Linux Administration

Disks and filesystems

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Disks partionning

- At a minimum, Linux will require to partitions on a hard drive:
  - a system and data partition
  - a swap partition
- The swap space is used when the physical memory is reaching its limits.
- It is usually recommended to use different partitions for the system and the data.

Data redundancy

- When multiple physical hard drives are available, it is recommended to setup a RAID (Redundant Array of Independent Disks).
- RAID can be hardware-based (when a RAID controller is available) or software-based (managed by the operating system).
- This will provide some protection against hardware failure, but not against human error, malware or a major incident.
- RAID is not a backup system.

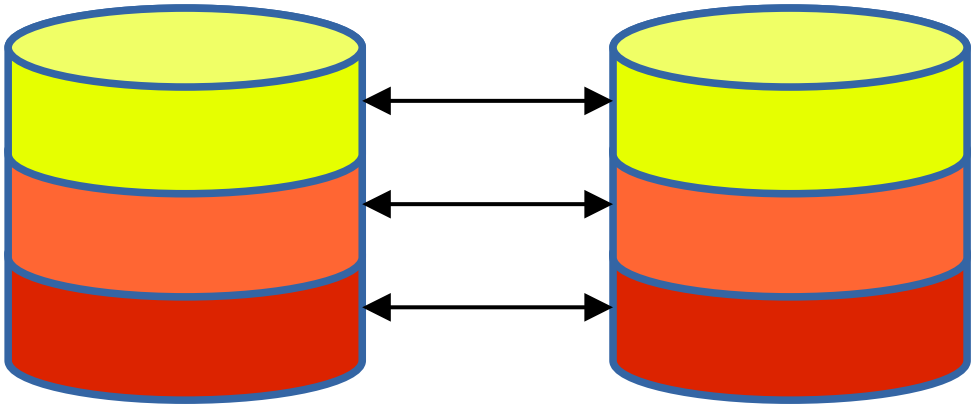
RAID 0

- Data is stripped between multiple disks.
- Increase performances.
- Doesn’t provide any protection.

two disks minimum

RAID 1

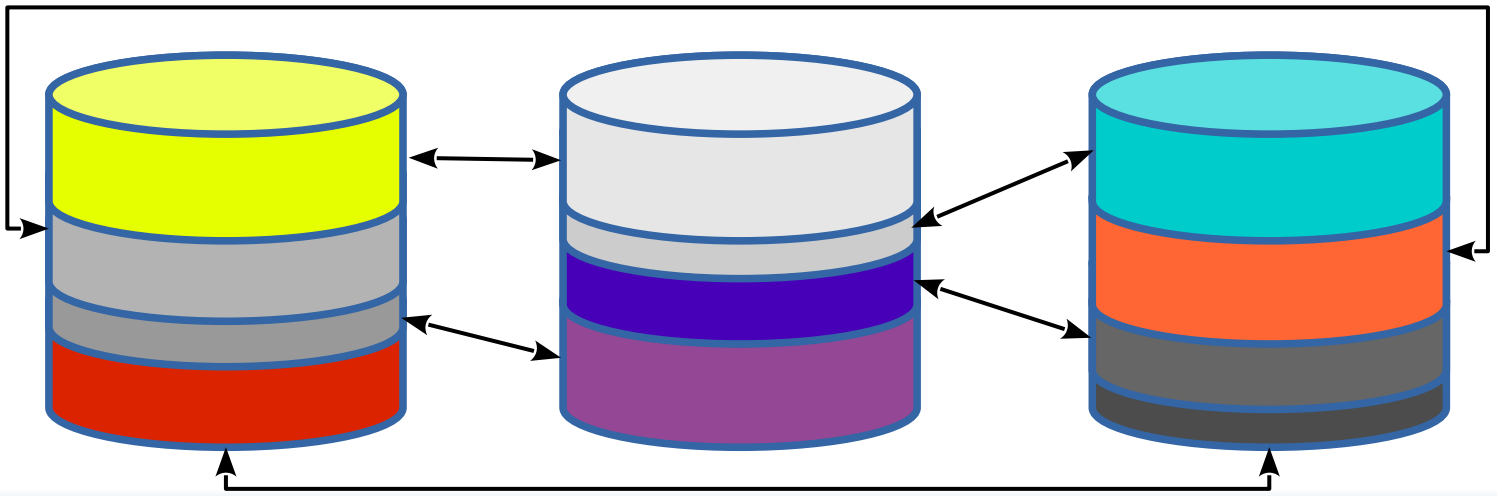
- Data is mirrored from one disk to another.
- Can survive to the loss of a disk.
- Expensive.



two
disks
minimum

RAID 5

- Data is stripped between multiple disks, with distributed parity.
- Can survive the loss of one disk.
- Cost effective.



three disks minimum

Creating a RAID array

- On a Linux system, you can create a software-based array using the *mdadm* utility.
- The hard drives should be partitioned properly first.
- That same tool will be used to manage the array later on (checking on status, adding or removing drives, …).

Drive partionning

- Various tools are available to create and manage disk partitions on a Linux system, the most commons are *fdisk* and *cfdisk*.
- Usually the system installer includes a step to create and manage partitions.

Logical Volume Management

- LVM provides an abstration layer between disk partitions and the operating system to provide specific functiunnality such as volume resizing, snapshots and more).
- Volume groups (VG) contains Physical Volumes (PV) that contains Logical Volumes (LV).

Disk encryption

- In order to protect system and data files, disk encryption is recommended, mostly for mobile devices.
- Linux Unified Key Setup (LUKS) is the encryption mechanism most commonly used.

Creating filesystems

- ext4 and xfs are the most common filesystems used with Linux.
- Partitions are usually formatted as part of the system installation.
- File data is saved in data blocks, metadata is saved in inodes, file names are saved in directories.

Identifiying disks

- Each partition will be identified by a file device (/dev/sda1 for the first partition on the first drive).
- The *lsblk* command can help identify devices.
- UUID (universally unique identifier) are also used to improve persistence.

/etc/fstab file

- This configuration file store all details for the partitions used by the system.
- Each partition will be listed with a name, a mounting point and some options.

Repairing filesystems

- In case a filesystem has not been umounted properly, the *fsck* (file system check) command may be executed automatically at the next boot, to attempt a repair.