Performing MySQL Backups using LVM Snapshots

Presented by,
MySQL AB® & O'Reilly Media, Inc.

2008-04-16
MySQL Conference & Expo 2008
Santa Clara, CA, USA

Lenz Grimmer <lenz@mysql.com>
MySQL Community Relations Manager
Database Group, Sun Microsystems Inc.

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

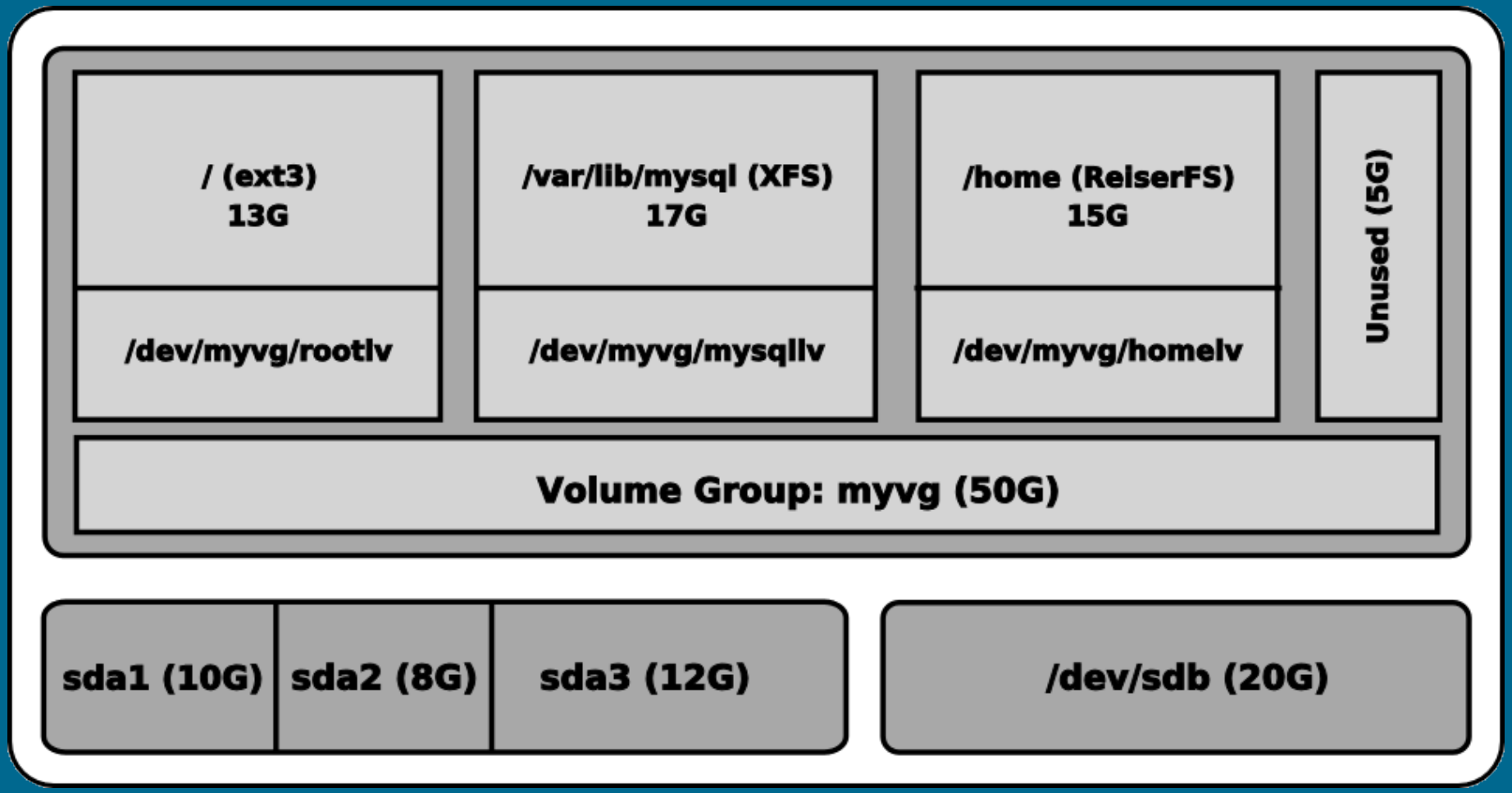
Introduction to LVM

- 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)

Overview


/ (ext3)
13G
/var/lib/mysql (XFS)
17G
/home (ReiserFS)
15G
Unused (5G)
/dev/myvg/rootlv
/dev/myvg/mysqllv
/dev/myvg/homelv
Volume Group: myvg (50G)
sda1 (10G)
sda2 (8G)
sda3 (12G)
/dev/sdb (20G)

Tools

- 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)

General procedure

- FLUSH TABLES
- FLUSH TABLES WITH READ LOCK
- Create the snapshot (lvcreate -s)
- (SHOW MASTER 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)

mylvmbackup

- Perl script (GPL)
- Creates tar.gz archives or directory copies (using rsync)
- Performs InnoDB log recovery on the snapshot prior to backup (LVM2)
- http://www.lenzg.org/mylvmbackup/

General hints & recommendations

- File system recommendations

  XFS, ReiserFS (support online resizing of Lvs)
- Snapshot size

Related tools & technologies

- 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

Q&A

- Any questions/suggestions/ideas?