

# A Study on Computer of Basic Things to Understand But One Study: One Comprehensive Overview

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**Abstract** — This research Letter Of Objective Computer of basic things Of One Comprehensive Overview provide to do is , in which historical development , computer system Of Necessary components , operating system software \_ And application , network And internet , computer Security And emerging Hui technologies Involved Are. primary Objective computing In basic concepts To clear to do And Today Of digital Era In Their Importance But Light Pour Is. modus operandi In Computer Science In Chief developments of literary review, various Computer components And technologies Of Analysis And present trends of Search Involved Is. conclusion various domain Of users Of For Computer of basic things To understand of Important Role To Underlined Do are , technology Of fast From advanced yes are landscape In One Strong foundation of Need But Force give Are. Research Letter Computer Of development, components and applications in valuable insight provide does is, whose Objective Reader of Necessary Computer concepts And Their Real World Of implications of Understanding to Increase Is.

**Keywords:** Computer System Software and Applications, Various Computer Components and Technologies of Analysis, Computer of Applications, Components

## I. INTRODUCTION

Digital Era Of fast from rising landscape in, computer of basic things of intense Understanding Indispensable yes Went Is. Computer primary devices from powerful devices in advanced happened Are Who personal Communications and Entertainment From taking Complex commercial Operation And Scientist Research till Our daily Life Of every aspect In prevalent Are. This Reference in , computer of basic things To understand Of Importance To Less by doing estimated No Go Can is because \_ it digital literacy of foundation makes Is And persons To fast From technology - driven Society In navigate to do And Contribution to do Of For strong makes Is.

### A. Objective

- To Study about computer.
- To Study about computer application.
- To Study on Computer Software



Fig. 1: Computer Parts

### B. Computer Of historical Development

The evolution of computers is a fascinating journey that has lasted centuries, marked by significant technological advances. Here is a brief overview of the major milestones in the development of computers.

- 1) Abacus (3000 BC) – The abacus, an ancient counting device, is often considered one of the earliest mechanical devices used for basic arithmetic calculations.
- 2) Antikythera Mechanism (circa 100 BC) – The Antikythera Mechanism, an ancient Greek analog computer, was designed to predict astronomical positions and eclipses. This is an early example of a geared mechanism.
- 3) Mechanical calculators (17th century) – Blaise Pascal's Pascaline (1642) and Gottfried Wilhelm Leibniz's Step Reckoner (1673) were among the first mechanical calculators designed for arithmetic calculations.
- 4) Analytical Engine Concept (1837) – Charles Babbage conceptualized the Analytical Engine, a mechanical general purpose computer. Ada Lovelace, a mathematician, is credited with writing the first algorithm for implementation on a machine, making her the world's first programmer.
- 5) Punch card technology (late 19th century) – Herman Hollerith developed punch card technology to process data for the US census. This technology became fundamental to early computing systems.
- 6) Electromechanical Computers (1930s– 1940s) – The era of electromechanical computers saw the development of machines such as the IBM Harvard Mark I (1937–1944) and the Atanasoff – Berry Computer ( ABC ) (1939–1942) .



Fig. 2: historical Development

### C. Computer System of Constituent:

#### 1) Central processing Unit (CPU):

Role of CPU as the brain of the computer

The central processing unit (CPU) acts as the brain of the computer, playing a vital role in executing instructions and managing data within the system. It performs the following major functions.

- 1) Instruction execution – The CPU executes instructions stored in the computer's memory, performing calculations, logical operations and data manipulation.
- 2) Control Unit – The control unit of the CPU manages the execution of instructions, ensuring that each operation occurs in the correct order.
- 3) Arithmetic Logic Unit (ALU) – ALU is responsible for performing arithmetic operations (addition, subtraction, multiplication and division) and logical operations (AND, OR, NOT) as per the instructions of the program.

#### 2) Different CPU architectures and their impact on computing power.

- 1) CISC (Complex Instruction Set Computing) – CISC architecture uses a large set of complex instructions. Each instruction can perform multiple low - level operations. The purpose of this architecture is to reduce the number of instructions required for a program, potentially increasing the speed of program execution. Intel x86 processors are a prime example of CISC architecture.

- 2) EPIC (Explicitly Parallel Instruction Computing) – The EPIC architecture, notably used in Intel's Itanium processors, emphasizes parallel processing. Its purpose is to execute multiple instructions simultaneously, improving overall performance.

- 3) GPU (Graphics Processing Unit) – While primarily designed for rendering graphics, GPUs have evolved into massively parallel processors. Their architecture, often referred to as SIMD (single instruction, multiple data), allows them to perform parallel calculations efficiently, making them suitable for some types of general - purpose computing tasks (GPGPU).

#### 3) Memory (RAM) and storage)

- 1) RAM (Random Access Memory) – RAM, or random access memory, is a type of computer memory used for temporary storage of data that requires quick access to the CPU during computer operation. Unlike storage devices such as hard drives or SSDs, RAM is volatile memory, meaning it loses its contents when the power is turned off.

- 2) Fast access: - RAM is much faster than other types of storage such as hard drives or SSDs. This allows the CPU to read and write data instantly, providing high-speed access to information needed by currently running applications and processes.

- 3) Functions of Operating System: - Operating system uses RAM to store essential system files and data that it needs to run efficiently. It includes the kernel, device drivers, and other critical components.

#### 4) Different types of storage devices

- 1) Hard Disk Drive (HDD)

- Mechanical components: HDDs use a rotating magnetic disk (platter) and read / write heads that rotate on the surface of the platter.
- Capacity: HDDs generally provide larger storage capacities than other types of storage.
- Speed: Slower data access speed than SSD due to mechanical components.

#### 2) Solid State Drive (SSD)

- No moving parts: SSDs use NAND-based flash memory, which has no moving parts, making them more durable and faster than HDDs.
- Speed: Faster data access speeds than HDDs, resulting in faster boot times and application loading.
- Capacity: Initially, SSDs had low capacity, but advancements have increased their storage size.

#### 3) Hybrid Drive (SSHD)

- Combination: SSDs combine a traditional HDD with a smaller SSD cache.
- Performance: SSDs provide better performance than HDDs because of their cache.

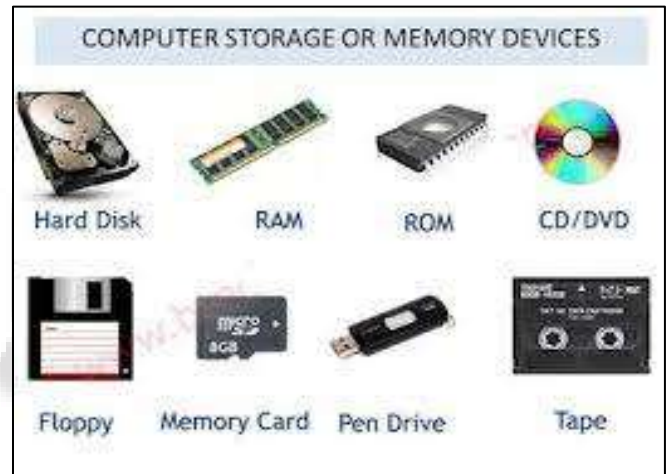


Fig. 3: Computer Storage

### D. Input and Output Device:

Explain various output devices (monitor, printer) and their functions.

Output devices are responsible for presenting information from the computer to the user in a useful format. Two common output devices are monitors and printers.

#### 1) Monitor

- Function: A monitor, or display screen, visually presents information generated by a computer's graphics card. It provides a visual interface for users to interact with the computer.
- Importance: Monitors are essential for tasks such as viewing documents, pictures, videos, and graphical user interfaces. They come in a variety of types, including LCD, LED, and OLED, which offer different resolutions and color capabilities.

#### 2) Printer

- Function: A printer produces hard copies of digital documents, images or other content stored on a computer. There are different types of printers, including inkjet, laser, and dot matrix, each with their own printing technology.

- Importance: Printers are important for producing physical copies of documents, reports, photos and other materials. They are widely used for documentation purposes in offices, homes and various industries.
- 3) *Speaker*
    - Function: Speakers convert digital audio signals into audible sound. They are essential for listening to music, watching videos, and engaging with multimedia content.
  - 4) *Headphones*
    - Function: Like speakers, headphones provide an audio output experience. These are used for private listening and are common in environments where sound isolation is required.
  - 5) *Projector*
    - Function: Projectors display computer - generated images or presentations on a large screen or surface, allowing group viewing in meetings, classrooms or other shared spaces.

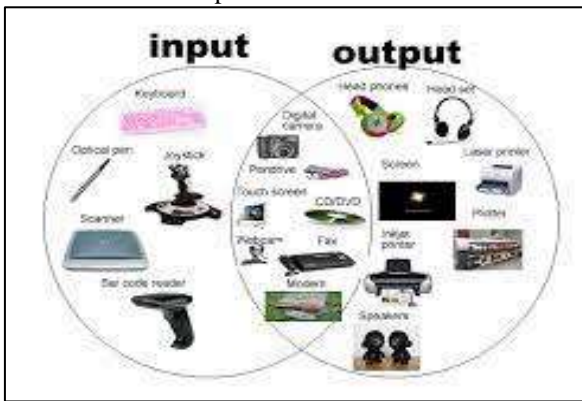


Fig. 4: Input Output Device

## II. OPERATING SYSTEM

Comparison of popular operating systems

### A. Windows

- Vendor: Microsoft.
- User Interface: Graphical User Interface (GUI).
- File System : NTFS ( New Technology File System )
- Compatibility: Widely compatible with a wide range of software and hardware.
- Uses: Mainly used in desktop and laptop computers.
- Notable versions : Windows 10, Windows 11
- Features: Windows offers a wide range of applications, gaming support, and a user-friendly interface. It is widely used in business and home environments.

### B. MacOS

- Seller : Apple
- User Interface : Graphical User Interface ( GUI )
- File System : APFS (Apple File System )
- Compatibility: Limited to Apple hardware but widely compatible with software available in the Apple ecosystem.
- Usage: Mainly used on Apple Macintosh computers.

### C. Linux

- Vendors : Various distributions by various organizations and communities (for example, Ubuntu, Fedora, Debian)
- User interface : Can be both graphical user interface ( GUI ) and command - line interface ( CLI )
- File System : Ext4 ( commonly used )
- Uses: Used in servers, embedded systems, and increasingly desktop environments.
- Features: Known for stability, security and open - source nature. Supports a wide range of software development tools.

## III. SOFTWARE & APPLICATION

### A. System Software

#### 1) Disk Cleanup and Defragmentation

Purpose: Utility programs like Disk Cleanup (Windows) and Disk Utility (MacOS) help users optimize their storage by removing unnecessary files and defragmenting the hard drive for better performance.

#### 2) Backup and Recovery Tools

Purpose: Tools such as Windows Backup, Time Machine (MacOS) and various third - party applications enable users to create backups of their data and recover it in case of system failure or data loss.

#### 3) Antivirus and anti - malware software

Purpose : Necessary to maintain system security , antivirus programs ( for example , Windows Defender , Norton , Bitdefender ) scan and remove malicious software , protecting the system from viruses , malware, and other threats.

#### 4) System monitoring tools

Purpose: Tools such as Task Manager (Windows) and Activity Monitor (MacOS) provide real-time information about system performance, resource usage, and running processes, helping users identify and resolve performance issues. Is.

#### 5) File Compression and Extraction Tools

Purpose: Utilities like WinZip, WinRAR and built-in tools like File Explorer (Windows) or Archive Utility (macOS) allow users to compress files for storage efficiency and extract the compressed files when needed.

#### 6) Password Manager

Purpose: Utilities like Last Pass, 1Password, and Bitwarden help users securely store and manage their passwords while increasing security and convenience.

#### 7) Uninstaller Program

Purpose: These tools, such as Add / Remove Programs (Windows) and AppCleaner (MacOS), help remove software applications and related files from the system.

### B. Application Software

#### 1) Productivity Software

Purpose: Productivity software is designed to increase efficiency and help users create, edit, and manage different types of content.

#### 2) Microsoft Office Suite

Includes applications such as Microsoft Word for word processing, Excel for spreadsheets, and PowerPoint for presentations.

3) *Google Workspace (formerly G Suite)*,

Provides cloud - based productivity tools such as Google Docs, Sheets, and Slides for collaboration and document creation

4) *LibreOffice*

An open - source office suite providing applications for word processing, spreadsheets, presentations, and more.

5) *Entertainment software*

Purpose: Entertainment software is designed for leisure and enjoyment, providing users with a variety of digital entertainment.

6) *Video players*

VLC Media Player, Windows Media Player and QuickTime to play files.

7) *Games*

Popular gaming applications like Fortnite, Minecraft and League of Legends

8) *Streaming services*

Applications like Hulu and Disney +.

9) *Communication software*

Purpose: Communication software facilitates interaction and exchange of information between users.

10) *Email clients*

Microsoft Outlook, Mozilla Thunderbird, and Apple Mail to manage and send email.

11) *Instant messaging and chat apps*

WhatsApp, Slack and Telegram for text communication in real time

12) *Conferencing equipment*

Zoom, Microsoft Teams, and Skype for video calls and virtual meetings

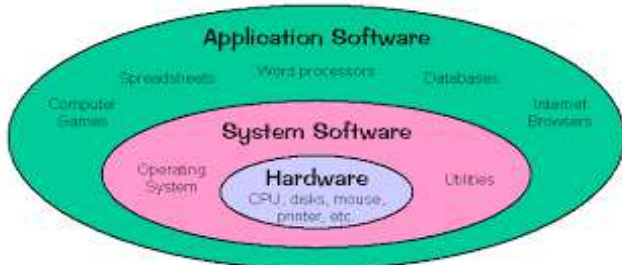


Fig. 5: Software & Application

IV. NETWORK AND INTERNET

Computer networking involves connecting multiple computers and devices to share resources, information, and services. Networks can range from small local networks within a home or office to large-scale global networks such as the Internet. Here are some basic concepts of computer networking.

- Nodes, – Nodes are devices connected to the network, such as computers, printers, routers, and servers.
- Links, – Links are communication routes that connect nodes in a network. These can be wired (e.g., Ethernet cable) or wireless (e.g., WI - Fi).
- Protocols – Networking protocols define rules and conventions for communication between devices. Examples include TCP / IP (Transmission Control Protocol / Internet Protocol), HTTP (Hypertext Transfer Protocol), and DNS (Domain Name System).

- LAN ( Local Area Network ) and WAN ( Wide Area Network )
- LANs are networks that cover a small geographic area, such as a building or campus. WANs cover large areas , often connecting LANs to cities or countries
- Routers and switches – Routers connect multiple networks and facilitate data traffic between them. Switches manage data traffic within the network by directing messages to their intended recipients.
- IP Addresses, - IP (Internet Protocol) addresses uniquely identify devices on a network. IPv4 and IPv6 are two versions of the Internet Protocol.
- Subnetting, – Subnetting involves dividing a large network into smaller subnetworks to improve performance and security.
- Firewall, – Firewalls are security devices that monitor and control incoming and outgoing network traffic, protecting networks from unauthorized access and cyber threats.
- Wireless networks – WI - Fi enables wireless connectivity, allowing devices to connect to a network without physical cables.
- Importance of Internet in connecting computers globally
- The Internet is a global network of interconnected computers and networks, and it plays a vital role in connecting people and devices around the world. Here are the major reasons for the importance of the Internet.
- Global communications, – The Internet facilitates instant communication through email, messaging, and social media platforms, allowing people around the world to connect in real time.
- Information access , – The Internet provides access to vast stores of information , allowing users to retrieve data , conduct research, and stay informed on a variety of topics .
- E - Commerce leverages the Internet for online commerce, enabling cross- level transactions, sales and financial activities.
- Collaboration and remote work, – The Internet supports collaborative work and remote communication, enabling teams and individuals to work together regardless of geographic locations.
- Entertainment and media, – use the Internet to deliver entertainment content to users around the world.
- Education, – The Internet has transformed education by providing access to online courses, educational resources, and collaborative learning platforms.
- Research and Innovation, - The pace of innovation can be faster.

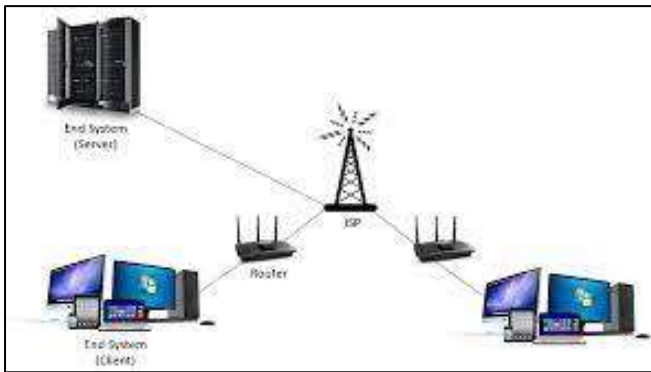


Fig. 6: Computer Network & Internet

## V. COMPUTER SECURITY

### A. Introduction to Cyber Security

Cyber security is the practice of protecting computer systems, networks, and data from unauthorized access, attacks, damage, or theft. As our dependence on digital technologies increases, the importance of cyber security has become paramount to protect sensitive information, maintain system integrity and ensure the availability of critical services. Cybersecurity encompasses a combination of technologies, processes, and practices designed to defend against a wide range of threats in the digital landscape.

### B. Malware,

Definition: Malicious software, such as viruses, worms, trojans, and ransomware, designed to damage or exploit computer systems. Preventive measures: Use antivirus software, keep software updated, and avoid downloading from untrusted sources, and back up data regularly.

### C. Fishing,

Definition: An attempt to trick individuals into revealing sensitive information such as passwords or credit card numbers by posing as a trusted entity. Preventive measures: Beware of unsolicited emails, messages or links; Use two-factor authentication; and educate users about phishing tactics.

### D. Social Engineering,

Definition: Manipulating individuals into revealing confidential information or taking actions that may compromise security. Preventive measures: Provide security awareness training, enforce strict access controls, and encourage a culture of skepticism regarding requests for sensitive information.

### E. Denial of service (DoS) and distributed denial of service (DDoS) attacks,

Definition: To exert traffic pressure on a system, network, or website in order to disrupt normal functioning and deny access to legitimate users. Preventative measures: Use firewalls and intrusion prevention systems, implement traffic filtering, and DDoS Deploy mitigation services.

### F. Man - in - the - middle (MITM) attacks,

Definition: Interruption of communications between two parties by an unauthorized third party. Preventive measures:

Use encryption protocols (HTTPS), enforce secure WI - Fi connections, and employ digital signatures.

### G. Preventive measures in cyber security

Firewalls and intrusion detection systems – Employ firewalls to monitor and control incoming and outgoing network traffic. Intrusion detection systems (IDS) help detect and respond to suspicious activities.

- Access controls – Implement strong access controls, including user authentication and authorization, to ensure that only authorized individuals have access to sensitive information.
- Regular software updates and patch management – Keep operating systems, applications, and software up to date to address known vulnerabilities and reduce the risk of exploitation.
- Backup and Recovery – Regularly back up critical data and ensure recovery procedures are in place to minimize the impact of data loss in the event of a security incident.



Fig. 7: Computer Security

## VI. EMERGING TECHNOLOGIES

Current trends and emerging technologies in computing

### A. Artificial Intelligence (AI)

- Current Trends: AI continues to advance, with machine learning algorithms and deep learning techniques making significant progress. Natural language processing (NLP) and computer vision applications are becoming more sophisticated.
- Emerging developments: Explainable AI, federated learning, and edge computing are attracting AI attention. Reinforcement learning and generative AI models are also developing.

### B. Internet of Things (IoT)

- Current trend: IoT Expanding, connecting devices and enabling data exchange for a variety of applications including smart homes, Industrial IoT (IIoT), and healthcare.
- Emerging Developments: IoT Edge computing, 5G connectivity for faster data transfer, and IoT Integration of AI for intelligent decision making within the system.

### C. 5G Technology

- Current Trends: The deployment of 5G networks is underway, providing faster and more reliable wireless communications with lower latency.
- Emerging developments: The expansion of 5G infrastructure, enabling new applications such as

augmented reality (AR), virtual reality (VR), and the proliferation of IoT devices.

D. Potential impact on the future of computing

1) Artificial Intelligence (AI)

Impact: AI is transforming industries by automating processes, improving decision making, and enabling new applications. It has the potential to revolutionize healthcare, finance, manufacturing and customer service.

2) Internet of Things (IoT)

Effect: IoT Building interconnected ecosystems, optimizing resource use and improving efficiency. It is set to enhance smart homes, smart cities, and industrial processes, leading to a more connected and automated world.

3) 5g technology

Impact: 5G technology enables faster and more reliable wireless communications, facilitating the development of IoT, AR, VR, and autonomous systems. This will contribute to better connectivity and enhanced user experience.



Fig. 8: technologies

VII. CHALLENGES AND MORAL IDEA

A. Privacy Concerns

Issue: The collection, storage and analysis of large amounts of personal data raises concerns about personal privacy. Companies and governments often have access to sensitive information, leading to potential misuse or unauthorized access.

Mitigation: Enforcing strong data protection regulations (for example, GDPR), using encryption, and promoting user education on privacy settings and practices.

B. Data Breach

Problem: Unauthorized access to the database can result in a data breach, exposing sensitive information, causing financial losses and damaging the organization's reputation.

Mitigation: Implementing strong access controls, encryption, regular security audits, and incident response plans to reduce the impact of data breaches.

C. Digital Inequality

Issue: Unequal access to technology, known as the digital divide, can result in disparities in education, job opportunities, and access to essential services.

Shaman: Initiative to bridge the digital divide, provide affordable internet access, and promote digital literacy and skill development in disadvantaged communities.

Ethical considerations in technology

D. Fairness and BIAS in AI

Ethical considerations: AI systems can acquire bias from their training data, leading to discriminatory results. It is essential to ensure fairness and reduce bias in AI development.

Mitigation: Regularly auditing and refining AI algorithms, diverse and representative data collection, and transparent AI development practices.

E. Privacy and Data Security

Ethical Considerations: Respecting the privacy rights of individuals and protecting their data from unauthorized access or use is a fundamental ethical concern.

Mitigation: Enforcing privacy by design principles, obtaining informed consent, anonymizing data, and complying with data protection regulations.

F. Cyber Security Ethics

Ethical Considerations: Ethical considerations in cybersecurity include using ethical hacking practices, responsibly disclosing vulnerabilities, and ensuring responsible use of cybersecurity measures.

Mitigation: Adhering to ethical hacking principles, promoting responsible disclosure, and avoiding the use of cybersecurity for malicious purposes.

G. Environmental Effect

Ethical considerations: The environmental impact of computing, including energy consumption and electronic waste, is an ethical concern.

Mitigation: Adopting sustainable computing practices, adopting energy - efficient technologies, and promoting responsible disposal and recycling of electronic devices.

User consent and autonomy

Ethical considerations: It is essential to respect user autonomy and obtain informed consent for data collection and use of technology.

Mitigation: clearly communicating terms of service, obtaining opt - in consent, and allowing users control over their data and privacy settings.



Fig. 9: technologies

VIII. CONCLUSION

Evolution of computers – Traces the evolution of computers from early mechanical devices to modern digital systems, reflecting significant advances in computing technology.

- Role of the CPU – Explains the central role of the CPU as the brain of the computer, explaining in detail the different CPU architectures and their impact on computing power.
- Memory and Storage – Defines RAM and its temporary data storage function, explores different types of storage

devices like HDD and SSD along with their characteristics.

- Input and Output Devices – Discusses the importance of input devices ( keyboard , mouse ) in user interaction and explains the functions of various output devices ( monitor , printer , speakers , headphones , projector, and plotter ) .
- Outlines the operating systems – macOS, Linux) and its role in managing computer resources, comparing their features.
- Computer Networking – Introduces the fundamentals of computer networking , including nodes , links , protocols , LANs, WANs, routers , switches , IP addresses, and various network topologies.
- Importance of the Internet – Highlights the importance of the Internet in connecting computers globally, enabling global communications, information access, e-commerce, collaboration and innovation.
- Cyber Security – Common security threats (malware, phishing, DoS Explores the concept of cybersecurity, discussing attacks) and preventive measures (firewalls, encryption, access controls).
- Ethical reparations – addresses ethical considerations in computing, including fairness in AI, privacy protections, transparency, accountability, cybersecurity ethics, and environmental impacts of the technology.

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