RAID and mirroring

Track SA-E

AfNOG workshop

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(Slides by Phil Regnauld)

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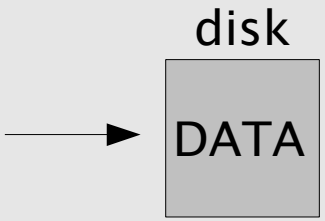
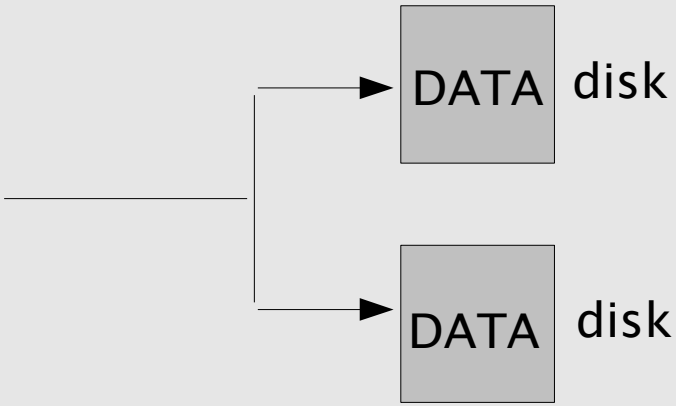
Types of redundancy

- There are different levels of redundancy:
  - none – if a disk crashes, data is lost



  - RAID1 – 2 disks are mirrored, data is written to both disks at any time. One disk can be lost without losing data.



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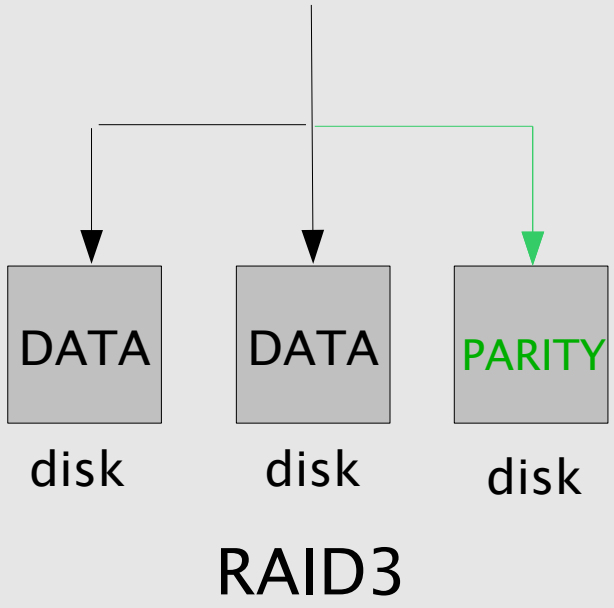
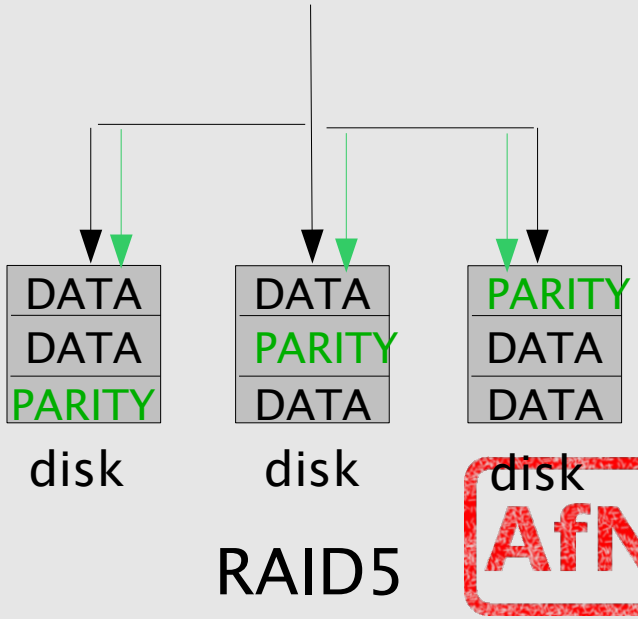
Types of redundancy

- RAID3, RAID5 – data is distributed across several disks, data parity, used to rebuild a defective drive, is either placed on a dedicated drive (RAID3) or across all drives (RAID5):





Types of redundancy

- In case of a disk failure, the failed disk can be rebuilt...
  - RAID1 -> from the remaining disk (1-1 copy)
  - RAID3 -> from the remaining data + parity disk
  - RAID5 -> from the parity blocks on other disks

Hardware or software ?

- In *general*, hardware RAID is more transparent to the user, and disk replacement is straightforward:
  - remove defective disk
  - install new disk
  - RAID controller detects this and starts rebuilding on new disk
- (Note: real hardware RAID controllers, NOT BIOS RAID such as Promise)

Hardware or software ?

- RAID3 and 5 can be complex to implement in software (in the OS), so hardware might be a better choice
- But what happens if the RAID controller dies? How does one recover if one does not have a spare controller?
- Consider having a spare controller for RAID3/RAID5

(Note: we mean real hardware RAID controllers, *not* BIOS software RAID such as Promise)

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Hardware or software ?

- RAID1 is easy to recover from and easier to implement in software (within the OS) – worst case, all one needs is to skip a header at the beginning of each disk.
- FreeBSD and Linux have very good software RAID implementations nowadays
- In FreeBSD, at least 3 implementations:
  - gmirror
  - ccd
  - gvinum (also RAID5, but not recommended)

FreeBSD: gmirror

- gmirror is very easy to set up, many howtos available:
- http://www.freebsd.org/doc/en_US.ISO8859-1/books/handbook/geom-mirror.htm
- http://dannyman.toldme.com/2005/01/24/freebsd-howto-gmirror-system/
- http://www.onlamp.com/pub/a/bsd/2005/11/10/FreeBSD_Basics.html

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Building a mirror - demo

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