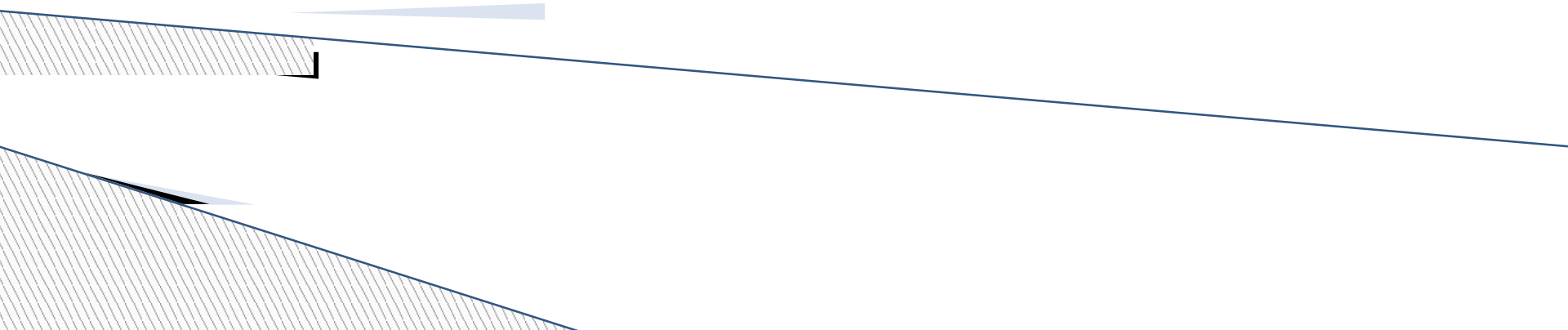# CST8207 GNU/Linux O/S I Disks and Partitions

Topics

Disk Partition Table
Identifying Partitions
Linux Partitions
fdisk

Associated Readings

Chapter 3: pages 71 – 82
You've already read this
it's about the partitioning that was done as you installed Fedora

What is a partition?

- A **partition** is a section of a disk. It can be all or part of the disk. It is usually formatted to contain a **file system**.
- The Master Boot Record of the disk (first sector) contains the **Partition Table**, which can hold exactly **four** partition entries
  - We only cover the **four**-entry MSDOS Partition Table type
  - Some programs can create more than four; rarely done
- Each **partition table entry** specifies its disk **start** location, **end** location, and whether it is **bootable**
- Partitions can be assigned **system identifiers** (or **types**), but the type may not match what is actually in the partition – you can put *anything* into any type of partition
- Some of the identifiers stand for multiple types - confusing

Three Types of Partitions

- Each of the **four** DOS partition entries on a disk can be either a **Primary partition** or an **Extended Partition**
- Up to **four** Primary Partitions are possible on a disk
- Only **one** of the four partition entries can be designated as an **Extended Partition** that may contain any number of additional **Logical Partitions** inside it (as many as you like)
- An **Extended Partition** takes one of the four slots and reduces the number of possible **Primary Partitions** to three
- You can create many **Logical Partitions** inside an **Extended Partition**, up to the size limit of the **Extended Partition**
- Some operating systems only *recognize* a limited number of **Logical Partitions** – check your O/S manual

Linux Disk Names – sd**?**
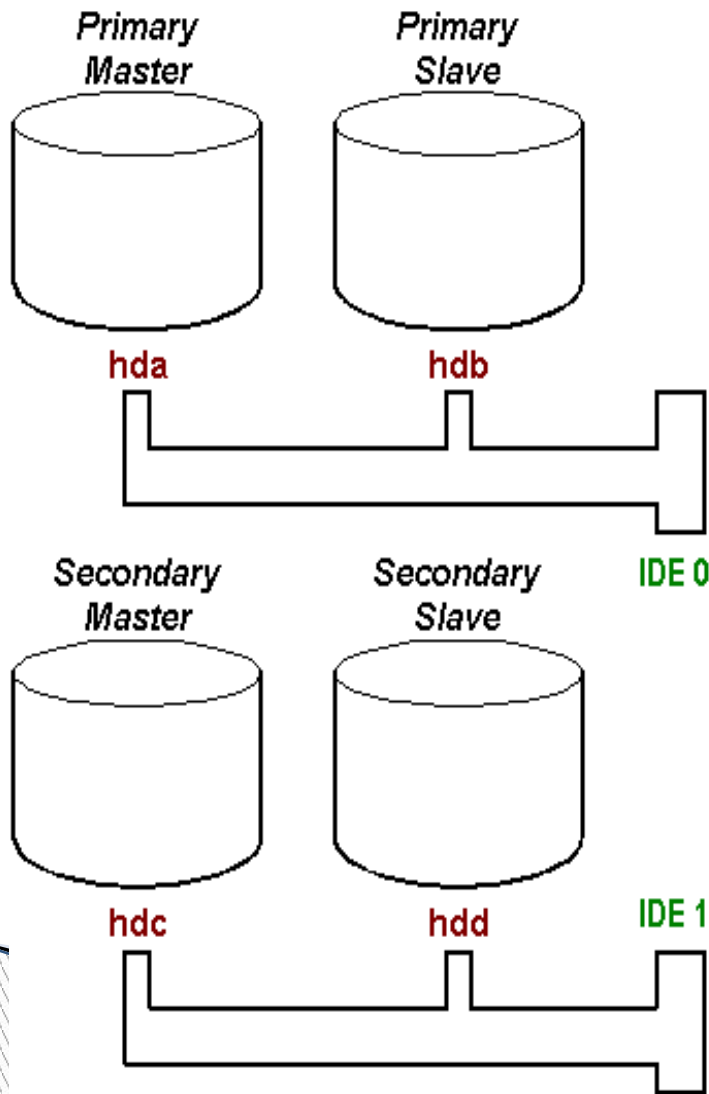
Naming disk drives – sd?

- Primary master ---   hda *or* **sda**
- Primary slave -----   hdb *or* **sdb**
- Secondary master -   hdc *or* **sdc**
- Secondary slave --   hdd *or* **sdd**
- Other disks: **sde**, **sdf**, **sdg**, etc.

- "**sd**" used to mean only SCSI disks, but modern Linux systems treat all disks, even IDE, ATA, and SATA, as SCSI disks and name them starting with "**sd**"

Primary Master — hda

Primary Slave — hdb

IDE 0

Secondary Master — hdc

Secondary Slave — hdd

IDE 1

Linux Partition Names
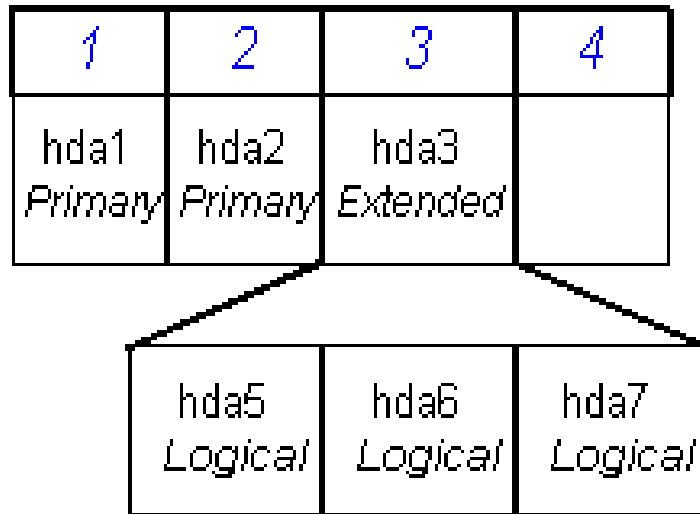
Naming partitions

Ø **sd?1 – sd?4**

- The four DOS partitions *always* use these **four** names

Ø **sd?5 – sd?63**

- Logical Partitions inside an Extended Partition *always* start at number **5**

- Maximum of 4 DOS primary/extended partition entries
- "*Any number*" of Logical Partitions inside Extended

Device Names in `/dev`

- Each disk and each partition is represented in the Linux file system as a separate "*device special file*", usually in the **`/dev`** directory:

  - **`/dev/sda`** represents the entire first disk (**`sdb`** is the second)

  - **`/dev/sda1`** is the first of four DOS partitions (**Primary** or **Extended**) of the first disk (**`sda2`** is the second primary/extended DOS partition)

- **Logical Partitions** inside an **Extended Partition** *always* start at **5**

  - **`/dev/sda5`** is *always* the first Logical Partition (**`sda6`** is the second)

- Partitions using the four DOS **Primary Partition** entries never change numbers when you create or delete them. They always number **1** to **4**.

- Logical Partitions are *always* numbered sequentially starting at number **5**; removing a Logical Partition causes all the **following** logical partition numbers to go down by one, e.g. 6 becomes 5, 7 becomes 6, etc.!

Required Linux Partitions

🖉 Linux can run inside only a single partition, the **ROOT** partition, but most Linux systems use at least two partitions:

- A *ROOT* partition (with the O/S and all your files)

  - e.g. it might be **/dev/sda1**

- A swap partition (to permit **virtual memory**)

  - e.g. **/dev/sda2** (if swap is a *primary* partition)

  - or **/dev/sda5** (if swap is a *logical* partition)

Programs for Partitioning

- Using the Microsoft **fdisk** program under DOS?
  - very limited Linux support – don't try
- Linux **fdisk** program – same name, different program
  - similar to DOS fdisk, but more features available
  - console/terminal-based – does not need a GUI
- console-based **parted** can handle more partition tables
- Other Linux graphical utilities may be used if you have a GUI (but many servers have no GUI!) e.g. *Disk Druid, gparted*
- Buy third-party stand-alone tools (e.g. *Partition Magic*, etc.)
  - Make sure the tool understands what's in the partitions!
  - Some tools only understand Microsoft/Apple partitions

Linux `fdisk` command

- **`fdisk`** is the universal command-line partition table manipulator for Linux: `fdisk [options] device`

  - The device is a **disk name** ("`/dev/sda`") *not* a partition name!

  - Useful "`-l`" option: `fdisk -l ; fdisk -l /dev/sda`

- allows for viewing or modifying existing partition table and/or creating new partition(s) for a specified device

- can set the Partition Type (system ID) for most of the common file systems in use today

- Does not change anything until you **write** out the partition table – remember to **save** your changes!

What is the maximum number of primary partitions allowed?

1. one
2. two
3. three
4. four
5. 63
6. as many as you like

What is the maximum number of extended partitions allowed?

1. one
2. two
3. three
4. four
5. 63
6. as many as you like

Which of these is the third partition of the second disk?

1. /dev/b3sd
2. /dev/a2sd
3. /dev/2asd
4. /dev/sd3b
5. /dev/sda2

6. /dev/sdb3
7. /dev/bs3d
8. /dev/as2d
9. /dev/3bsd
10. /dev/sd2a