

ITS CHAPTER 1

Computer System

Ultra Detailed Notes - Complete Guide to Computer Fundamentals



1. Introduction to Computer System

Computer - An electronic device programmed to accept data as input, process it, and generate output.

Components - CPU, memory, input/output devices, and storage devices.

System - Hardware and software function together as a single unit to deliver desired output.



2. Central Processing Unit (CPU)

CPU - Electronic circuitry; the "brain" of the computer.

ICs - Integrated circuits on semiconductor chips.

Registers - Local memory for data/instructions.

ALU - Performs arithmetic and logic operations.

Control Unit - Controls instruction execution and data flow.



3. Input and Output Devices



Input Devices

- Convert input data into digital form acceptable by computer
- **Common:** Keyboard, mouse, scanner, touch screen
- **Accessibility:** Braille keyboards for visually impaired users
- Data is transformed into binary format for processing



Output Devices

- Display or produce digital information in human-understandable form
- **Common:** Monitors, projectors, headphones, speakers, printers
- **Printer Types:** Inkjet, laserjet, dot matrix, 3D printers
- 3D printers build physical replicas of digital designs



4. Evolution of Computer

ARCHITECTURE

Von Neumann

CPU for processing, memory for data storage, I/O devices, and communication channels. ENIAC was the first binary programmable computer based on this architecture.

MOORE'S LAW

Gordon Moore (1965): Transistors on a chip double every 2 years while costs halve.

INTEGRATION

Integrated Circuits

ICs drastically reduced computer sizes by packing entire electronic circuits onto tiny silicon chips.

VLSI & SLSI

Very Large Scale Integration (1980s): ~3 million components. Super Large Scale Integration: millions more on a single chip.



5. Computer Memory and Units

Bit

0 or 1

>

Nibble

4 bits

>

Byte

8 bits

>

KB/MB/GB

TB/PB/EB

RAM (Volatile)

- Random Access Memory
- **Temporary storage** while computer is working
- Loses all contents when powered off
- Directly interacts with CPU
- Fast read/write access

ROM (Non-Volatile)

- Read Only Memory
- **Retains contents** without power
- Stores startup boot loader
- Rarely changed data
- Firmware storage

Cache & Secondary

- **Cache:** High-speed between CPU & RAM
- Reduces average data access time
- **HDD/SSD:** Non-volatile secondary
- Larger capacity, cheaper
- Permanent storage



6. Data Capturing, Storage, Retrieval, and Deletion

Capturing

Gathering digital data from keyboards, barcode readers, remote satellite sensors, and other input sources.

Storage

Keeping captured data in digital storage devices or large data servers for future processing and retrieval.

Retrieval

Fetching data from storage devices so the CPU can process it. Data is accessed through memory addresses.

Deletion

Marks address as free without immediately wiping bit-level details. Recovery possible if not overwritten. Use secure shred tools.



7. Software Classification

Software is a set of instructions that acts as an interface between users and hardware, making the hardware operational.

System Software

Operating Systems

Most basic system software managing all other applications. Examples: Windows, Ubuntu, Android, macOS.

System Utilities

Configuring and maintaining the system. Anti-virus, disk defragmentation, backup tools.

Device Drivers

Mediators between OS and specific hardware devices. Enables communication with peripherals.

Application Software

General Purpose

Ready-made for large audience. Examples: Adobe Photoshop, LibreOffice Calc, MS Word, browsers.

Customised Software

Tailor-made for specific needs of individuals or organizations. School management, ERP systems.

FOSS | Proprietary

FOSS: Free to use with source code (Python, Ubuntu). Proprietary: Requires purchase, hidden code (Windows, Tally).



Important Questions & Answers

Q1

What is a computer system and what are its physical components?

Definition: A computer system is a programmed electronic device combined with hardware and software to generate results.

Four Physical Components: CPU, primary memory, input devices, and output devices.

Q2

How does RAM differ from ROM?

● RAM (Volatile)

A volatile primary memory that loses all its data when the power is turned off. Temporary working memory.

● ROM (Non-Volatile)

A non-volatile primary memory that permanently stores rarely changed data, like the startup program, even without power.

Q3

What is the purpose of cache memory?

Location: Very high-speed memory placed between the CPU and primary memory to speed up operations.

Function: Stores copies of data from frequently accessed memory locations to prevent the CPU from slowing down.

Q4

Differentiate between Proprietary Software and FOSS.

Proprietary Software

Requires purchasing from a vendor who owns the copyright. Source code is hidden. Examples: Microsoft Windows, Tally.

FOSS (Free & Open Source)

Freely available to the public along with its source code for modifications. Examples: Python, Ubuntu, Firefox.

Q5

What happens when digital data is simply deleted?

Address Marking: When data is deleted, its address entry is marked as free and the space is shown as empty to the user.

Recovery Possible: The actual details are not immediately changed at the bit level, meaning data can potentially be recovered until overwritten.

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