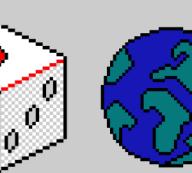
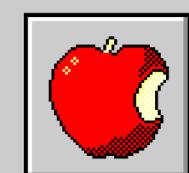
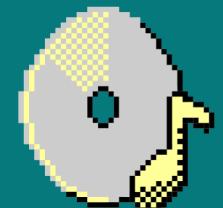
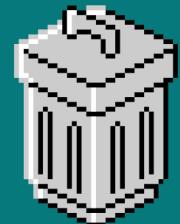
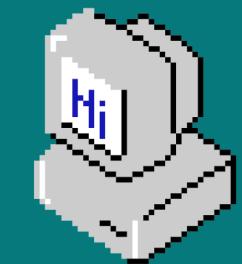


Introduction to Computer Organization

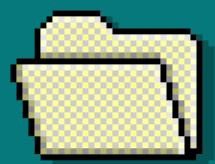


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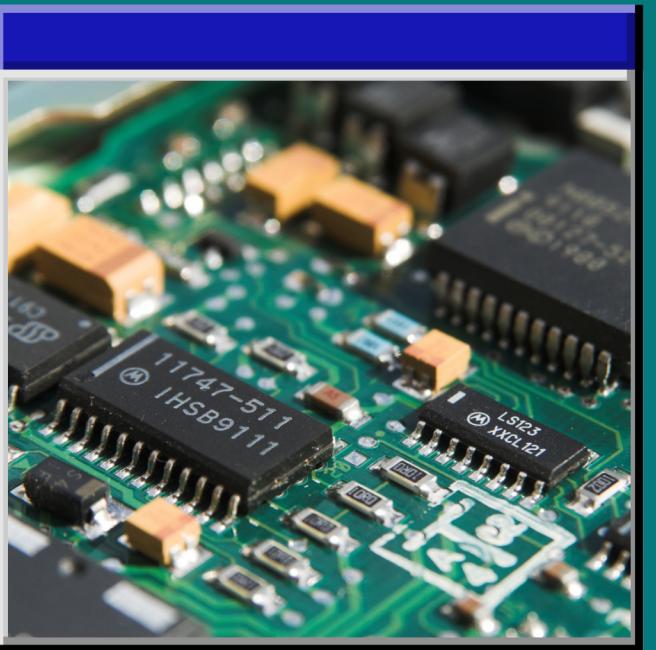
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Discussion Outline



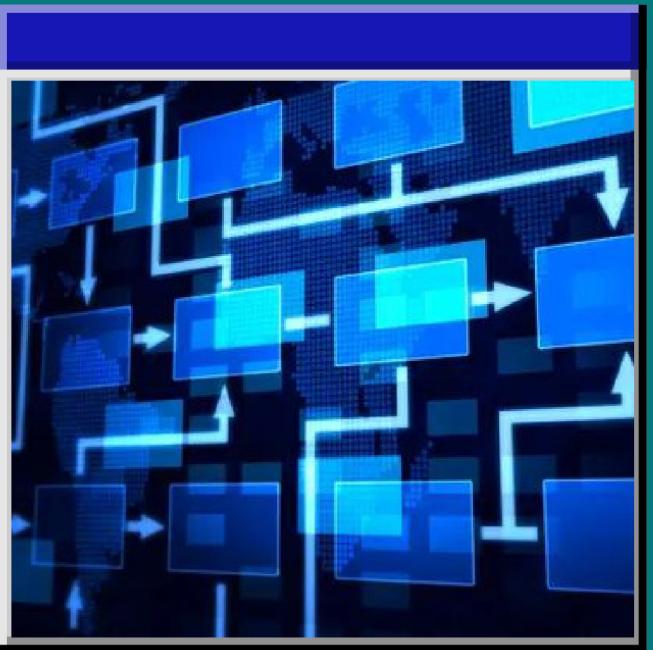
Computer Organization

introduction to comp. org.



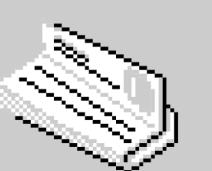
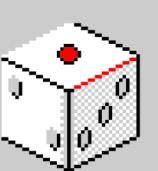
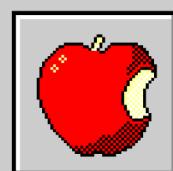
Computer and its Components

i/o devices and peripherals

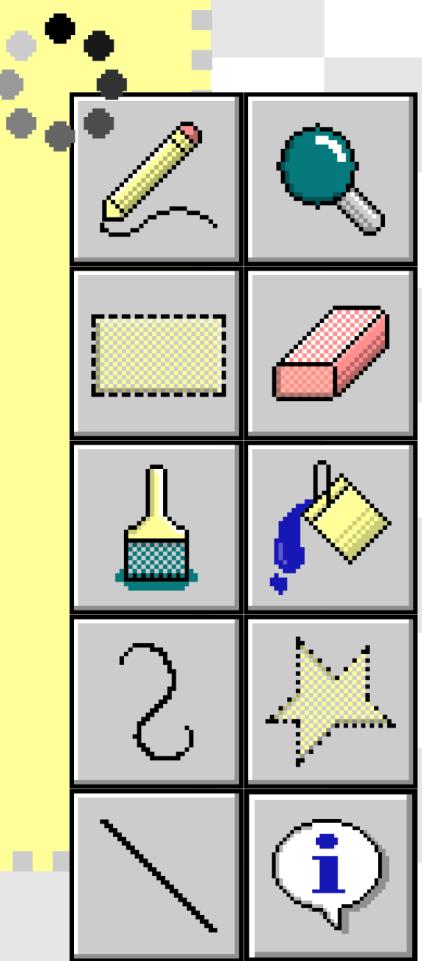
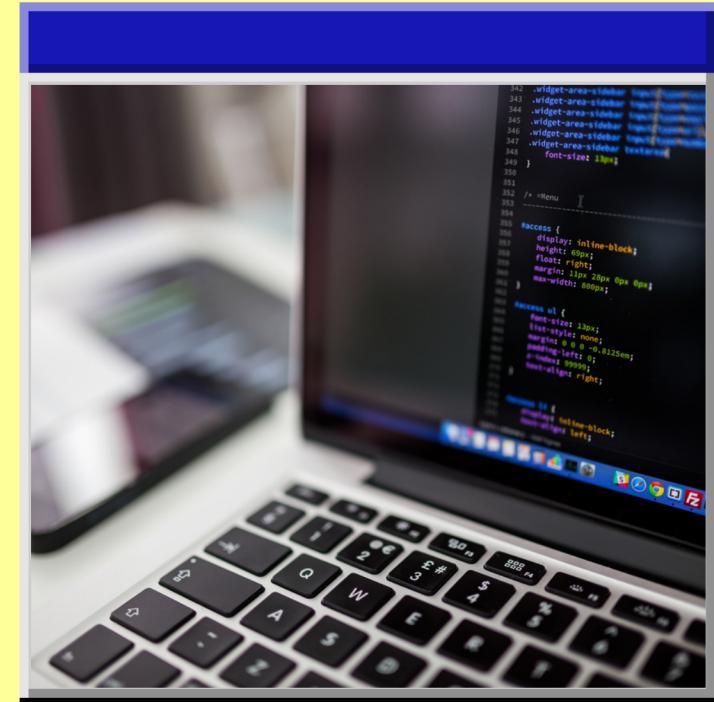


Computer Architecture

end-to-end structure



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Computer Organization

Introduction to Comp. Org.

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Thoughts about Computer Organization



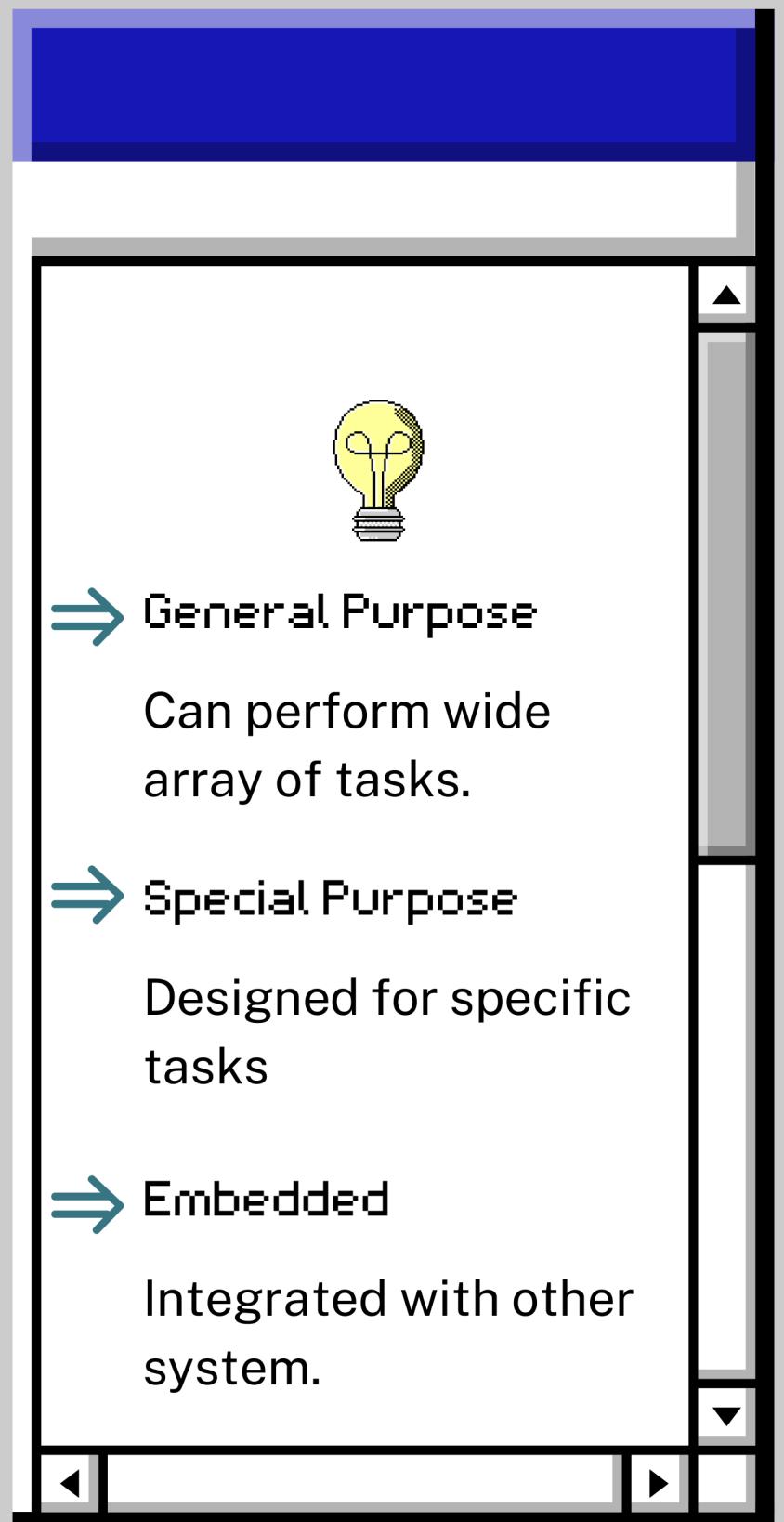
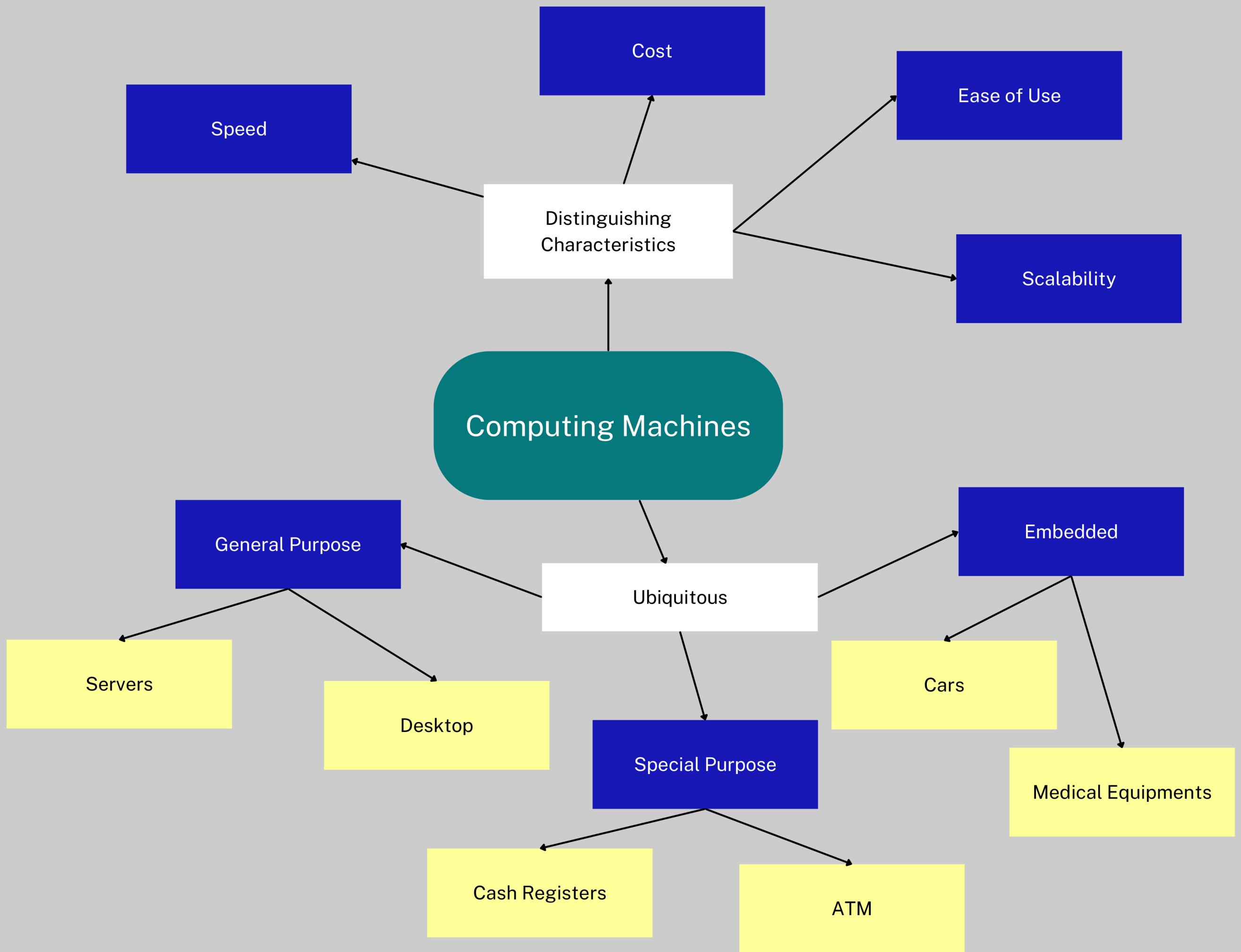
computer organization is a field which explains about **structure** and **behavior** of digital computers .its main objective is to make us understand the over all computer hardware structure and all its peripheral devices .it tells us how all the units in the system are arranged and interconnected to each other.



Computer organization is the knowing, What the functional components of a computer are, how they work and how their performance is measured and optimized.



computer organization refers to the operational units and their interconnections that implement the architecture specification. It deals with how the components of a computer system are arranged and how they interact to perform the required operations.



Computer Organization



A very wide semantic gap between the intended behavior and the workings of the underlying electronic devices that will actually do all the work.

The forerunners to modern computers attempted to assemble the raw devices (mechanical, electrical, or electronic) into a separate purpose-built machine for each desired behavior.

General Purpose Computer

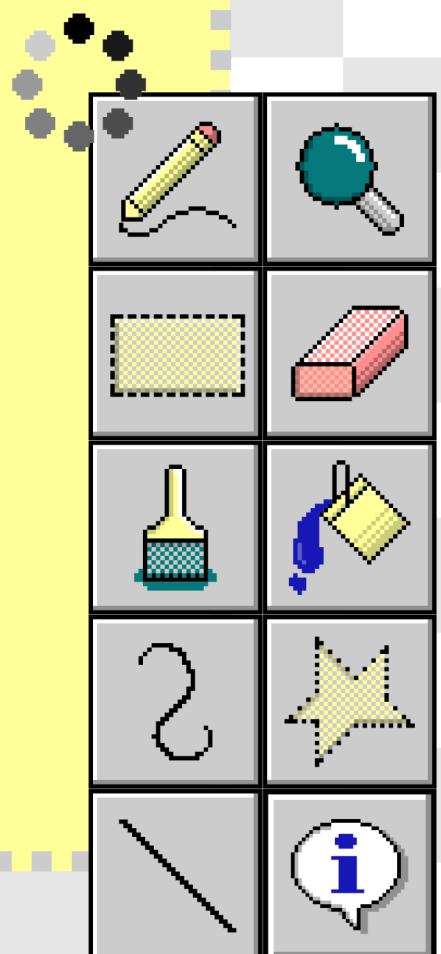
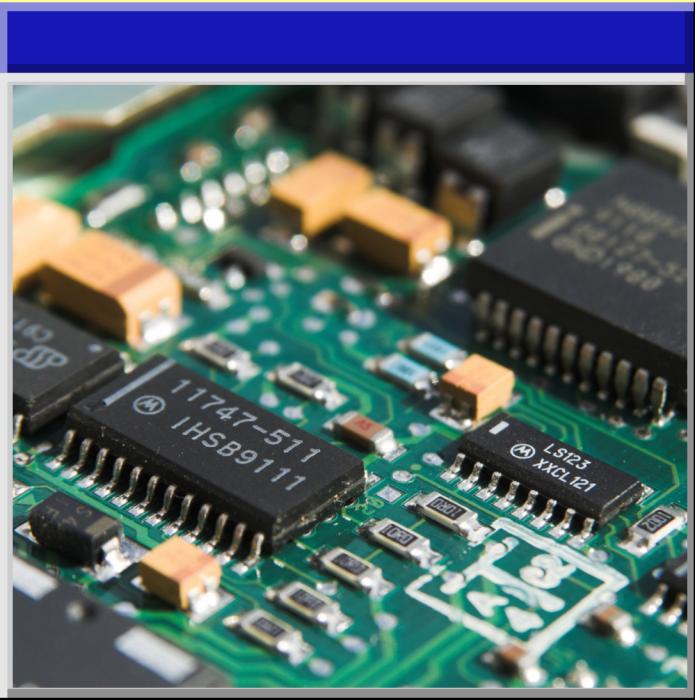


A general purpose computer is like an island that helps span the gap between the desired behavior (application) and the basic building blocks (electronic devices).

Computer Organization



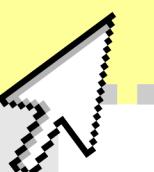
Computer organization refers to the way a computer's hardware components are designed, interconnected, and work together to execute instructions and perform tasks. It involves understanding the structure and functionality of a computer's central processing unit (CPU), memory, storage, input/output devices, and how data flows between them.

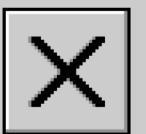


Computer and its Components

I/O devices and Peripherals

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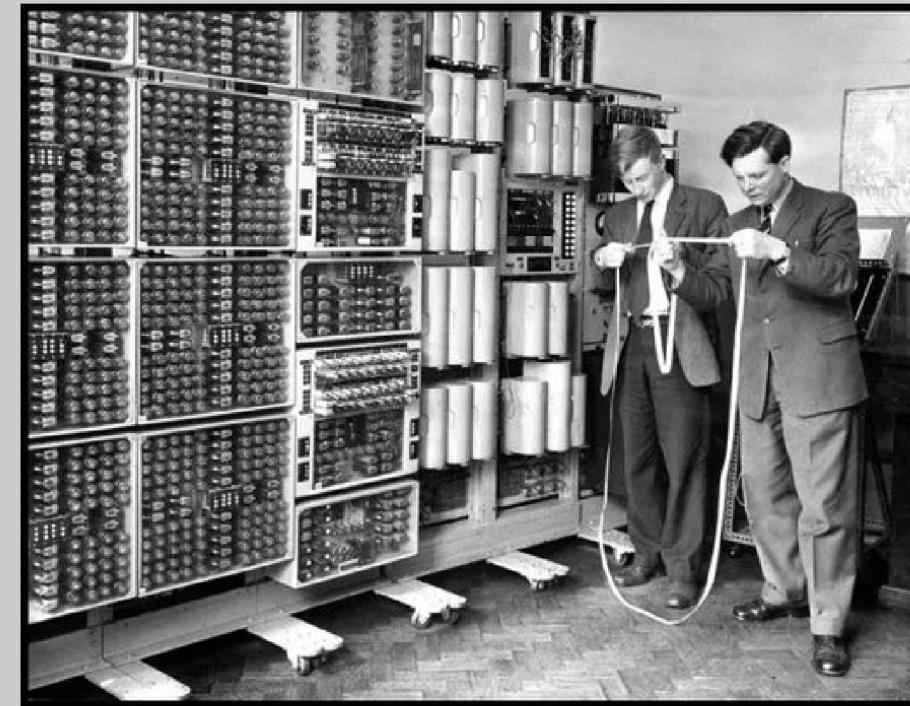


What is a Computer?

Computer:

A computer includes both hardware and software. In general, hardware comprises the visible, physical elements of the computer, and software provides the invisible instructions that control the hardware and make it perform specific tasks.

Knowing computer hardware isn't essential to learning a programming language, but it can help you better understand the effects that a program's instructions have on the computer and its components.

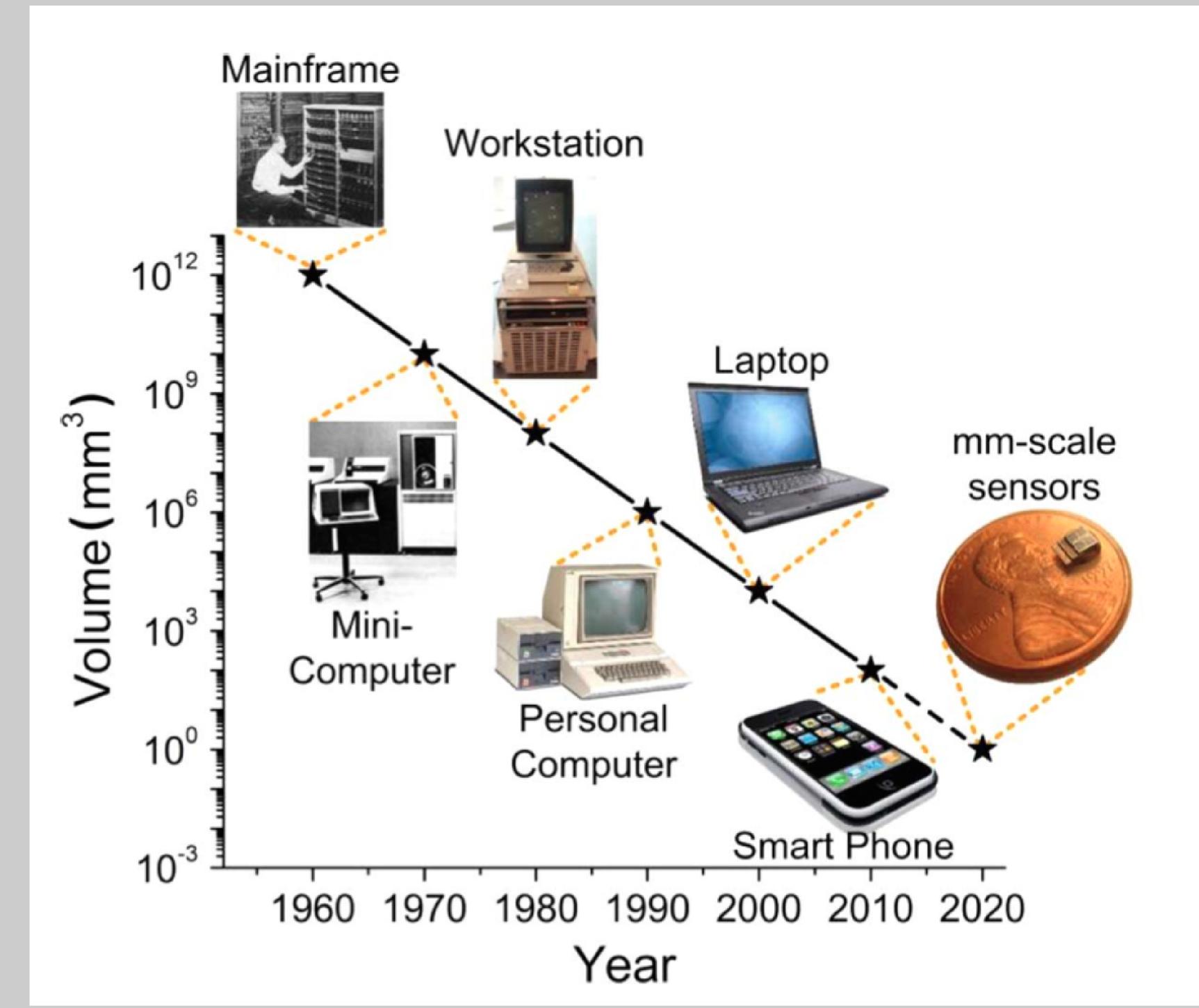


Harwell Computer (1950's)

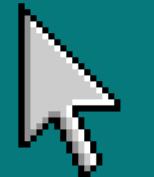


ENIAC (1945)

Evolution of Computer



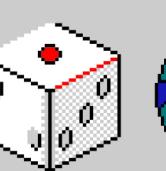
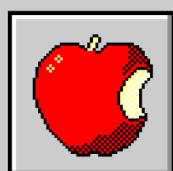
First Generation Computers (1940-1956)



- Vacuum Tubes
- Developed by the British engineer **John Ambrose Fleming**.
- A vacuum tube is an electronic device that is used to control the flow of electric current in a vacuum.

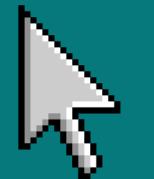
The image shows a windowed computer interface with a blue header bar and a red close button in the top right corner. Inside the window, there is a large black and white photograph of a man standing next to a massive, floor-to-ceiling electronic computer system made of vacuum tubes. The computer consists of several tall, rectangular metal racks filled with intricate circuit boards and components. In the top right corner of the window, there is a blue speech bubble icon containing a white letter 'i'.

Early Computer



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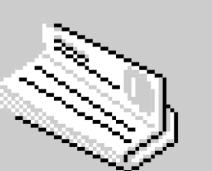
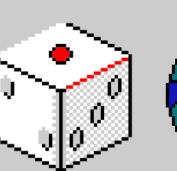
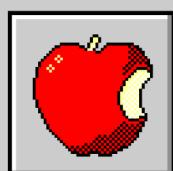
First Generation Computers (1940-1956)



The first general-purpose programmable electronic computer was the **ENIAC** (Electronic Numerical Integrator and Computer), built by **J. Presper Eckert** and **John V Mauchly** at the University of Pennsylvania. The ENIAC was 30-50 feet long, 30 tons weighted, contained 18000 vacuum tubes, 70000 registers, and 10000 capacitors, and it required 150000 watts of electricity, which makes it very expensive.

Later, Eckert and Mauchly developed the first commercially successful computer name **UNIVAC**(Universal Automatic Computer) in 1952.

Vacuum Tubes

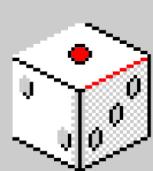


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First Generation Computers (1940-1956)

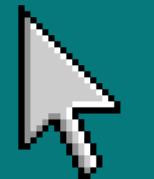


Advantage	Disadvantage
These generations' computers have simple architecture.	The computer was very costly.
These computers calculate data in a millisecond.	It takes up a lot of space and electricity
This computer is used for scientific purposes.	These computers heat a lot.



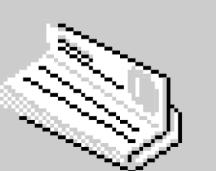
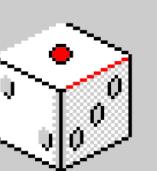
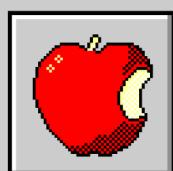
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Second Generation Computers (1956-1963)



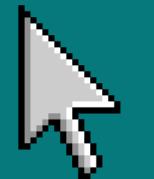
- Transistors
- It was developed in **1947** by three American physicists
“John Bardeen, Walter Brattain, and William Shockley”.

The image shows a computer application window with a blue header bar containing a red close button. Below the header is a white toolbar with several icons. The main content area displays a black and white photograph of an IBM 400 computer system. The system consists of several large, grey, rectangular components, including a tape drive on the left, a control panel with a keyboard and a small screen in the center, and a large mainframe unit on the right. In the foreground, there is a smaller, separate control console with a keyboard and a display. A blue speech bubble icon with a white 'i' is positioned above the main computer unit. At the bottom of the window, the text "IBM 400" is visible, along with standard window control buttons (minimize, maximize, close) at the bottom right.



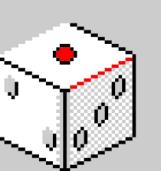
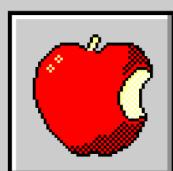
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Second Generation Computers (1956-1963)



- A **transistor** is a semiconductor device used to amplify or switch electronic signals or opens or close a circuit. It is invented in bell labs, The transistors become the key ingredient of all digital circuits, including computers.
- The invention of transistors **replaced the bulky electric tubes** from the first generation of computers.
- Transistors perform the same functions as a Vacuum tube, except that electrons move through **instead of through a vacuum**. Transistors are made of semiconducting materials and they controlled the flow of electricity.

The slide has a blue header bar with a red 'X' button in the top right corner. Below the header is a white area containing a blue speech bubble icon with a white 'i'. In the center of the slide is a collection of six different transistors of various sizes and packages. The largest transistor at the top is labeled 'IRF 505 BU 208'. Below it are four smaller surface-mount transistors labeled 'BF 869G', 'BD246 1A004', '004 BD244B', and 'BF 4596'. To the right of these is a small axial lead package labeled '2N3904'. The slide is titled 'Transistors' at the bottom left. At the very bottom are navigation icons: a left arrow, a right arrow, and a double arrow.

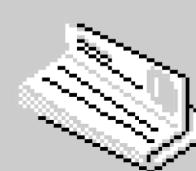
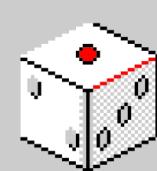


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Second Generation Computers (1956-1963)

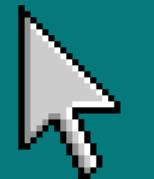


Advantage	Disadvantage
It is smaller in size as compared to the first-generation computer	It is also costly and not versatile
It used less electricity	Punch cards were used for input
Not heated as much as the first-generation computer.	Cooling is still needed



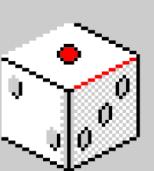
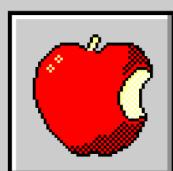
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Third Generation Computers (1964-1971)



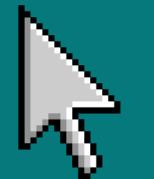
- **Integrated Circuits**
- Developed in 1958 by **Jack Kilby**.

IBM 360



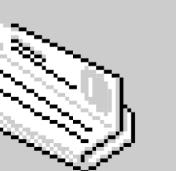
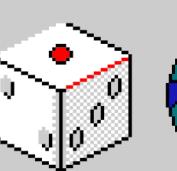
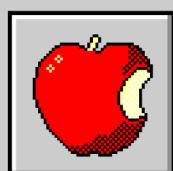
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Third Generation Computers (1964-1971)



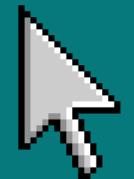
- An **integrated circuit** in third-generation computers is a tiny, complex electronic component that combines multiple electronic functions onto a single piece of silicon or semiconductor material. It replaced the discrete components used in earlier computer generations, such as transistors and diodes. Integrated circuits are like miniaturized circuits, making computers smaller, faster, and more reliable.
- This development made computers smaller in size, low cost, large memory, and processing. The speed of these computers is very high and it is efficient and reliable also.

Integrated Circuits

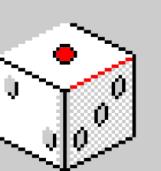


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Third Generation Computers (1964-1971)



Advantage	Disadvantage
These computers are smaller in size as compared to previous generations	It is still very costly
It consumed less energy and was more reliable	Sophisticated Technology is required to manufacture Integrated Circuits
It produced less heat as compared to previous generations	It is not easy to maintain the IC chips.

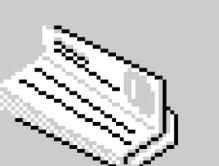
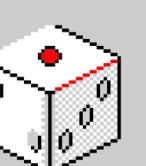


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Fourth Generation Computers (1971-Present)

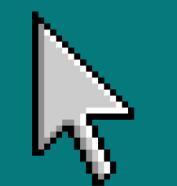


- **Microprocessor**
- It was invented in the **1970s** and It is developed by four inventors named are “**Marcian Hoff, Masatoshi Shima, Federico Faggin, and Stanley Mazor**”.
- The first microprocessor named was the “**Intel 4004**” CPU, it was the first microprocessor that was invented.

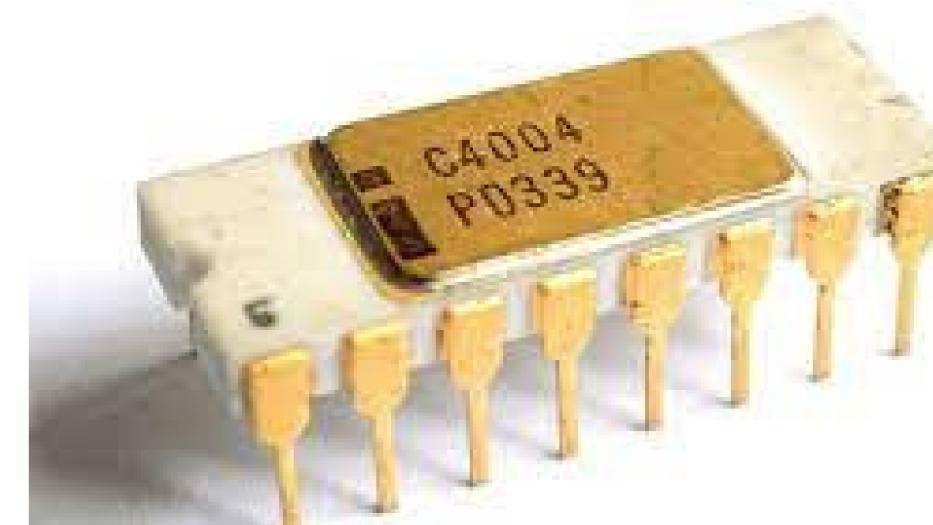


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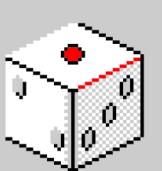
Fourth Generation Computers (1971-Present)



- A microprocessor contains all the circuits required to perform **arithmetic, logic, and control** functions on a single chip. Because of microprocessors, fourth-generation includes more data processing capacity than equivalent-sized third-generation computers. Due to the development of microprocessors, it is possible to place the **CPU (Central Processing Unit)** on a single chip. These computers are also known as microcomputers. The personal computer is a fourth-generation computer. It is the period when the evolution of computer networks takes place.



Intel 4004

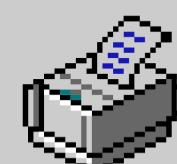


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Fourth Generation Computers (1971-Present)



Advantage	Disadvantage
These computers are smaller in size and much more reliable as compared to other generations of computers.	It required the latest technology for the need of making microprocessors and complex software
In these computers, all types of higher languages can be used in this generation	These computers were highly sophisticated
The heating issue on these computers is almost negligible	It also required advanced technology to make the ICs(Integrated circuits)



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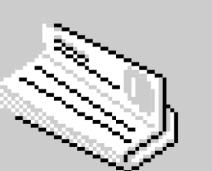
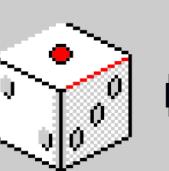
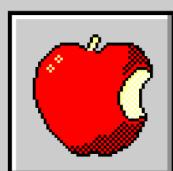
Fifth Generation Computers (Present-Future)



- **Integration of AI Technology**
- Artificial technology is the branch of computer science concerned with making computers behave like humans and allowing the computer to take its own decision currently, no computers exhibit full artificial intelligence (that is, are able to simulate human behavior).

The image shows a windowed application interface, likely a presentation slide. The main content area displays a photograph of a computer setup. In the foreground, there's a laptop with its screen open, showing a colorful desktop background. Behind it is a desktop computer with a monitor displaying a world map, a keyboard, and a mouse. A small blue speech bubble icon with a white 'i' is positioned above the laptop screen. The window has a standard title bar with a red 'X' button in the top right corner. At the bottom of the window, there are navigation controls: a left arrow, a right arrow, and a vertical scroll bar.

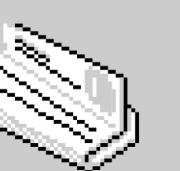
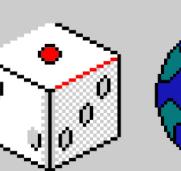
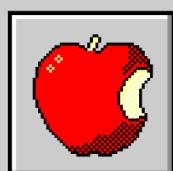
Desktop and Laptop



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Fifth Generation Computers (Present-Future)

- This is the most recent and technologically advanced computer generation. Modern high-level languages such as Python, R, C#, Java, and others are used as input methods. These are incredibly dependable and use the Ultra Large Scale Integration (ULSI) technology. War. Parallel processing hardware and artificial intelligence software are used in computers.

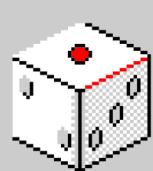


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Fifth Generation Computers (Present-Future)

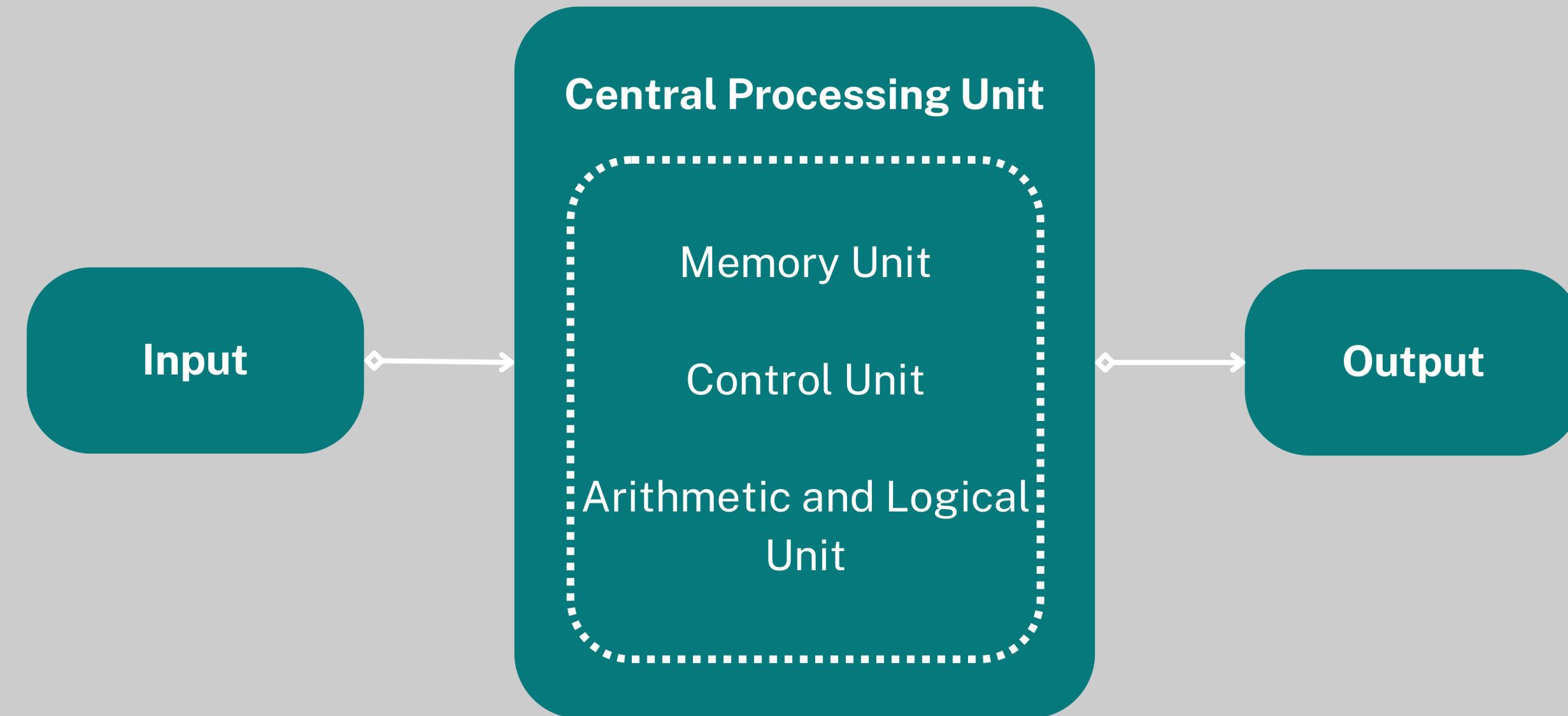


Advantage	Disadvantage
These computers are very powerful and cheaper in cost	It tends to be sophisticated and complex tools
It is obviously used for the general purpose	It pushes the limit of transistor density.
Advancement in Parallel Processing and superconductor technology.	

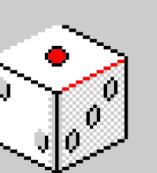
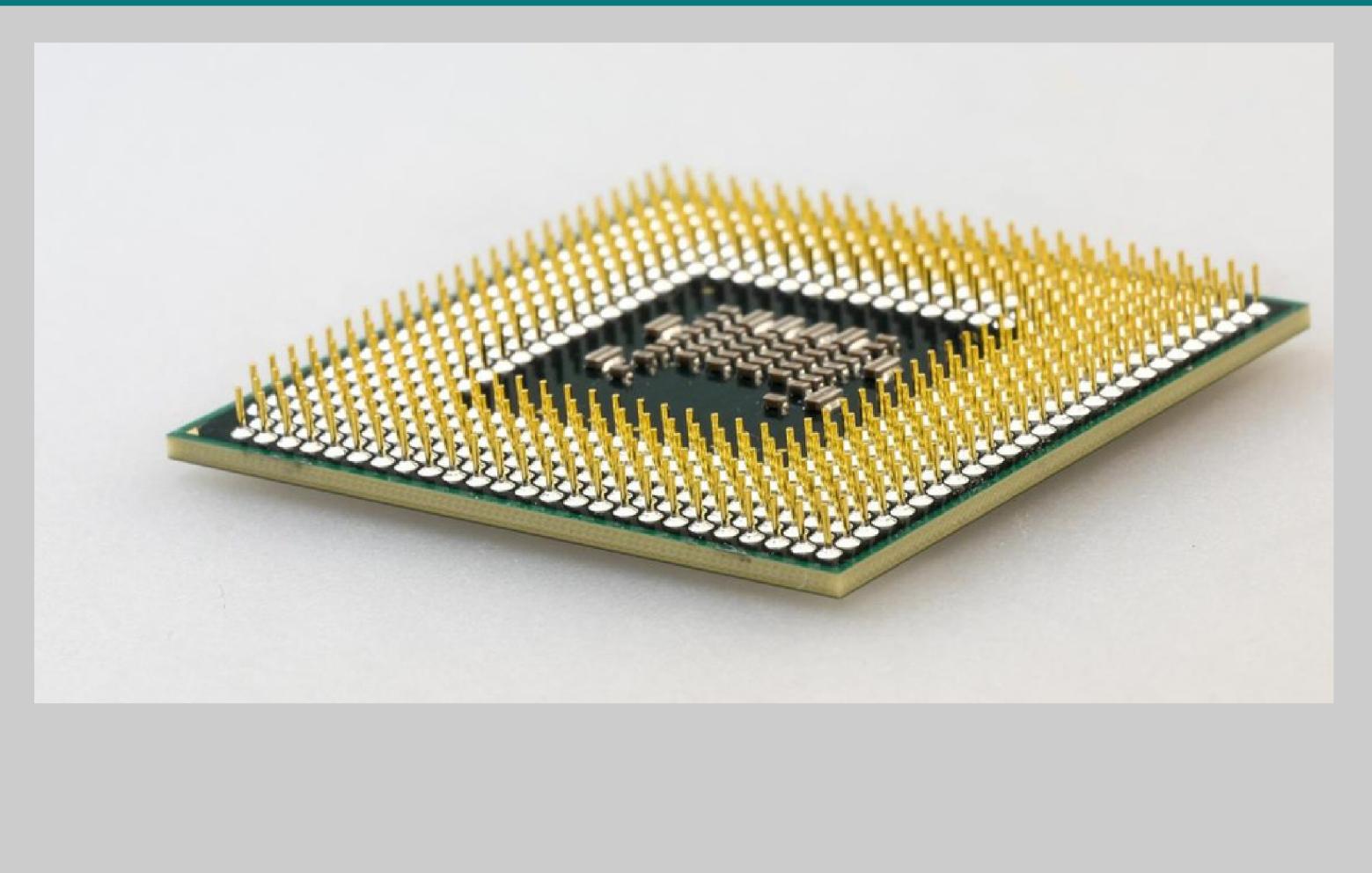


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Computer Components

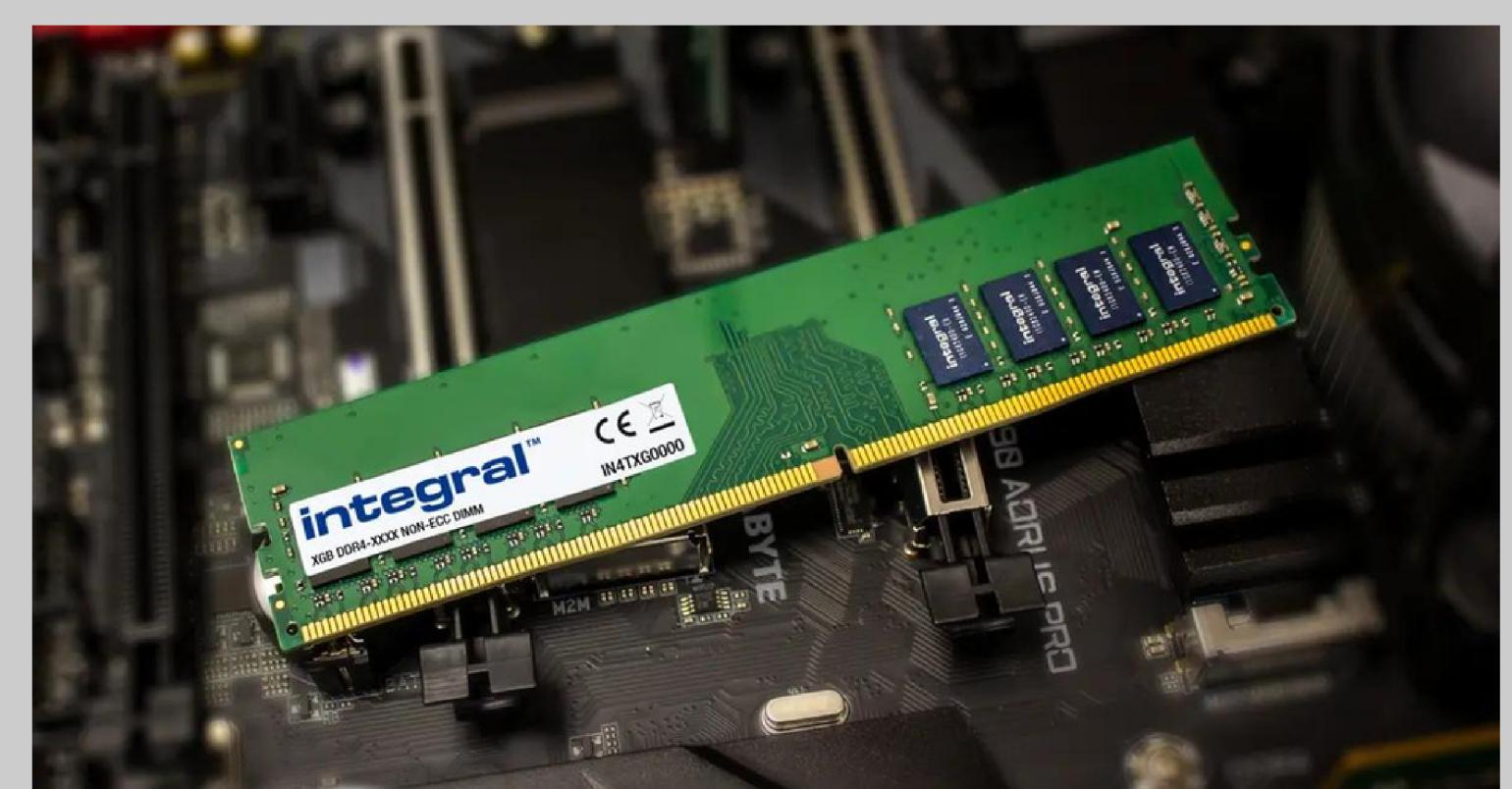


"Guess the component"



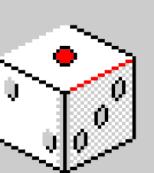
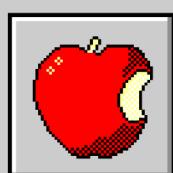
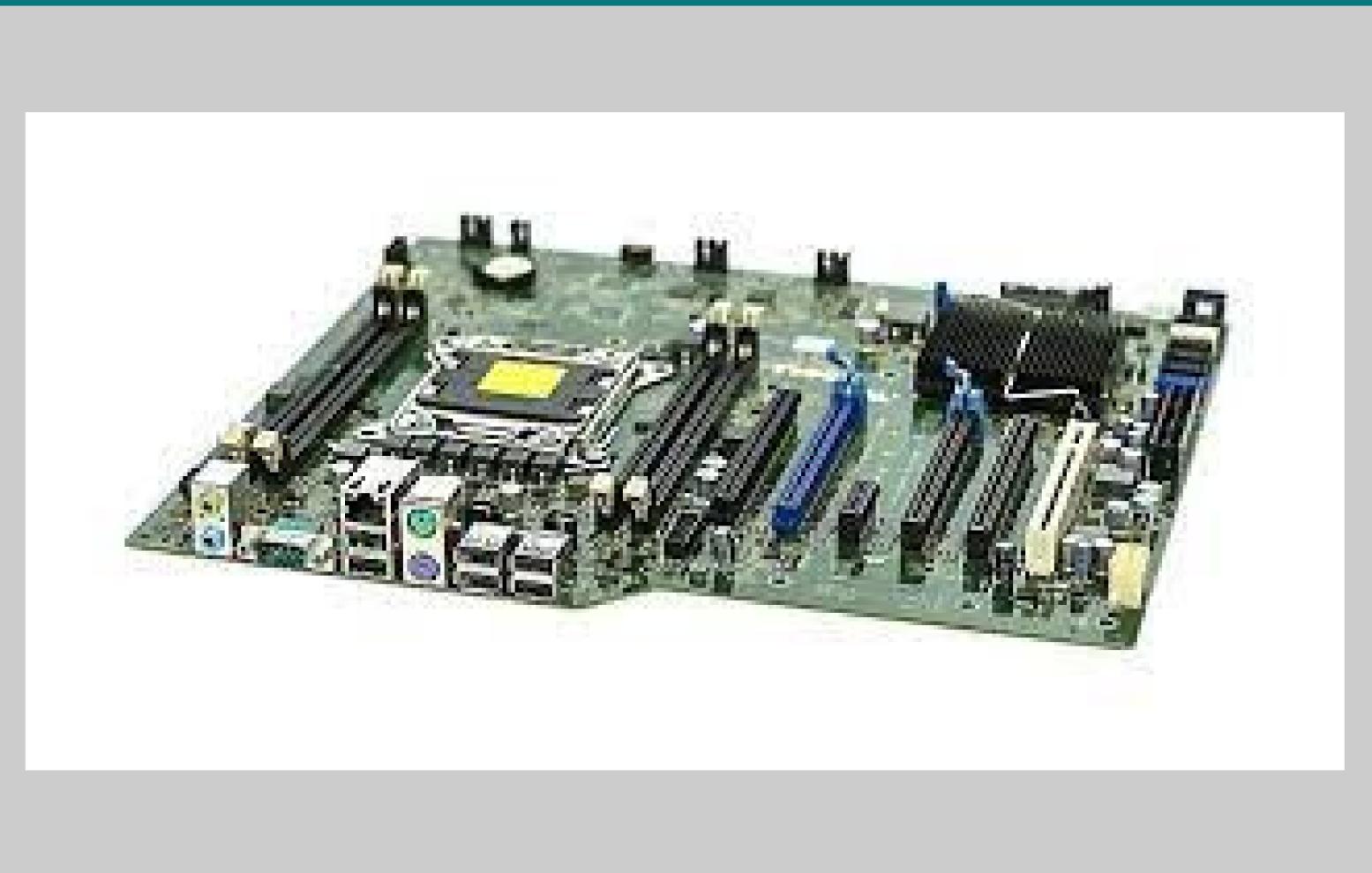
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"Guess the component"



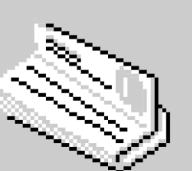
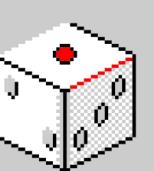
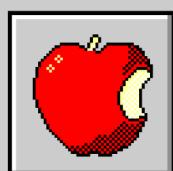
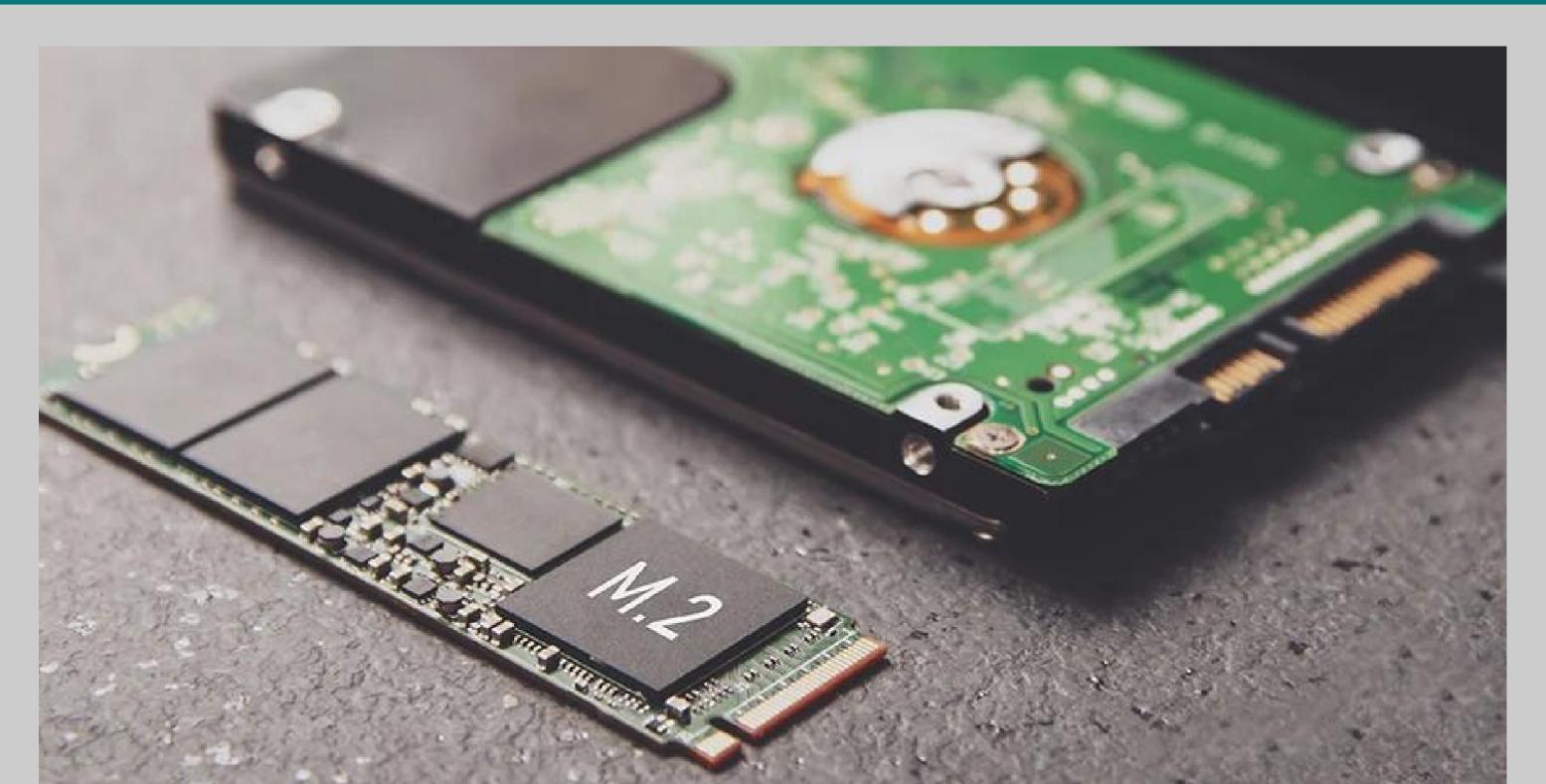
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"Guess the component"



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"Guess the component"



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Computer Components

A computer device is made up of various elements which help in its effective functioning and processing. There are five basic components of the computer which help in making this processing of data easier and convenient.

By definition, components of a computer system are the primary elements which make the functioning of an electronic device smooth and faster. There are five basic components which include:

- Input Unit
- Output Unit
- Memory Unit
- Control Unit
- Arithmetic and Logical Unit



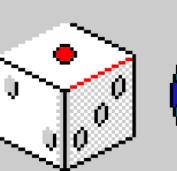
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Input Unit

A computer will only respond when a command is given to the device. These commands can be given using the input unit or the input devices.

For example: Using a **keyboard** we can type things on a Notepad and the computer processes the entered data and then displays the output of the same on the screen.

The data entered can be in the form of numbers, alphabet, images, etc. We enter the information using an input device, the processing units convert it into computer understandable languages and then the final output is received by a human-understandable language.



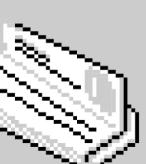
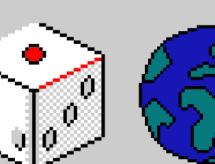
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Output Unit

When we command a computer to perform a task, it reverts for the action performed and gives us a result. This result is called output. There are various output devices connected to the computer. The most basic of which is a monitor. Whatever we write using a keyboard or click using a mouse, is all displayed on the monitor.

Thus, the output unit gives us the final result once the entire processing is done within the mechanism of a device.

For example: when we visit an ATM, we enter our details like language, pin, amount to be withdrawn, etc. and then the final money which the cash dispenser releases is our outcome. In this case, the cash dispenser acts as an output unit.



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Memory Unit

When we enter the data into the computer using an input device, the entered information immediately gets saved in the memory unit of the Central Processing Unit (CPU). Because of the presence of some existing programming, the Memory Unit transmits the data further to the other parts of the CPU.

Similarly, when the output of our command is processed by the computer, it is saved in the memory unit before giving the output to the user.



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Control Unit

This is the core unit which manages the entire functioning of the computer device. It is one of the most essential components of the computer system.

The Control Unit collects the data entered using the input unit, leads it on for processing and once that is done, receives the output and presents it to the user. It can be said to the centre of all processing actions taking place inside a computer device.

Basically, the instructions taken, interpretation of entered data, issuing signals to execute the data and then finally retrieving the data is all done in the Control Unit.

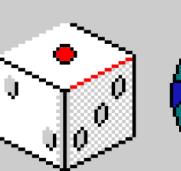


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Arithmetic and Logical Unit

As the name suggests, all the mathematical calculations or arithmetic operations are performed in the Arithmetic and Logical Unit of the CPU.

It can also perform actions like a comparison of data and decision-making actions. The ALU comprises circuits using which addition, subtraction, multiplication, division and other numerical based calculations can be performed.



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Example Scenario:

Creating an MS word Document: Input to Output Interaction

1. Input Units:

- Your input devices, such as the keyboard and mouse, play a crucial role in the process.
- As you type on the keyboard and click the mouse, input signals are generated and sent to the computer.

2. Central Processing Unit (CPU):

- The CPU, the brain of your computer, receives these input signals.
- Its Control Unit manages and coordinates operations and directs data flow.

3. Memory Unit (RAM):

- RAM (Random Access Memory) stores both the program code of Microsoft Word and the data you create in your document.
- Text, images, and formatting data are temporarily stored in RAM, providing the CPU with quick access to the information it needs for processing.



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Example Scenario:

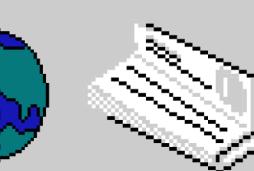
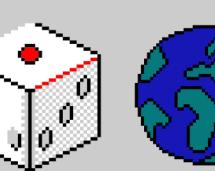
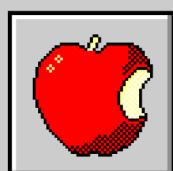
Creating an MS word Document: Input to Output Interaction

4. Registers (Inside the CPU):

- Within the CPU, registers serve as the smallest and fastest storage locations.
- As you type and perform actions in Word, registers play a crucial role in temporarily holding and processing small pieces of data and instructions at blazing speeds.

5. Control Unit:

- The Control Unit, part of the CPU, manages and coordinates operations within the CPU and interacts with memory.
- It fetches program instructions from RAM, including those that govern the Microsoft Word program.
- As you interact with Word, the Control Unit decodes instructions, such as displaying the user interface and responding to your input.



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Example Scenario:

Creating an MS word Document: Input to Output Interaction

6. Arithmetic Logic Unit (ALU):

- The ALU, another essential component of the CPU, handles mathematical and logical operations necessary for Word processing.
- When you type text or apply formatting, the ALU processes data from registers, performing operations like character encoding, text alignment, and formatting changes.

7. Output Units:

- Output units, such as your monitor are essential for displaying and presenting the results of your actions in Word.
- As the CPU processes your input and manipulates data, it sends signals to the output units to update the display on your monitor, allowing you to see your document, make changes, and review your work.
- Output units also play a role in audio feedback, allowing you to hear sound notifications or voice commands from Microsoft Word.



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Assignment:

Make an **essay** about the evolution of computer, use the following questions to guide the main point of your essay.

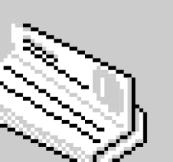
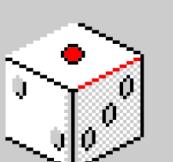
- What events in history lead humans on developing a machine that can do complex calculations?
- What do you think is the most significant point in the evolution of computer's timeline?
- Given the game changer innovations in computer technology, what do you think will be the future of computing?

Format:

- 1 Page - short
- 1 inch margin in all sides
- 12 font size Times New Roman
- 1.5 Spacing

Save as pdf file (**SURNAME_Lab1.pdf**) and send to andam.jhunbrian@gmail.com.

DUE: Friday, 09/22/2023 11:59 PM



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