

# Module 12

# Understanding Computer Hardware



# Exam Objective

## 4.2 Understanding Computer Hardware

### Objective Description

Familiarity with the components that go into building desktop and server computers



# Identifying Hardware and Viewing CPU Information

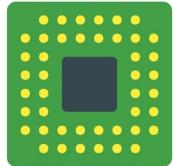


# Motherboards

- The main hardware board in the computer that connects the central processing unit (CPU), random-access memory (RAM) and other components.
- Hardware communicates via the motherboard or via system buses.

# Processors

- Central Processing Unit (also known as the CPU or processor) performs the decision and calculations for the Operating System.
- Connected to other hardware via the motherboard.
- Multiprocessor = system with more than one CPU.
- Multi-core = more than one processor on a single chip.



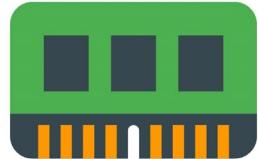
# Processors

- Two main processor types:
  - x86 (32 bit)
  - x86\_64 (64 bit)
- x86 invented in 1978, x86\_64 invented in 2000.
- X86 is limited to 4GB RAM.



# Random Access Memory (RAM)

- Random Access Memory (RAM) is where program and system data is stored.
- Virtual memory (swap space) is a filesystem type or file that is used when available RAM is low.
- The `free` command can display memory utilization.



```
sysadmin@localhost:~$ free -m
              total        used        free      shared  buffers   cached
Mem:       128920       56000      72919          0       1181    12110
          -/+ buffers/cache:      42709      86211
Swap:      131050           3     131047
```

# Buses

- A high-speed connection that allows communication between computers or internal components
- Peripheral Devices: Devices not directly attached to motherboard
  - Two common types:
    - Peripheral Component Interconnect (PCI)
      - `lspci` command
    - Universal Serial Bus (USB)
      - `lsusb` command

# Hard Drives

- Also called *disk devices*
- Can be connected directly to motherboard, to PCI or USB.
- Are divided into *partitions*, which are logical divisions of a hard drive that take large storage space and break it up into smaller chunks.
  - Two partitioning types:
    - Master Boot Record (MBR)
    - GUID Partitioning Table (GPT)

# Boot Records

- MBR
  - Older technology but still commonly used
  - Tools to view and modify MBR partitions
    - `fdisk`, `cfdisk`, `fsdisk`
- GPT
  - Newer technology and allows for larger partitions than MBR
  - Tools to view and modify GPT partitions
    - `gdisk`, `cdisk`, `sdisk`

# Solid State Disks

- Type of hard disk that has no moving parts or spinning disks, is effectively RAM or memory
- Advantages:
  - Lower power usage, less heat and vibration, and less time system booting and loading programs.
- Disadvantages:
  - Lower capacity due to higher cost and no ability to upgrade if soldered onto the motherboard.

# Optical Drives

- Removable storage media often referred to as CD-Roms, DVDs, or Blu-Ray.
- Removable drives are mounted on the Linux file system
  - Older distributions mount drives on `/mnt`
  - Newer distributions mount drives on `/media` or `/var/run/media`

# Managing Devices

- How do Linux distributions manage devices? Are the devices compatible?
  - Hardware devices need software, called *drivers*, that allows them to communicate with the operating system (OS).

# Video Display Devices

- Computers need a video display device to display output to an attached monitor.
- Video display devices can be built into or attached to the motherboard, as well as connected through PCI bus.

# Power Supplies

- Devices that convert alternating current (120v, 240v) into direct current that computer uses at various voltages (3.3v, 5v, 12v).
- These devices protect the computer from fluctuations in voltage coming from power source.
- Desktop and servers are more vulnerable to power fluctuations than laptop computers, which have an internal battery.