Generation & Classification of Computers

Generations of Computers

1st **First Generation (1940-1956)**: Used vacuum tubes, slow and large in size.
2nd **Second Generation (1956-1963)**: Used transistors, smaller and more reliable.
3rd **Third Generation (1964-1971)**: Used integrated circuits (ICs), increased processing speed.
4th **Fourth Generation (1971-Present)**: Used microprocessors, personal computers became common.
5th **Fifth Generation (Present & Beyond)**: Based on artificial intelligence (AI), quantum computing.

Classification of Computers

- **Supercomputers**: High-performance computing, used for research and simulations.
- **Mainframe Computers**: Large-scale data processing, used in banking and airlines.
- **Minicomputers**: Mid-range computers, used in industries.
- **Microcomputers (PCs)**: Personal computers for general use.
- **Embedded Systems**: Computers embedded in devices like ATMs, washing machines.

Block Diagram of a Computer

1st **Input Unit** → Accepts data (keyboard, mouse).
2nd **Central Processing Unit (CPU)** → Processes data.

- **Control Unit (CU)**: Manages operations.
- **Arithmetic Logic Unit (ALU)**: Performs calculations.
- **Registers**: Temporary storage for processing.

3rd **Memory Unit** → Stores data temporarily (RAM) or permanently (Hard Drive).
4th **Output Unit** → Displays results (Monitor, Printer).

Categories of Software

1st **System Software** → Controls hardware operations.

- **Operating System (OS)** (Windows, Linux, macOS).
- **Utility Programs** (Antivirus, Disk Cleanup).

2nd **Application Software** → User-specific tasks.

- **Productivity Software** (MS Office, Photoshop).
- **Web Browsers** (Chrome, Firefox).

3rd **Programming Software** → For coding and development.

- **Compilers, Debuggers, Editors**.

4th **Middleware** → Bridges different applications and databases.

Network Structure

- **LAN (Local Area Network)**: Small network within a building.
- **WAN (Wide Area Network)**: Large-scale network like the internet.
- **MAN (Metropolitan Area Network)**: Covers a city or campus.
- **Client-Server Model**: Centralized system with a server and clients.
- **Peer-to-Peer Model**: Computers communicate directly.

Number System & Conversions

Types of Number Systems

- **Binary (Base 2)**: Uses 0 and 1.
- **Decimal (Base 10)**: Uses 0-9.
- **Octal (Base 8)**: Uses 0-7.
- **Hexadecimal (Base 16)**: Uses 0-9, A-F.

Conversions

- **Binary to Decimal** → Multiply each digit by powers of 2 and sum.
- **Decimal to Binary** → Divide by 2 and record remainders.
- **Binary to Hexadecimal** → Group binary digits into 4-bit sections.
- **Decimal to Hexadecimal** → Divide by 16 and record remainders.

Algorithm, Pseudo Code & Flow Chart

Algorithm

- A **step-by-step** procedure to solve a problem.
- Example: **Finding the largest number in a list**.

Pseudo Code

- A **simplified programming notation** using English-like statements.
- Example:
- `css`
- `CopyEdit`
- `Start`
- `Input A, B`
- `If A > B then`
- `    Print A is larger`
- `Else`
- `    Print B is larger`
- `End`
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Flow Chart

- A **graphical representation** of an algorithm using symbols:
- **Oval** → Start/End.
- **Rectangle** → Process.
- **Diamond** → Decision.
- **Arrow** → Flow direction.