



جامعة المستقبل
كلية العلوم
قسم الفيزياء الطبية



computer science

Second lecture

Subject: The Concept of a Computer and Its Types

Class: First stage

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This unit aims to:

- Explain the concept of a computer and identify its characteristics and different types.
- Explain the components of a computer and their functions.
- Explain the hardware components of a computer and their different types.
- Provide a brief overview of computer software and its applications.



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The Concept of a Computer and Its Types

Concept of a Computer:

A computer is an electronic device designed to receive data as input, process it according to a set of instructions (programs), store it, and produce useful information as output. Computers are characterized by high speed, accuracy, reliability, and the ability to store large amounts of data.

Types of Computers:

Computers can be classified into several types based on their size, capability, and purpose, including:

1. Supercomputers:

Extremely powerful computers used for complex scientific calculations such as climate modeling, space research, and nuclear simulations.

2. Mainframe Computers:

Large and powerful computers used by large organizations (such as banks and government institutions) to process and manage large volumes of data.

3. Minicomputers:

Medium-sized computers that support multiple users



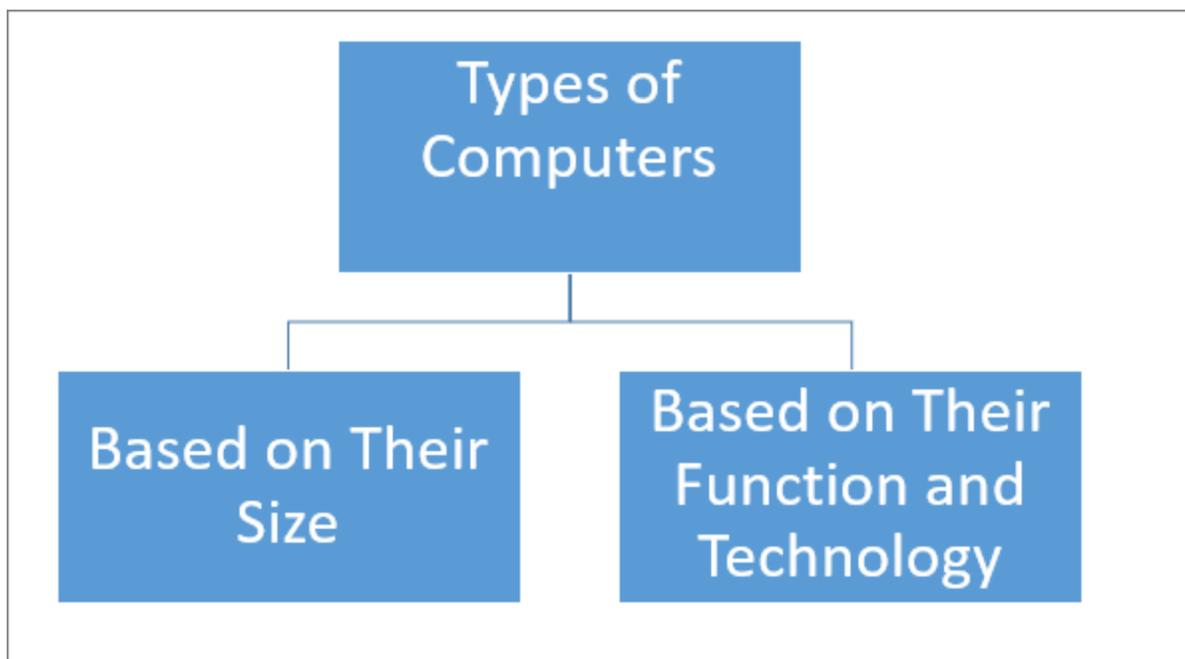
simultaneously and are often used in small to medium-sized organizations.

4. **Microcomputers (Personal Computers):**

Computers designed for individual use, such as desktop computers, laptops, tablets, and smartphones.

5. **Embedded Computers:**

Small computers integrated into other devices to perform specific tasks, such as those found in cars, washing machines, and smart devices.





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الحواسيب الرقمية Digital Computers:

Processes only **digital data** with discrete values.

Used to solve **complex computational problems** and to organize **files and databases**.

The main application areas of **digital computers** include **education, administrative management, and accounting**.

They are characterized by **high processing speed** and the ability to perform **multiple calculations simultaneously**.



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الحواسيب القياسية (Analogue Computer):

Uses **analog data**, which are data that can take many continuous values such as **sound intensity** and **temperature**.

It is used to calculate **physical properties** such as **weight, pressure, and heat**.

It is commonly used in **scientific centers, medical institutions, and meteorological centers**.

These systems can also **monitor conditions and control processes automatically** according to the required parameters.



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Supercomputers:

- They are extremely fast machines with the ability to run **dozens of programs simultaneously**.
- They can store **billions of characters in memory** and use the **latest technological advancements** for this purpose.
- They can be connected to **hundreds of peripheral devices**.
- The cost of such systems can reach **millions of dollars**.
- They are mainly used in **government scientific research, universities, and applied industrial research centers**.



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الحاسبات الكبيرة (Main Frames):

- They are characterized by **very high processing speed**.
- They have the ability to **serve hundreds of users simultaneously**.
- They possess **large storage capacity**.
- These computers are often connected to **multiple terminals** and are commonly used in **large companies and universities**.



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Minicomputers:

- They are **smaller in size, storage capacity, and processing speed** compared to the previously mentioned computers.
- Suitable for use in **small and medium-sized business operations, industrial control, and information communication systems.**
- Typically require a **small number of users (about eight people or fewer)** to operate them.
- They are **less expensive than mainframe computers.**



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الحاسبات الدقيقة (Micro Computers):

Microcomputers (Personal Computers):

- They are the **smallest type of computers** and have **limited storage capacity**.
- They are known as **Personal Computers (PCs)** or **home computers**.
- They are used to perform **simple and general-purpose tasks**.



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- They are considered the **least expensive type of computers**.
- They are typically designed to be used by **one person at a time**.



محطة العمل: WorkStation

A **workstation** is similar to a **personal computer** in that it is designed for a **single user**. However, it is **more powerful** in terms of **data processing, storage capacity, and high-resolution graphics display** on the monitor.

Because of its high performance, this type of computer is commonly used by **engineers, scientists, laboratories, and industrial**



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environments, especially in fields that require very high processing capabilities.



Control Computer:

This type is used for monitoring and controlling various devices, such as industrial and medical equipment, as well as transportation systems like airplanes and automobiles, to issue warning signals in case of a malfunction or fault. It is also used in communication systems, such as switches and exchanges, to handle telephone call routing and respond to user requests.



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Comparison between a Personal Computer (PC) and a Workstation:

Feature	Personal Computer (PC)	Workstation
Number of Users	Typically single-user	Single-user, but supports heavy-duty tasks
Processing Performance	Suitable for general use	Very high performance for large data processing and engineering/scientific applications
Storage Capacity	Relatively limited	Larger, to support big files and applications
Graphics Display Quality	Standard	Very high, suitable for engineering design, professional graphics, and scientific analysis
Common Usage	Office work, entertainment, web browsing	Engineering, scientific research, laboratories, factories, professional design
Cost	Low to medium	High, due to advanced components and high performance