Introduction Computer Systems

Lecture 2

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Types Of Computers

- The main types of computers are supercomputers, mainframes, minicomputers, and microcomputers (which include personal computers, workstations, and laptops). Other classifications include servers, which provide resources over a network, and embedded computers, which are built into other devices.

- **Computers are divided based on the following:**
- **Types of computers by size and function.**
- **Classification by Data Handling Capability**

Types of computers by size and function

- Supercomputers
- Mainframe Computers
- Minicomputers
- Microcomputers (PCs)
- Now, we are going to discuss each of them in detail.

- **Supercomputers:** Extremely fast, powerful computers used for complex calculations in scientific research and weather forecasting. They are the largest and most expensive type.

- Supercomputers are the speed demons of the computer world, performing billions of calculations per second. They're like the Hulk of tech, tackling huge tasks like predicting weather or designing spacecraft.

- **Features:**
- Lightning-fast, thanks to thousands of processors teaming up.
- Super expensive and massive, often taking up entire rooms.
- Used for big-deal research, like studying stars or curing diseases.

- **Examples:** Frontier (helps with climate research), Fugaku (aids medical breakthroughs).
- **For Students:** Supercomputers power the weather apps you check to see if you need an umbrella for recess.

Mainframe computers:

- High-performance, multi-user computers used by large organizations for tasks like processing massive amounts of data, such as in banking systems.
- Mainframes are big machines that juggle tons of tasks and users at once. Think of them as a school librarian helping hundreds of kids find books at the same time.

Features:

- Handles thousands of users and programs simultaneously.
- Huge storage and speedy processing for massive data.
- Used by banks, airlines, and big companies to manage records.
- Examples: IBM zSeries (keeps bank transactions secure).
- For Students: When you buy a game online, mainframes make sure your payment goes through safely.

Minicomputers:

- Midrange computers that can support many users simultaneously. They are smaller than mainframes and were developed as a more affordable alternative, though much of their processing power is now found in modern PCs.
- Minicomputers are mid-sized machines that support multiple users (4–200) for tasks like accounting or billing. They're smaller than mainframes but bigger than your laptop.
- **Features:**
  - More portable than mainframes but still hefty.
  - Reliable for medium-sized jobs.
  - Used in schools, businesses, or labs for specific tasks.
- **Examples:** PDP-11 (an older model used in universities).
- **For Students:** Minicomputers might track your school's attendance or grades.

Microcomputers:

Small, affordable computers for personal use. This is the most common category and includes:

- **Personal computers (PCs):** Includes desktops, laptops, and tablets.
- PCs are built for one person to use at home, school, or work. This includes desktops, laptops, tablets, and smartphones—stuff you probably use all the time.
- **Features:**
  - Small, affordable, and easy to use.
  - Great for homework, gaming, browsing, or video calls.
  - Comes with a CPU, memory, and input/output devices like keyboards and screens.
- **Examples:** Dell laptops, Apple iMac, iPads, Samsung Galaxy phones.
- **For Students:** You use PCs for writing essays, playing Minecraft, or watching YouTube tutorials

Workstations:

- High-performance PCs used for specialized tasks like engineering, video editing, and graphic design.
- Workstation Computers
- Workstations are high-powered computers for one user, built for heavy-duty tasks like creating animations or designing buildings. They're like a turbo-charged art studio for tech work.
- **Features:**
- Fast processors, tons of memory, and awesome graphics.
- Perfect for video editing, 3D modeling, or simulations.
- Stronger than a regular PC but smaller than a mainframe.
- Examples: HP Z Workstations (used by engineers or animators).
- For Students: Workstations create the special effects in your favorite movies or video games.

Servers:

- Computers that provide services to other computers over a network. They are designed for high performance and reliability and often store a company's data or host websites.
- Servers store and share data or programs over a network. They're like a school cafeteria serving up data to lots of devices at once.
- **Features:**
- Run 24/7 to deliver services like websites or email.
- Built to share resources with many users.
- Manage data for multiple devices or users.
- Examples: Web servers (host sites like Google), database servers (store school records).

- **Embedded computers:** Computers built into a larger device for a specific function, such as the control systems in cars, smart appliances, or fitness trackers.

- **Wearable computers:** Small, portable computers that can be worn on the body, like smartwatches and smart glasses.

Classification by Data Handling Capability

- **Analog Computers:** Process continuous data (e.g., temperature, speed, pressure) using continuously changeable physical quantities. Examples include speedometers and mercury thermometers.

- Analog Computers are particularly designed to process analog data. Continuous data that changes continuously and cannot have discrete values are called analog data. So, an analog computer is used where we don't need exact values or need approximate values such as speed, temperature, pressure, etc. It can directly accept the data from the measuring device without first converting it into numbers and codes. It measures the continuous changes in physical quantity. It gives output as a reading on a dial or scale. For example speedometer, mercury thermometer, etc.

- **Characteristics**:
- Handles **continuous data**.
- **Real-time data processing** without needing to convert it into digital form.
- Used in applications where **approximate values** are sufficient.
- **Examples**:
- **Speedometer** (for measuring vehicle speed)
- **Thermometers** (mercury thermometer)

Digital Computers:

- Process data in discrete form, using binary values (0s and 1s). Nearly all modern computers, including laptops and smartphones, are digital computers.
- are designed in such a way that they can easily perform calculations and logical operations at high speed. It takes raw data as input and processes it with programs stored in its memory to produce the final output. It only understands the binary input 0 and 1, so the raw input data is converted to 0 and 1 by the computer and then it is processed by the computer to produce the result or final output. All modern computers, like laptops, desktops including smartphones are digital computers.

Characteristics:

- Processes data in the form of **binary digits** (0s and 1s).
- Handles **precise, accurate data** and complex operations, including calculations, logical operations, and storage.
- **Fast data processing** and capable of running various applications from entertainment to business management.
- **Examples**:
- **Laptops**
- **Desktops**
- **Smartphones**

Hybrid Computers:

- Combine features of both analog and digital computers, used in specialized applications like hospital monitoring systems or petrol pumps where continuous input (fuel flow) is converted into discrete data (price).

- As the name suggests hybrid, which means made by combining two different things. Similarly, the hybrid computer is a combination of both analog and digital computers. Hybrid computers are fast like analog computers and have memory and accuracy like digital .

- computers. So, it has the ability to process both continuous and discrete data. For working when it accepts analog signals as input then it converts them into digital form before processing the input data. So, it is widely used in specialized applications where both analog and digital data are required to be processed. A processor which is used in petrol pumps that converts the measurements of fuel flow into quantity and price is an example of a hybrid computer.

Characteristics:

- Can handle both analog and digital data.
- Real-time processing with high accuracy.
- Often used in applications where both types of data are needed.

Examples:

- Petrol pump processors that convert fuel flow measurements into digital format (quantity and price).
- Medical equipment like ECG (Electrocardiogram) machines

- **Tablet and Smartphones**
- Tablets and Smartphones are the types of computers that are pocket friendly and easy to carry is these are handy. This is one of the best use of modern technology. These devices have better hardware capabilities, extensive operating systems, and better multimedia functionality. smartphones and tablets contain a number of sensors and are also able to provide wireless communication protocols.
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