy integration
- Fast recovery
- Free



Picture taken by Travis Gray (flickr)

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General procedure

- FLUSH TABLES
- FLUSH TABLES WITH READ LOCK
- Create the snapshot (lvcreate -s)
- (SHOW MASTER/SLAVE STATUS)
- UNLOCK TABLES
- Mount snapshot, perform backup
- Unmount and discard the snapshot (lvremove)

Caveats / Gotchas

- InnoDB ignores FLUSH TABLES WITH READ LOCK
- FLUSH TABLES performance impact
- I/O impact while snapshot is active
- Handling data spread on multiple volumes (e.g. logs on separate LV, DBs spread across multiple LVs)

mylvmbbackup

- Perl script (GPLv2)
- Creates tar.gz archives or directory copies (using rsync)
- Can perform InnoDB log recovery on the snapshot prior to backup (LVM2)
- <http://www.lenzg.org/mylvmbbackup/>

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General hints & recommendations

- File system recommendations
XFS, ReiserFS (support online resizing of Lvs)
- Snapshot size considerations

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Related tools & technologies

- Zumastor
- ZFS snapshots/clones
- SAN snapshots
- ext3cow
- Time Machine (Mac OS X)
- Veritas Volume Manager (VxVM)
- Volume Shadow Service (VSS) for MS Windows Server 2003
- SGI XVM / HP-UX LVM

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- Questions / suggestions / ideas?

Thank you!

- Lenz Grimmer <lenz@grimmer.com>
- <http://www.lenzg.org/mylvmbackup/>
- <http://tldp.org/HOWTO/LVM-HOWTO/>

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