

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

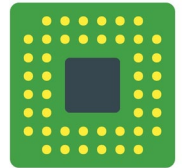
Identifying Hardware and Viewing CPU Information

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.

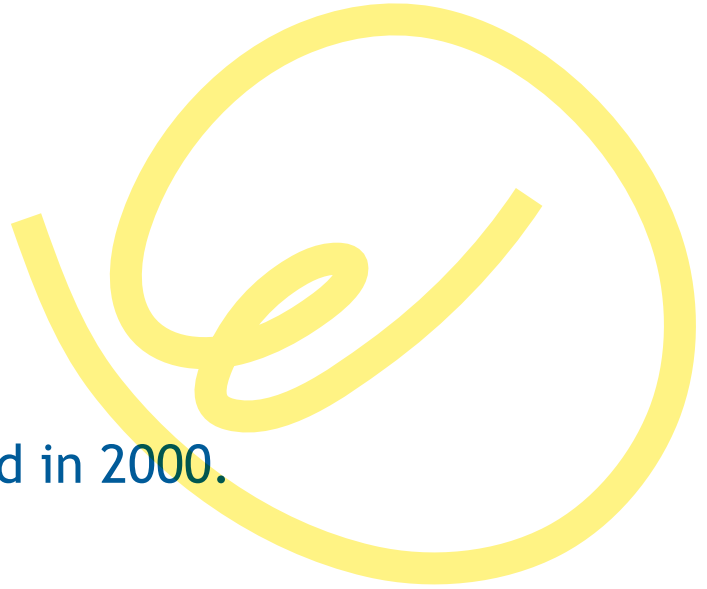
Processors

- 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.



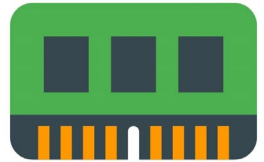
Processors

- 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.