



Introduction to Computers

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1. Definition of Computer

A computer is an electronic device that processes data, performing calculations and executing instructions to produce results. It can store, retrieve, and manipulate data, making it an essential tool in various fields.

2. Characteristics of Computers

Speed

Computers can process vast amounts of data quickly and efficiently, significantly outperforming human capabilities.

Accuracy

Computers deliver high levels of accuracy in calculations and data processing, minimizing errors.

Automation

Tasks can be automated, allowing for consistent performance without human intervention.

Versatility

Computers can perform a range of tasks and operate various applications, making them adaptable to different needs.

Storage

They have the ability to store vast amounts of information, making data retrieval quick and easy.

3. Generations of Computers

The evolution of computers can be categorized into five generations, each marked by significant technological advancements:

1

First Generation

Vacuum tubes were used, making computers large and energy-inefficient.

2

Second Generation

Transistors replaced vacuum tubes, leading to smaller, more reliable machines.

3

Third Generation

Integrated circuits further miniaturized computers while improving performance.

4

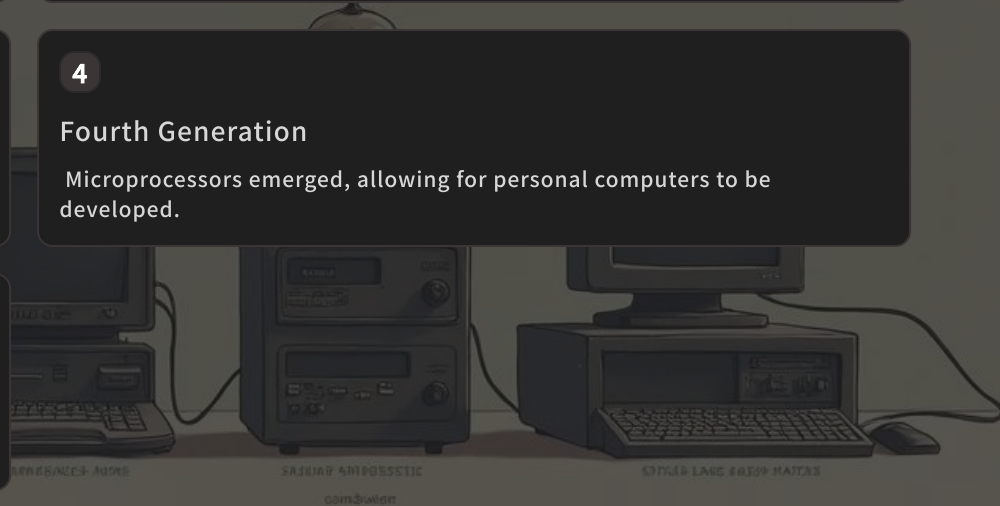
Fourth Generation

Microprocessors emerged, allowing for personal computers to be developed.

5

Fifth Generation

Focus on artificial intelligence and advancements in machine learning technologies.



4. Classification of Computers

Computers can be classified into various types based on functionality:

Analog Computers

Handle continuous data.

Digital Computers

Process discrete data and are widely used today.

Hybrid Computers

Combine features of both analog and digital computers.



5. Uses / Applications of Computers

Computers have numerous applications in different domains such as education, healthcare, business, entertainment, and science. They assist in automation, data processing, online communications, and more.



1. Hardware vs Software

Hardware

The physical components of a computer that you can touch and see.

Software

A set of instructions that tells the hardware how to perform tasks.





2. Input, Output, Processing

1

Input

Devices that allow users to enter data (e.g., keyboard, mouse).

2

Output

Devices that convey results to users (e.g., monitor, printer).

3

Processing

The manipulation of data according to specific rules.



4. CPU Components

ALU (Arithmetic Logic Unit)

Performs mathematical operations and logical comparisons.

Control Unit

Directs the operation of the processor and coordinates activities.

Registers

Small storage locations for quick data access.

5. Memory Classification

1 Primary Memory

Includes RAM (random access memory) for temporary storage and ROM (read-only memory) for permanent storage.

2 Secondary Memory

Involves HDD (hard disk drive), SSD (solid-state drive), and optical storage for long-term data retention.



6. I/O Devices

Computers utilize various input/output devices including:

Keyboard

Mouse

Monitor

Printer

Scanner





1. Number Systems

The various number systems include:

1

Binary

Base-2 system used by computers.

2

Decimal

Base-10 system used in everyday counting.

3

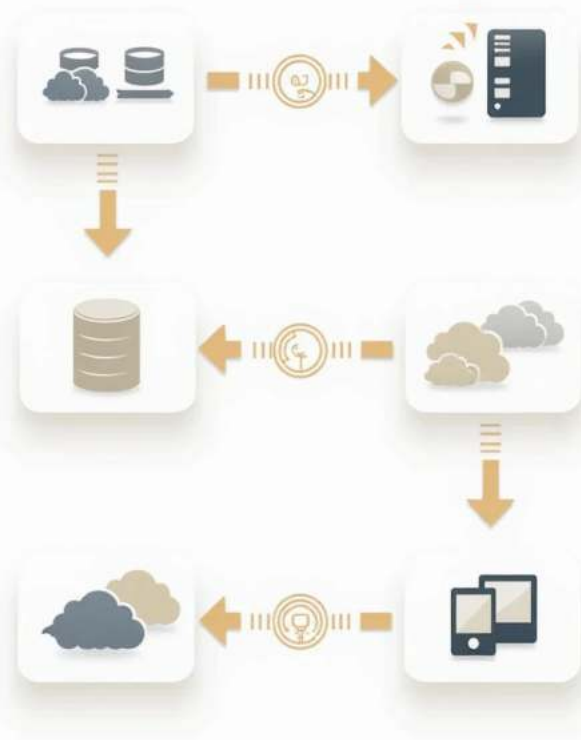
Octal

Base-8 system used in computing.

4

Hexadecimal

Base-16 system often used in programming and memory addressing.



2. Conversions Between Systems

It is essential to understand how to convert between systems for effective data processing.



3. Data Representation

1

Bits

The smallest unit of data in a computer.

2

Bytes

Comprised of 8 bits.

3

Word

A set number of bits processed as a unit.

4. Character Encoding

ASCII

A character encoding standard for electronic communication.

Unicode

An encoding standard that supports diverse characters used in global languages.

Aufbau = Extension
Gunt() = Azxg)
Aunt() Extmi
Aank() Hamo ≡ Ancbod
Gunt() Pacró ≡ Shtpdvsy
Agnit() Taxys ≡ Haupe Dash
Gunt() = Extg)
bertuk() = Aranos = Ajam
uf Omsina ↔ ()
Ximachs = ()

5. Signed Numbers

The representation of signed numbers can be done through methods like two's complement, which enables computers to work with positive and negative integers.

Two's Complement Representation

$$\begin{array}{r}
 + \\
 \text{Binary of } 45 \\
 \text{B}_{10} \quad \text{B}_{21} \\
 \text{Number } 5210
 \end{array}
 \quad
 \begin{array}{r}
 + \\
 \text{Binary of } -43 \\
 \text{D}_{20} \quad \text{U}_{11} \\
 \text{Number } 2230
 \end{array}$$

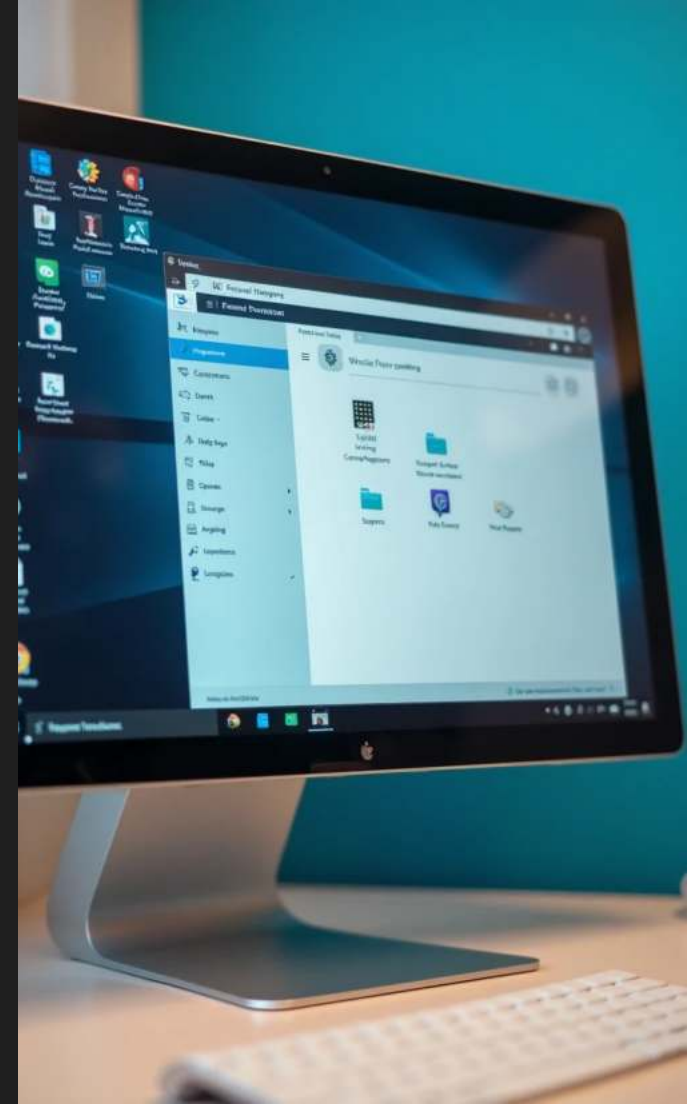
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$$\begin{array}{r}
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 + \\
 \text{Binary of } -43 \\
 \text{D}_{10} \quad \text{U}_{ic} \\
 \text{Number } 2230
 \end{array}$$

DONARY

1. Definition & Functions

An operating system (OS) is software that manages computer hardware and software resources and provides common services for computer programs.





2. Types of Operating Systems

- 1 Batch**
Processes batches of jobs without user interaction.
- 2 Time-sharing**
Allows multiple users to share system resources simultaneously.
- 3 Real-time**
Provides immediate processing and results.
- 4 Distributed**
Manages a network of interconnected computers.
- 5 Embedded**
Designed for specific control functions within larger systems.

3. OS Components

Kernel

The core part of an operating system.

File System

Used to store and organize files.

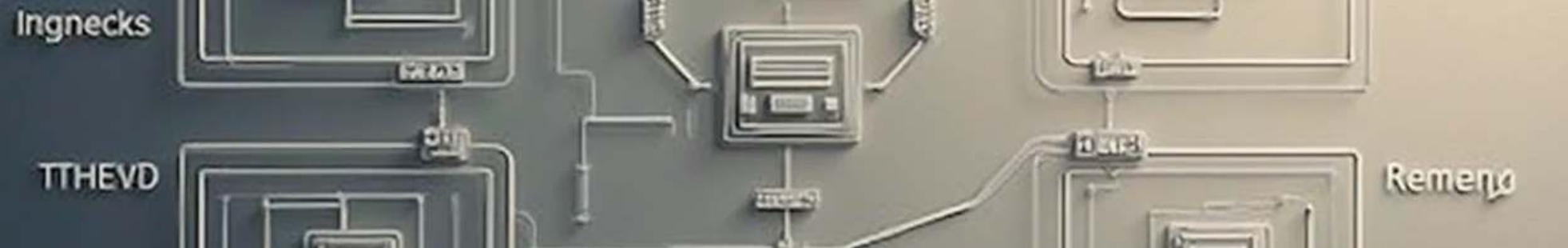
Shell

The user interface for the operating system.

Device Drivers

Software that interacts with hardware components.





4. Processes & Threads

A process is a running instance of a program, while threads are the smallest sequence of programmed instructions.



5. Memory Management

Operating systems manage memory allocation, scheduling tasks, and handling interrupts to optimize performance.



1. What is Software?

1

System Software

Operating systems and utilities that manage resources.

2

Application Software

Programs designed for end-users, performing specific tasks.



2. Language Generations

Machine Language

The lowest level of programming, directly understood by the CPU.

Assembly Language

A low-level programming language that uses symbolic instructions.

High-level Languages

More abstract programming languages that are easier to work with.



3. Compiler vs Interpreter

1

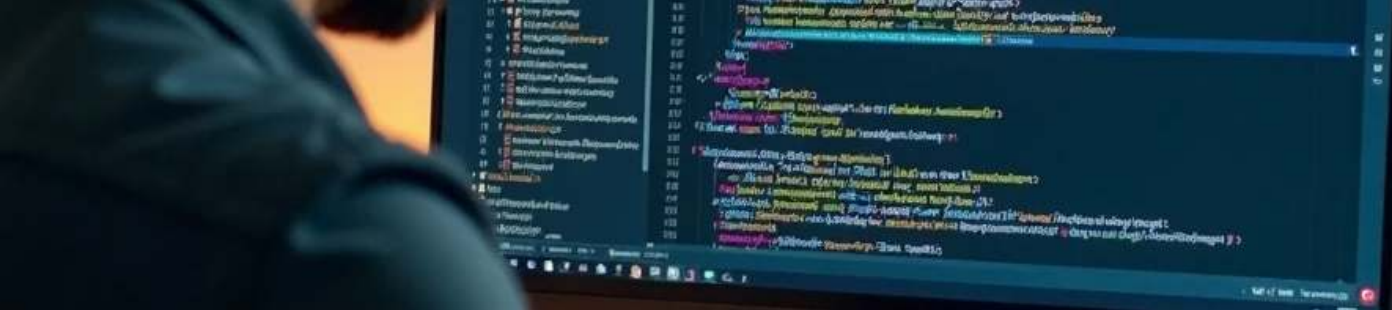
Compiler

Translates high-level code into machine code before execution.

2

Interpreter

Translates high-level code into machine code line-by-line during execution.



4. Development Tools

IDEs (Integrated Development Environments)

Software applications for software development.

Editors

Tools for writing and editing source code.

Debuggers

Tools for identifying and fixing errors in code.

1. Common Data Structures

1 Arrays

Collection of items stored at contiguous memory locations.

4 Queues

First-in, first-out (FIFO) data structure.

2 Linked Lists

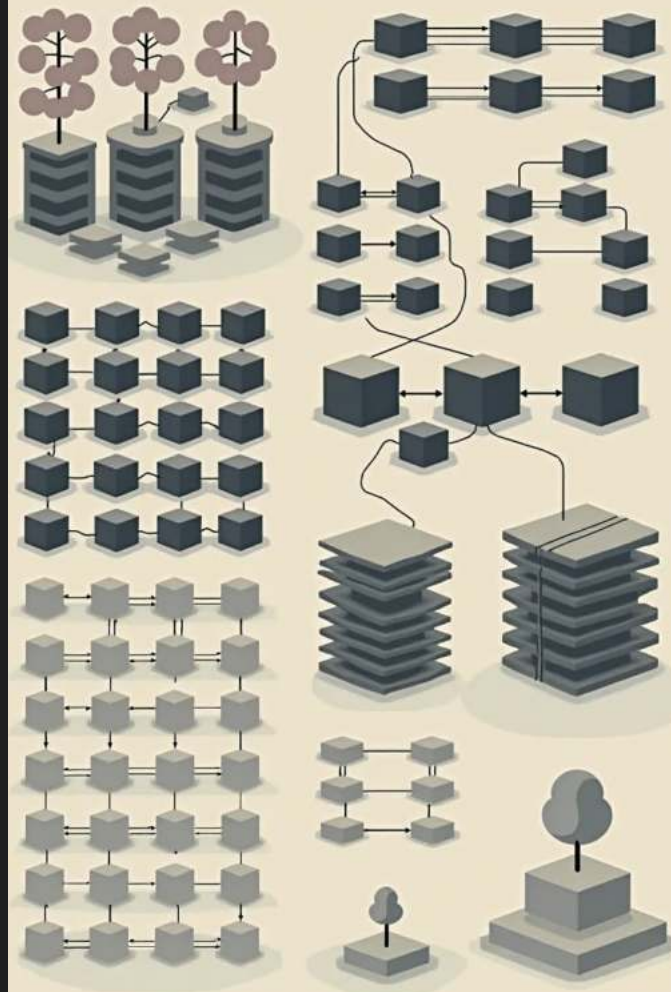
Collection of items through nodes, where each node points to the next.

5 Trees

Hierarchical structure with nodes.

3 Stacks

Last-in, first-out (LIFO) data structure.



2. File Organization

Sequential

Files are organized in a sequence.

Indexed

Uses an index to access files quickly.

Direct

Accessing data directly through its address.



3. Database Basics

An overview of databases encompassing the storage and retrieval of data, especially regarding data relationships.





1. Definition of a Network

A network is a collection of computers and devices connected together for sharing resources.

2. Types of Networks

1

LAN (Local Area Network)
Covers a small geographic area.

2

WAN (Wide Area Network)
Covers a large geographic area.

3

MAN (Metropolitan Area Network)
Covers a city or large campus.

4

PAN (Personal Area Network)
A network for personal devices.



3. Network Topologies

Star

All nodes are connected to a central hub.

Ring

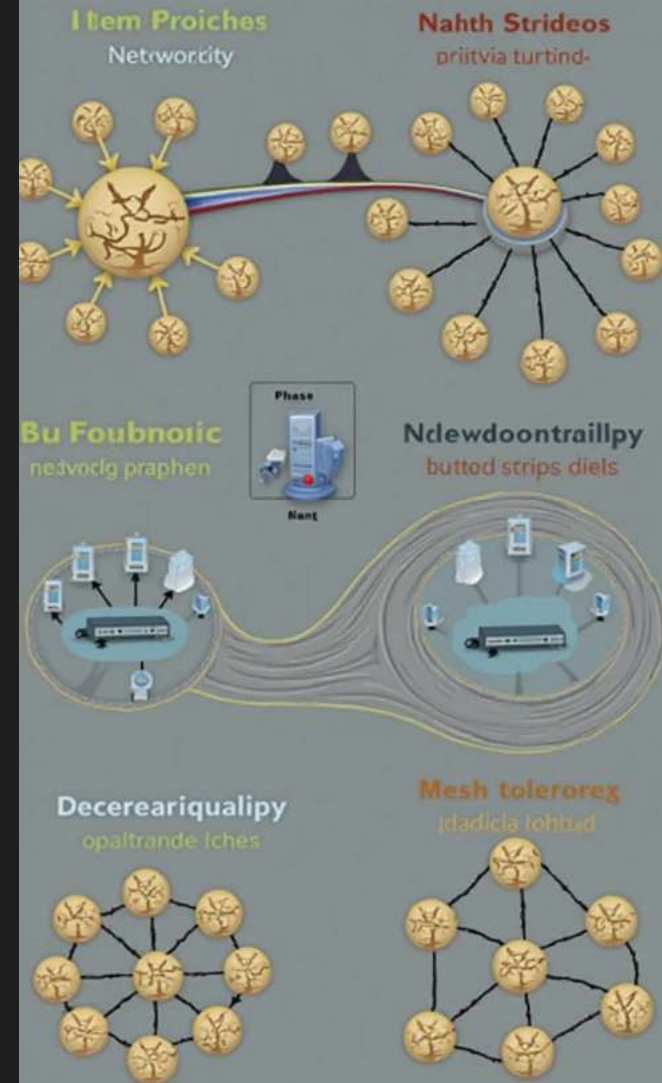
Each device is connected to two other devices, forming a circle.

Bus

All devices share a single communication line.

Mesh

Devices are interconnected, allowing multiple pathways for data.



4. Networking Devices

1

Router

Connects networks and directs data traffic.

2

Switch

Connects devices within a network.

3

Hub

Basic device to connect multiple Ethernet devices.

4

Modem

Converts signals between digital and analog.

5

Firewall

Monitors and controls network traffic for security.





5. Protocols

TCP/IP

The fundamental suite for inter-computer communication.

HTTP

The protocol for transferring web pages.

FTP

File transfer protocol for transferring files.

SMTP

Protocol for sending emails.



6. IP Addressing

Understanding IP addressing, DNS (Domain Name System), and DHCP (Dynamic Host Configuration Protocol) is essential for managing networks.



1. Need for Security

In an increasingly digital world, security is paramount to protect data and personal information.



2. Threats

1

Malware

Software designed to disrupt, damage, or gain unauthorized access.

2

Viruses

Malicious code that replicates itself.

3

Phishing

Fraudulent attempts to obtain sensitive information.

4

Hacking

Unauthorized access to systems or networks.



3. Security Measures

Firewalls

Protect networks from unauthorized access.

Antivirus

Software to detect and eliminate malware threats.

Encryption

Secures data by converting it into a coded format.

Authentication

Verifies the identity of users before granting access.



4. Backup & Recovery

Regular data backups are essential for recovery in case of data loss or cyber incidents.



1. Cloud Computing

A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources.



2. Internet of Things (IoT)

Network of interconnected devices that communicate and share data with each other.



3. Artificial Intelligence / Machine Learning

AI focuses on creating systems that can perform tasks that typically require human intelligence, while machine learning enables systems to learn from data patterns.

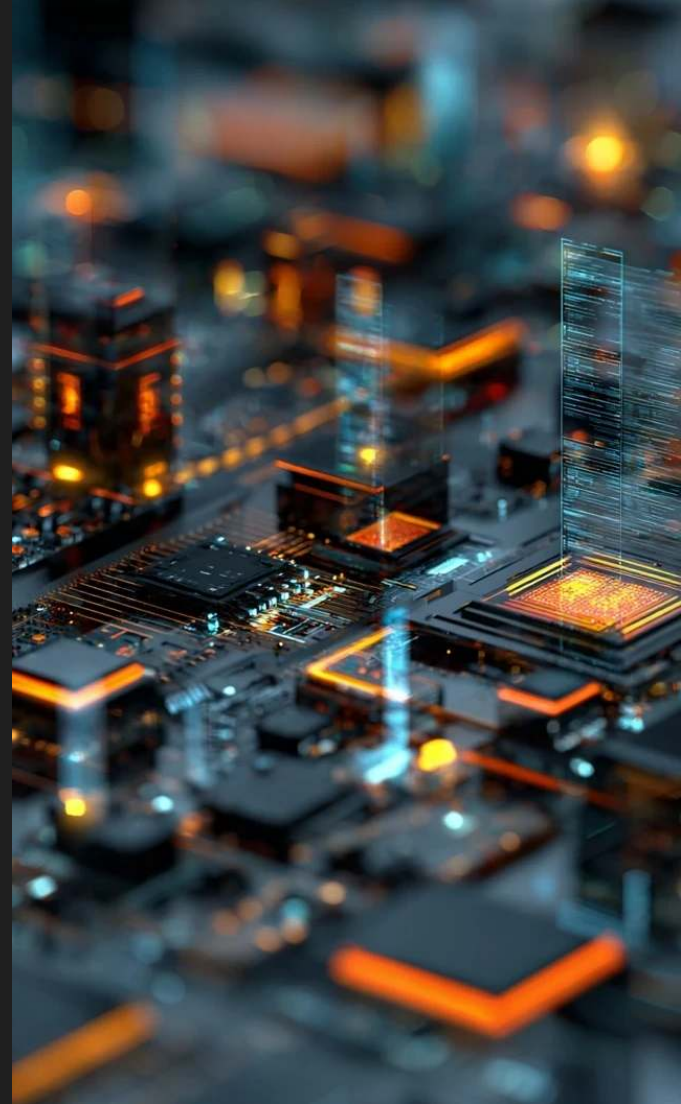


4. Big Data & Blockchain

Big Data refers to vast volumes of data that can be analyzed for insights, whereas Blockchain is a distributed ledger technology ensuring secure and transparent transactions.

1. Recap Main Points

This presentation covered fundamental concepts of computers, their components, software, networks, and emerging trends shaping the technological landscape.



2. Future Outlook

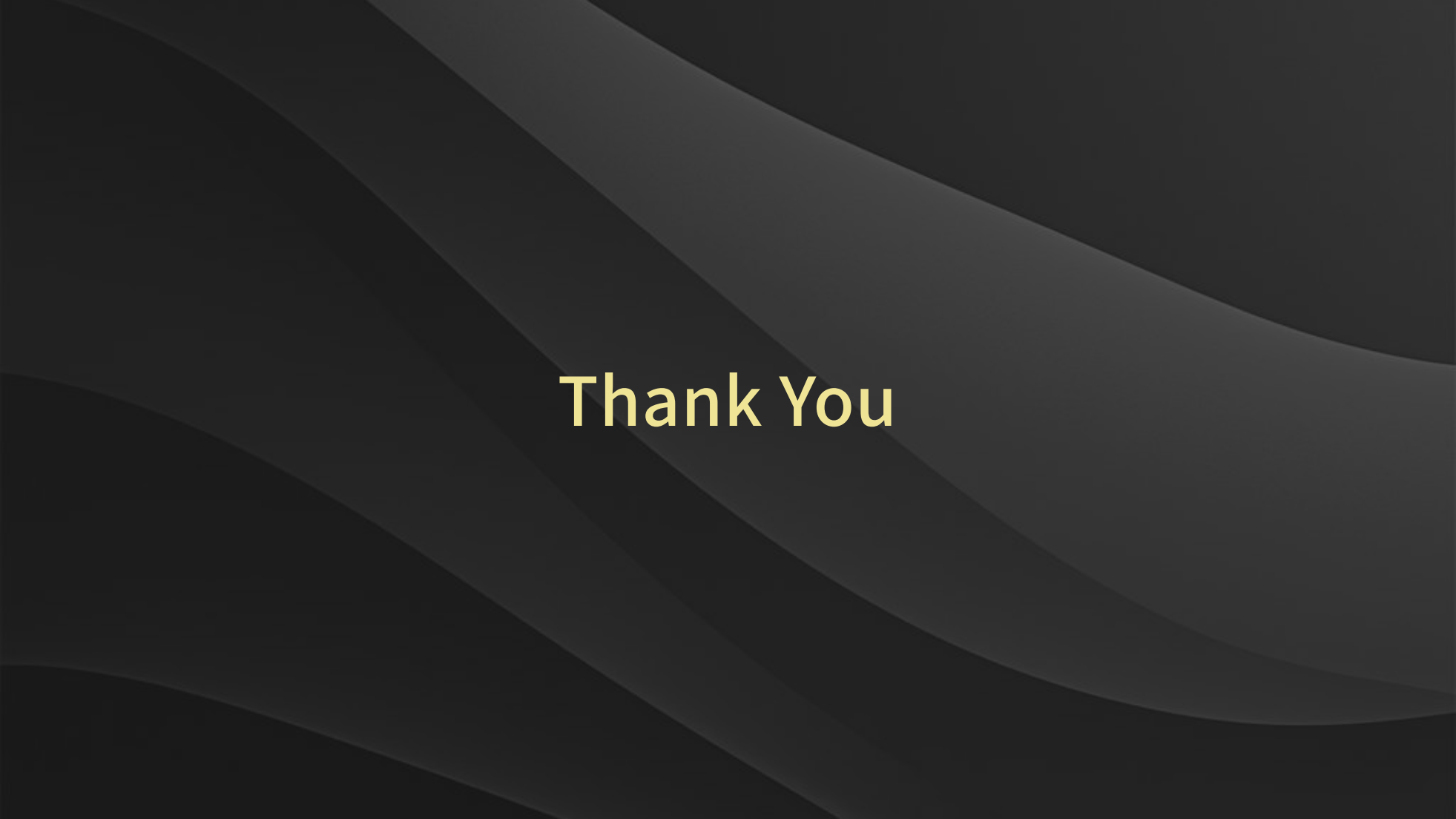
As technology continues to evolve, the impact of computers and associated systems will be increasingly significant in various sectors.



3. Q&A

Feel free to ask any questions regarding the content discussed.





Thank You