

Topic 01A

Basic Structure of Computers

RECAP SUMMARY

Overview of Computer Concepts

Most devices encountered when working with a network involve a computer

Most obvious devices are workstations (PCs and laptops) and network servers running operating systems such as:

- Windows, Linux, UNIX, and Mac OS

Also includes routers and switches

Specialized computers used to move data from computer to computer and network to network

You will learn more about them in later chapters

Basic Functions of a Computer



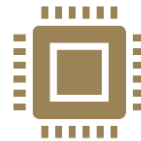
Input

A user types the letter 'A' on the keyboard, which results in sending a code representing the letter 'A' to the computer



Processing

The computer's CPU determines what letter was typed by looking up the keyboard code in a table



Output

The CPU sends instructions to the graphics cards to display the letter 'A', which is then sent to the computer monitor

Processing Components

CPU: a computer's main processing component

- Executes instructions from computer programs, such as word processors and from the computer's operating system

Current CPUs are composed of two or more processors called cores

- A multicore CPU is like a person with two brains
- Multicore CPUs enable computers to carry out multiple instructions simultaneously
- Results in better overall performance

Storage Components

The more storage a computer has, the better the performance

Most storage components are both input and output devices

Most people think of storage as disk drives, CD/DVD drives, and USB flash drives.

Two main categories of storage

- Short-term storage
- Long-term storage

VOLATILE MEMORY VERSUS NONVOLATILE MEMORY

VOLATILE MEMORY

Computer memory that requires constant power to maintain the stored information

Requires a consistent flow of power to retain data

Affects the system performance

Holds data temporary

Faster

Refers to primary storage type

Ex: RAM

NONVOLATILE MEMORY

Computer memory that can store information even there is no constant power

Does not require a consistent flow of power to retain data

Affects the system storage

Holds data permanently

Slower

Refers to secondary storage type

Ex: ROM, hard disk, floppy memory, Solid State Drive

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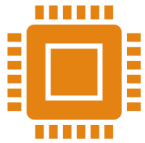
Short Terms vs Long Term Storage

Key component of motherboard

Table 1-2 Key components of a motherboard

Component	Description
CPU socket	The CPU is installed in this socket.
PCI bus expansion slots	Used to add functionality to a PC by adding expansion cards that have a Peripheral Component Interconnect (PCI) connector.
PCI-Express expansion slots	PCI-Express supersedes PCI and supports faster data transfer speeds. The larger slots are suitable for high-performance expansion cards, such as graphics cards and disk controllers. The smaller slots are best suited to sound cards and network interface cards.
RAM slots	Slots for installing RAM on the motherboard.
Chipset with heat sinks	The chipset consists of two chips referred to as the Northbridge and the Southbridge. These chips control data transfers between memory, expansion slots, I/O devices, and the CPU. The heat sink sits on top of the chipset to prevent it from overheating.
SATA connectors	Used for connecting hard drives and CD/DVD drives that use the Serial AT Attachment (SATA) specification.
IDE connector	Used for connecting Integrated Drive Electronics (IDE) hard drives and CD/DVD-ROM drives. Most systems now use SATA for hard drives and IDE for CD/DVD-ROM drives.
Main power connector	This connector is where the motherboard receives power from the system power supply.

Computer Bus Fundamentals



Data Bus

Used to carry data signals from main memory (Ram) to CPU and vice versa or from main memory (Ram) to input/output (I/O) devices vice versa



Address Bus

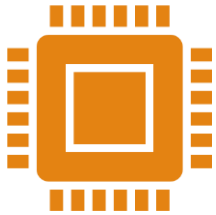
Used to carry address signals, example a memory location or port/interface where an input or output device is attached



Control Bus

Used to carry control signals, example read or write, from CPU to memory or port/interface

Interrupt and Polling



Polling

CPU keeps on checking I/O devices at regular interval whether it needs CPU service



Interrupt

the I/O device interrupts the CPU and tell CPU that it need CPU service.

HDD vs SSD

	Hard Disk Drive (HDD)	Solid State Drive (SSD)
Speed	HDD has higher latency, longer read/write times, and supports fewer IOPs (input output operations per second) compared to SSD.	SSD has lower latency, faster read/writes, and supports more IOPs (input output operations per second) compared to HDD.
Components	HDD contains moving parts - a motor-driven spindle that holds one or more flat circular disks (called platters) coated with a thin layer of magnetic material. Read-and-write heads are positioned on top of the disks; all this is encased in a metal case	SSD has no moving parts; it is essentially a memory chip. It is interconnected, integrated circuits (ICs) with an interface connector. There are three basic components - controller, cache and capacitor.
Weight	HDDs are heavier than SSD drives.	SSD drives are lighter than HDD drives because they do not have the rotating disks, spindle and motor.
Cost	Cheap	Expensive
Usage	Stores the documents you use as well as the applications that open those documents Stores the OS your computer loads when it boots	Most often found in mobile devices Also found in high-performance desktops and servers. Can be used to store

BIOS/CMOS

BIOS: basic input/output system

- Set of instructions located in a chip on the motherboard
- Tells the CPU to perform certain tasks when power is first applied to the computer
- One of those instructions is to perform a power-on self test (POST)
- When a computer boots, the BIOS program offers a chance to run the Setup utility in order to configure hardware components

CMOS: Complementary Metal Oxide Semiconductor

- This configuration is stored in a type of memory called complementary metal oxide semiconductor (CMOS)

Computer Boot Procedure

1. Power is applied to the motherboard
2. The CPU starts
3. The CPU carries out the BIOS startup routines, including the POST(Power-on self-test)
4. Boot devices, as specified in the BIOS configuration, are searched for an OS
5. The OS is loaded into RAM
6. OS services are started

NIC Basics and Wireless NIC

Computers that connect to a network requires a **Network Interface Card (NIC)** to create and mediate network connection.

- Contains MAC (Media Access Control) address. MAC Address is a Unique identifier which assigned to NIC.

Wireless NIC must be chosen according to type of wireless AP (Access Point) which is referred as Wi-Fi

- Some of the Wi-Fi standards are Wireless-n, 802.11ac or 802.11 a/b/g/n
- Wireless NICs connect to network using the **Service Set Identifier (SSID)**
- You may also need to enter a security key or a username and password depending on the network's security configuration