



# RAID / LVM

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## Redundant Array of Inexpensive Disks

Logical Volume Manager

# Redundant Array of Inexpensive Disks

- ▶ Disk abstraction technology
- ▶ Speed / Redundancy
- ▶ Multi-disk
- ▶ Multiple RAID levels
  - ▶ Striping
  - ▶ Parity
  - ▶ Mirroring
  - ▶ Multi-path (Linux)

# Striping

- ▶ Every other chunk of data on the virtual disk written to different device.
- ▶ Speed
  - ▶ Writes parallel
  - ▶ Read parallel
- ▶ Not redundant

# Parity

- ▶ At least a disk's worth of space used
- ▶ XOR parity information stored
- ▶ Redundant
- ▶ Can only handle 1 device failure per layer of parity
- ▶ Slow

# Mirroring

- ▶ Data repeated across multiple devices
- ▶ Redundant
- ▶ Handles any number of disk failures
- ▶ Speed
  - ▶ Fast reads
  - ▶ Slow writes

# Levels

RAID 0 Striping

RAID 1 Mirroring

RAID 2 Striping at the bit level

RAID 3 Striping at the byte level  
Dedicated parity disk

RAID 4 Striping  
Dedicated parity disk

RAID 5 Striping  
Distributed parity

RAID 6 Striping  
Two layers of distributed parity



Redundant Array of Inexpensive Disks

Logical Volume Manager

# Logical Volume Manager

- ▶ Disk abstraction technology
- ▶ Can do RAID, not meant for RAID
- ▶ Makes handling disks easier

# Overview

- ▶ Physical Volumes
- ▶ Volume Groups
- ▶ Logical Volumes

# Physical Volumes

- ▶ Actual drives
- ▶ Declared with 'pvcreate'
- ▶ Any block device

# Volume Groups

- ▶ Groups of physical volumes
- ▶ Declared with 'vgcreate'
- ▶ LVM's equivalent of a hard drive
- ▶ Support for thin sub-volumes

# Logical Volumes

- ▶ Devices created on Volume Group
- ▶ LVM's equivalent of a partition
- ▶ Stored in no particular order
- ▶ Stored on no particular drive
- ▶ Resize-able
- ▶ Snapshot-able
- ▶ Mirror-able
- ▶ Stripe-able
- ▶ Created using 'lvcreate'

# What to get out of this

There is no right way to do LVM, it instead depends on exactly what kind of setup you want.