Estd - 2003

DRIEMS POLYTECHNIC

Tangi, Cuttack — 754022, Odisha

C L A S S N O T E

INTRODUCTION TO IT SYSTEMS

Prepared by

Er. Sambit Kumar Sahoo

Lecturer, Department of Computer Science & Engineering

DRIEMS Polytechnic, Tangi, Cuttack — 754022

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Introduction to IT Systems — All Units

UNIT 1

INTERNET SKILLS AND COMPUTER BASICS

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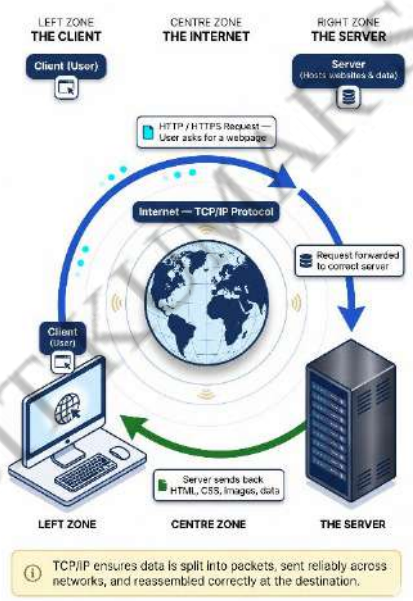
BASIC INTERNET SKILLS

What is the Internet?

The Internet is a global network of interconnected computers and devices that communicate with each other using standardized communication protocols. It enables the sharing of resources, information, and services across geographical boundaries. The Internet connects millions of networks belonging to private organizations, public institutions, academic bodies, businesses, and government agencies, forming a unified global communication infrastructure.

The Internet operates on a client-server model, where users access data and services hosted on remote servers through their local devices. The standardized protocols, primarily TCP/IP (Transmission Control Protocol/Internet Protocol), ensure that data is transmitted reliably and consistently regardless of the hardware or software used at either end of the communication.



Common Applications of the Internet

The Internet serves a wide range of purposes across personal, professional, and institutional domains. The major applications are as follows:

- Global Connectivity — The Internet connects millions of private, public, academic, business, and government networks worldwide, enabling seamless interaction across countries and continents.
- Communication — It enables communication through various means, including Email (Electronic Mail), Instant messaging, Voice and video calls, and Social media platforms.
- Information Sharing — The Internet facilitates access to vast amounts of information stored on servers and computers around the world through Websites, Search engines, and Online databases.
- E-Commerce — It supports online shopping, digital payment systems, and financial transactions between buyers and sellers across the globe.

- Collaboration — The Internet enables real-time collaboration on projects, sharing of documents, and simultaneous editing across different geographical locations using cloud-based tools.
- Entertainment — It provides access to a wide variety of entertainment content, including Video and audio streaming services, Online gaming platforms, and Multimedia content distribution.

Glossary for Internet Basics

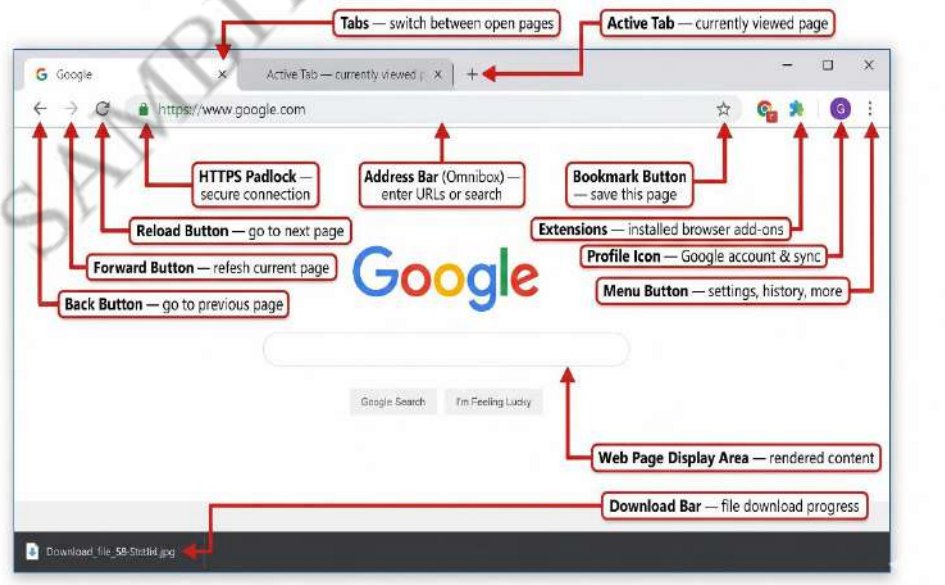
Term	Full Form	Definition
Internet	Internetwork	A global network connecting millions of private, public, academic, business, and government networks for communication and data exchange.
WWW	World Wide Web	A system of interlinked hypertext documents and multimedia content accessed via the Internet using web browsers.
URL	Uniform Resource Locator	The specific address used to locate a web page or resource on the Internet.
Web Browser	—	Software application used to access, retrieve, and view websites and web content. Examples include Chrome, Firefox, and Safari.
HTML	Hypertext Markup Language	The standard markup language used for creating, structuring, and designing web pages.
HTTP	Hypertext Transfer Protocol	The application-layer protocol used to transfer hypertext data over the Internet.
HTTPS	Hypertext Transfer Protocol Secure	An encrypted and secure extension of HTTP that ensures safe communication between a browser and a web server.
Server	—	A computer or system that provides resources, data, or services to other computers (clients) over a network.
IP Address	Internet Protocol Address	A unique numerical identifier assigned to each device connected to a network, used for identification and communication.
Domain Name	—	A human-readable address used to identify a website on the Internet, such as google.com.
DNS	Domain Name System	A hierarchical system that translates human-readable domain names into machine-readable IP addresses.
ISP	Internet Service Provider	A company or organization that provides users and institutions with access to the Internet.
Router	—	A networking device that forwards data packets between different computer networks, directing traffic along optimal paths.
Modem	Modulator-Demodulator	A device that modulates digital signals into analog signals for transmission and demodulates received analog signals back into digital form.

Term	Full Form	Definition
Bandwidth	—	The maximum rate of data transfer across a network or Internet connection, typically measured in bits per second.
Cookie	—	A small piece of data sent by a website and stored on the user's device to track browsing activity and preferences.
Firewall	—	A network security system that monitors and controls incoming and outgoing network traffic based on predefined security rules.
Phishing	—	A type of cyber attack where fraudulent emails or websites are used to deceive users into revealing sensitive personal information.
Malware	Malicious Software	Software intentionally designed to cause damage, disrupt operations, or gain unauthorized access to computers, networks, or data.
Cloud Computing	—	The delivery of computing services such as servers, storage, databases, networking, and software over the Internet.

1.1 UNDERSTANDING A BROWSER

What is a Web Browser?

A web browser is a software application specifically designed to access, retrieve, and display web pages and other resources available on the Internet. It interprets HTML documents, applies CSS stylesheets for visual formatting, and executes JavaScript code to render web pages in a visually understandable format for users. The browser acts as the primary interface between the user and the World Wide Web, enabling seamless navigation across websites and online services.



Components of a Web Browser

A web browser consists of several integrated components, each performing a specific function to ensure efficient retrieval and display of web content.

- User Interface (UI) — The graphical interface through which users interact with the browser. It includes Menus and toolbars, Address bar (for entering URLs), and Navigation buttons (Back, Forward, Refresh, Home).
- Rendering Engine — The core component responsible for interpreting HTML, CSS, and JavaScript to visually display web pages. Google Chrome uses the Blink engine; Mozilla Firefox uses the Gecko engine.
- Browser Engine — Acts as a coordinator between the rendering engine and the user interface, managing the flow of instructions and data between these two components.
- Networking Component — Handles all communication between the browser and web servers over the Internet using HTTP and HTTPS protocols.
- JavaScript Engine — Executes JavaScript code embedded within web pages, enabling interactive and dynamic content such as animations, form validations, and real-time updates.
- Browser Extensions and Add-ons — Optional software tools that extend and enhance browser functionality, such as ad blockers and password managers.
- Storage — Manages the local storage of browsing data, including Cookies, Cached files, and Session data.
- Security Features — Built-in mechanisms including HTTPS support, phishing protection and warning systems, and sandboxing to isolate web page processes.

How a Browser Interacts with the Internet

- Requesting Web Pages — When the user types a URL or clicks a hyperlink, the browser sends an HTTP or HTTPS request to the hosting server.
- Receiving and Rendering — The server responds by sending the requested content (HTML, CSS, JavaScript, images). The browser interprets and renders this content on the user's screen.
- Executing Scripts — JavaScript code is executed by the JavaScript engine, allowing the page to modify content dynamically, handle user input, and communicate with servers using AJAX.
- Caching — The browser stores copies of frequently accessed resources in local storage to speed up subsequent visits.
- Security Checks — The browser verifies website authenticity through HTTPS certificates and warns users about potentially malicious websites.

Popular Web Browsers

Browser	Developer	Key Characteristics
Google Chrome	Google	Known for speed, stability, and extensive built-in developer tools. Uses the Blink rendering engine.
Mozilla Firefox	Mozilla Foundation	Emphasizes user privacy, offers extensive customization, and is open-source software. Uses the Gecko rendering engine.

Browser	Developer	Key Characteristics
Apple Safari	Apple Inc.	Integrated with macOS and iOS devices. Focuses on performance optimization and energy efficiency.
Microsoft Edge	Microsoft	Built on the Chromium engine. Includes Cortana integration and compatibility with Windows services.

Components of a Web Browser — Summary Table

Component	Function
User Interface (UI)	Provides address bar, navigation buttons, tabs, and bookmarks for user interaction.
Browser Engine	Bridges the User Interface and Rendering Engine by translating user actions into executable commands.
Rendering Engine	Parses HTML, CSS, and JavaScript to construct and display the visual layout of web pages.
Networking	Handles HTTP/HTTPS requests and responses for retrieving web content from servers.
JavaScript Engine	Executes JavaScript code to enable dynamic and interactive web page functionality.
Storage	Stores cookies, cached files, and session data locally for faster and personalized browsing.
Security Features	Provides HTTPS support, phishing protection, and sandboxing for user safety.

Elements of a Chrome Browser Window

Element	Purpose
Menu Button	Opens a menu providing access to settings, history, and extensions.
Title Bar	Displays the title of the currently active web page.
Profile Icon	Provides access to Google account settings and synchronization.
Extensions	Displays icons of installed browser extensions on the toolbar.
Overflow Menu	Provides access to additional extensions not visible on the toolbar (puzzle piece icon).
Search/Address Bar	Accepts URL entries and search queries.
Back Button	Navigates to the previously visited page.
Forward Button	Navigates to the next page after using the Back button.

Element	Purpose
Reload Button	Refreshes the current web page.
Bookmark Button	Saves the current page as a bookmark.
Tabs	Displays titles of open pages and enables switching between them.
Web Page Display Area	Renders and displays the content of the active web page.
Download Bar	Shows download progress and provides access to downloaded files.

Common Browser Features

Tabs and Tab Management

- Tab Switching — Switch between multiple open web pages.
- Tab Pinning — Pin frequently visited websites as small persistent tabs.
- Tab Grouping — Organize related tabs into named groups.
- Tab Muting — Mute audio from specific tabs.

Address Bar (Omnibox)

- URL Entry — Enter website addresses directly.
- Search Functionality — Perform web searches from the address bar.
- Autocomplete — Suggests URLs or search terms as the user types.

Navigation Controls

- Back and Forward Buttons — Navigate through previously visited pages.
- Reload/Refresh Button — Reload the current web page.
- Home Button — Return to the default home page.

Privacy and Security

- Incognito/Private Mode — Browse without saving history or cookies.
- Password Manager — Securely store and auto-fill passwords.
- Do Not Track — Request websites not to track browsing activity.
- Pop-up Blocker — Prevent unwanted pop-up windows.

Developer Tools

- Console — Debug JavaScript errors and runtime logs.
- Inspector — Examine and modify HTML structure and CSS styling.
- Network Monitor — Analyze network requests and page loading performance.

1.2 EFFICIENT USE OF SEARCH ENGINES

Introduction to Search Engines

A search engine is a software system designed to carry out web searches by locating and retrieving information from the Internet based on user queries. It enables users to find specific information from the vast amount of data available across millions of websites and online resources. Efficient use of search engines significantly enhances the ability to find relevant and accurate information quickly.

Key Components of a Search Engine

1. Web Crawler (Spider/Bot)

Function: Automatically browses the World Wide Web and collects data from websites. The crawler visits web pages, reads content, and follows hyperlinks to discover and gather data from additional pages. This process is continuous and systematic.

2. Indexing

Function: Organises and stores collected data in a structured format. Information is indexed and categorised based on keywords present in the content, page titles and headings, and metadata such as descriptions and tags.

3. Database

Function: Stores all indexed data in a centralised repository optimised for rapid retrieval, enabling responses to queries within fractions of a second.

4. Query Processor

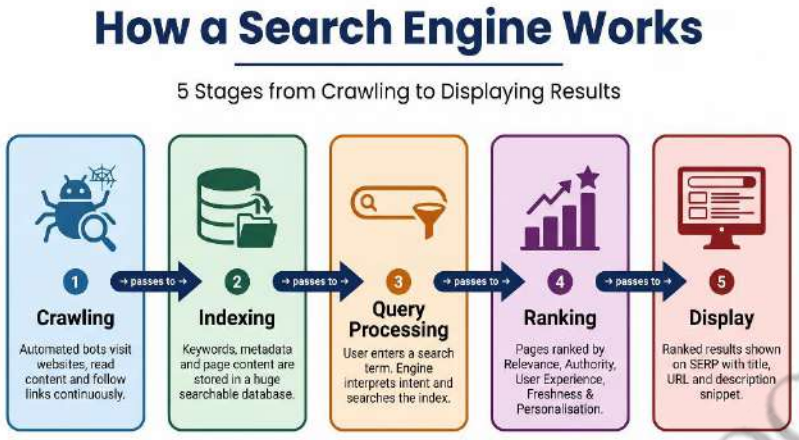
Function: Analyses user queries and retrieves relevant information from the database by interpreting search terms, identifying intent, and matching against indexed data.

5. Ranking Algorithm

Function: Determines the order in which search results are displayed based on Relevance, Quality, Page Authority, Keyword Usage, and User Engagement metrics.

6. Search Results Interface

Function: Displays results to the user in an organised format, presenting the page title, URL, and a content snippet for each result.



Key Components — Summary Table

Component	Function	Process
Web Crawler	Browses the web and collects data	Visits pages, reads content, follows hyperlinks
Indexing	Organizes and stores collected data	Categorizes by keywords, content, and metadata
Database	Stores indexed data centrally	Maintains optimized repository for rapid retrieval
Query Processor	Analyzes user queries	Interprets search terms and matches against index
Ranking Algorithm	Determines result display order	Ranks by relevance, quality, authority, engagement
Search Results Interface	Displays results to the user	Shows titles, URLs, and content snippets

How a Search Engine Works

- User Query — The user enters a search term or phrase into the search bar.
- Query Processing — The search engine analyzes the query to understand user intent.
- Search and Retrieval — The engine scans its index to locate matching web pages.
- Ranking — Results are ranked by relevance, authority, quality, and engagement.
- Display of Results — Ranked results are presented on the SERP with titles, URLs, and snippets.

Popular Search Engines

Search Engine	Developer / Origin	Key Characteristic
Google	Google LLC	Most widely used globally; powerful algorithms and vast database.
Bing	Microsoft	Similar to Google with different ranking algorithms; integrated with Microsoft services.
Yahoo!	Yahoo Inc.	One of the oldest search engines; now powered by Bing's search technology.
DuckDuckGo	DuckDuckGo Inc.	Privacy-focused; does not track user activity or store personal data.
Baidu	Baidu Inc. (China)	Leading search engine in China; tailored for Chinese language users.

Types of Web Searches

Type	Purpose	Example Queries
Informational Search	To find knowledge or information about a topic	"How does photosynthesis work?", "History of the Roman Empire"
Navigational Search	To locate a specific website or web page	"Facebook login", "YouTube"
Transactional Search	To perform an action such as purchasing or subscribing	"Buy iPhone 13", "Netflix subscription"

How Search Engines Work — Detailed Process

Stage 1: Crawling

- Automated crawlers begin with known URLs and sitemaps.
- Crawlers visit pages, read content, and follow links to discover new pages.
- Crawling is continuous and recurring to keep indexed data current.

Stage 2: Indexing

- Content of crawled pages is parsed and analyzed.
- Keywords, topics, and themes are identified and recorded.
- A massive searchable index (catalogue) is built.
- Metadata (title, URL, description) is stored for quick retrieval.

Stage 3: Ranking

- Relevance — How closely content matches the query.
- Authority — Credibility measured by quality external links.
- User Experience — Page load speed, mobile-friendliness, usability.
- Freshness — Preference for newer content on time-sensitive topics.

- Personalization — Adjustments based on user history, location, preferences.

Stage 4: Retrieval and Display

- Query keywords are processed to understand intent.
- The index is scanned for matching pages.
- Results are ranked and displayed on the SERP.
- Snippets (title, URL, description) are generated for each result.

Stage 5: Continuous Updates and Refinement

- Algorithms are regularly updated to improve quality.
- User interaction data (click-through rates, dwell time) is analyzed for refinement.

Search Engine Stages — Summary Table

Stage	Process	Description
Stage 1	Crawling	Crawlers discover and gather data from web pages by following links.
Stage 2	Indexing	Data is parsed, categorized, and stored in a structured index.
Stage 3	Ranking	Results are ordered by relevance, authority, experience, freshness, personalization.
Stage 4	Retrieval and Display	Results are retrieved from index and displayed on SERP with snippets.
Stage 5	Continuous Updates	Algorithms updated; user interaction data analyzed for improvement.

Informational Search Query Operators

Operator	Description	Example
define	Returns a definition of the given term	define tolerance
time	Returns the current time at a specified location	time Australia
to	Converts measurements from one unit to another	12 inches to feet
in	Converts currency or measurement values	650 EURO in INR
translate	Translates words or phrases into a specified language	Translate " Hello world " into Odia
map	Returns a map view of the specified location	map Odisha
stocks	Returns stock market information for a company	stock wipro
weather	Returns the weather forecast for a location or ZIP code	weather bodhgaya or 824231

Google Advanced Search — Step-by-Step Process

- Step 1: Open a web browser and navigate to www.google.com.
- Step 2: Enter the search term in the search box and press Enter to view results.
- Step 3: Select a content category from the tabs: All, News, Images, Books, Videos, Maps, Flights, or Finance.
- Step 4: Click the Tools button within the selected category to access additional refinement filters.
- Step 5: Explore other categories and apply their respective filters for precise results.

Category	Type of Results	Example Filters
All	General web results	Time period, verbatim search
News	News articles	Date range, source, sorting order
Images	Image results	Size, colour, type, usage rights
Books	Book references	Preview available, date
Videos	Video content	Duration, date, quality, source
Maps	Location-based results	Distance, transit mode
Flights	Flight information	Date, airline, stops, price
Finance	Financial data	Time range, comparison charts

1.3 AWARENESS ABOUT DIGITAL INDIA PORTALS

What is Digital India?

Digital India is a flagship initiative launched by the Government of India in 2015 with the vision of transforming India into a digitally empowered society and knowledge economy. The program aims to harness technology to improve governance, make public services more accessible to all citizens, and promote digital literacy across the country.

Objectives of Digital India

Objective 1: Digital Infrastructure as a Core Utility to Every Citizen

- High-Speed Internet — Ensuring access to high-speed Internet as a basic right.
- Digital Identity — Providing a unique digital identity (Aadhaar) for every citizen.
- Mobile Phone and Bank Account — Enabling widespread access to mobile and banking services.

Objective 2: Governance and Services on Demand

- e-Governance — Reforming government processes through digitization for transparency and efficiency.
- Online Services — Delivering government services through online and mobile platforms.
- Ease of Doing Business — Simplifying processes for businesses through digital tools.

Objective 3: Digital Empowerment of Citizens

- Digital Literacy — Promoting digital skills, particularly in rural and underserved areas.
- Universal Digital Literacy — Providing training for basic digital skills to every individual.
- Availability of Digital Resources — Ensuring access to digital content in regional languages.

Objective	Focus Area	Key Initiatives
Digital Infrastructure	Foundational digital infrastructure	High-speed Internet, Aadhaar, mobile and banking access
Governance on Demand	Digital governance reform	e-Governance, online services, ease of doing business
Digital Empowerment	Digital skills and resource access	Digital literacy, universal training, regional content

State Portals

A State Portal is an online platform created by individual state governments in India to provide citizens with access to government services, information, and resources specific to that state.

Key Features of State Portals

Feature	Description
Access to Government Services	Online applications for certificates, tax payments, license applications, and grievance redressal with tracking.
Information and Resources	Government notifications, policy updates, downloadable forms, and official documents.
Citizen Engagement	Feedback mechanisms, suggestion portals, and discussion forums.
E-Governance Initiatives	Mission Mode Projects such as e-Districts and integrated multi-department services.
Local Language Support	Multilingual interface in state official language and English.

How to Navigate a State Portal — Step-by-Step

- Access the Portal — Open a browser, enter the portal URL, and load the homepage.
- Explore the Homepage — Review the navigation bar, search bar, main menu, and featured services.
- Access Specific Services — Browse Citizen Services, Department Services, and Quick Links.

- Use Search Function — Enter keywords and apply filters to locate services.
- Register or Log In — Create a new account or log in with existing credentials.
- Fill Out Online Forms — Select a service, fill in details, upload documents, and submit.
- Make Payments — Use the payment gateway via card, net banking, or UPI.
- Track Application Status — Use the reference number to check progress.
- Download or Print Documents — Retrieve processed documents from the portal.
- Access Support or Help — Use the Help section, contact details, or FAQs.
- Log Out — Securely log out after completing all tasks.

College Portal

A college portal is an online platform provided by educational institutions that allows students, faculty, and staff to access academic and administrative services through a centralized digital hub.

Features of a College Portal

Feature Category	Target Users	Key Functions
Student Dashboard	Students	Profile management, course registration, attendance tracking, grades, assignments, exam schedules.
Faculty Dashboard	Faculty	Course management, grade submission, attendance monitoring, student communication.
Administrative Services	Students, Staff	Online fee payment, library access, event calendar.
Communication Tools	All Users	Integrated email and messaging, institutional announcements.
LMS Integration	Students, Faculty	Access to course materials, lecture notes, discussion forums.
Support and Helpdesk	All Users	Technical support, academic advising, FAQs.

Comparison: State Portal vs. College Portal

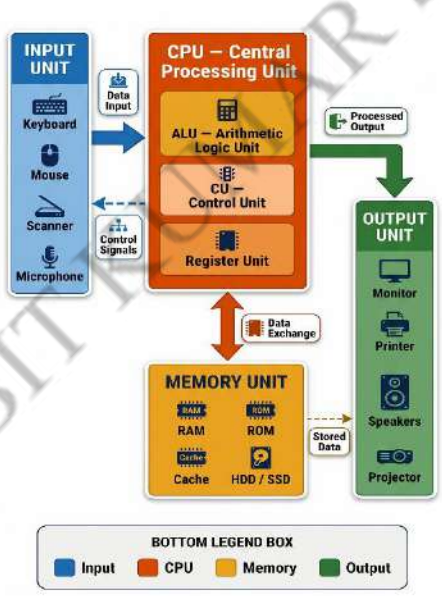
Parameter	State Portal	College Portal
Purpose	Government services and information for citizens	Academic and administrative services for students, faculty, staff
Target Users	General public and citizens	Students, faculty, institutional staff
Services	Certificate applications, tax payments, grievance redressal	Course registration, grades, fee payment, library, LMS
Language Support	State official language and English	Primarily English; may support regional languages

Parameter	State Portal	College Portal
Governance	Managed by state government (Digital India)	Managed by institutional administration and IT department
Login Credentials	Citizen registration with personal details	Institutional credentials (student ID and password)

1.4 GENERAL UNDERSTANDING OF VARIOUS COMPUTER HARDWARE COMPONENTS

Computer System

A computer system refers to the complete setup that enables a computer to function, comprising both hardware and software components working together. The fundamental functional units include the Input Unit, Output Unit, Central Processing Unit (CPU), and Memory Unit.



Input Unit

- The user interacts with the computer through the Input and Output units.
- The Input Unit accepts data from the user in a human-understandable form.
- It converts the accepted data into a machine-readable form for processing.
- Common input devices include: Keyboard, Mouse, and Trackball.

Output Unit

- The Output Unit presents processed data (information) to the user in a human-readable form.

- Common output devices include: Monitor (visual display) and Printer (hard copy output).

Central Processing Unit (CPU)

The CPU controls, coordinates, and supervises all operations of the computer. It consists of three sub-units:

Arithmetic Logic Unit (ALU)

The ALU performs all arithmetic and logical operations. It consists of three internal parts:

- Adder — Where actual arithmetic calculations take place.
- Register — Stores information temporarily during processing.
- Accumulator — Holds intermediate results of calculations.

Operations performed include Arithmetic Operations (Addition, subtraction, multiplication, division) and Logical Operations (AND, OR, NOT).

Control Unit (CU)

- Controls and maintains the correct sequence of instruction execution.
- Coordinates the functioning of all other units within the computer.
- Decodes instructions provided by the user or loaded from memory.

Register Unit

- Provides high-speed temporary storage within the CPU.
- Sometimes called chip memory.
- Stores data, instructions, addresses, and intermediate results.

CPU Sub-Units — Summary Table

Sub-Unit	Function	Key Components / Operations
ALU	Performs arithmetic and logical operations	Adder, Register, Accumulator; +, −, ×, ÷, AND, OR, NOT
CU	Controls instruction sequencing and system coordination	Instruction decoding, unit coordination
Register Unit	High-speed temporary storage within CPU	Data, instructions, addresses, intermediate results

Microprocessor

A microprocessor is a silicon chip that integrates the ALU, register circuits, and control circuits onto a single integrated circuit (IC). It is capable of receiving data, processing it, and outputting results on a single chip. It performs ALU operations and controls memory, input/output devices, and acts as a programmable device that processes binary data as per loaded instructions.

Memory Unit

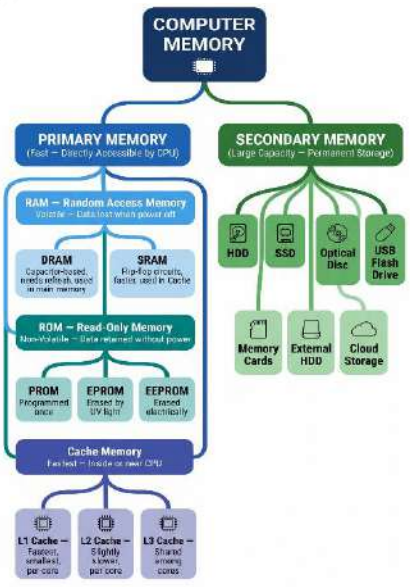
The Memory Unit stores instructions, data, intermediate results, and final output. Data is stored at specific memory locations identified by addresses.

Units of Digital Data Measurement

Unit	Symbol	Capacity
Bit	b	1 or 0 (on or off)
Byte	B	8 Bits
Kilobyte	KB	1024 Bytes
Megabyte	MB	1024 Kilobytes
Gigabyte	GB	1024 Megabytes
Terabyte	TB	1024 Gigabytes
Petabyte	PB	1024 Terabytes
Exabyte	EB	1024 Petabytes
Zettabyte	ZB	1024 Exabytes
Yottabyte	YB	1024 Zettabytes

Types of Computer Memory

The Memory Unit is classified into Primary Memory (Main Memory / Internal Memory) and Secondary Memory (Secondary Storage / External Memory).



1. Random Access Memory (RAM)

RAM is Volatile Memory — it loses content when power is turned off.

Type	Storage Mechanism	Refresh Requirement	Speed	Cost	Common Use
DRAM	Capacitor-based	Requires frequent refreshing	Slower	Less expensive	Main system memory
SRAM	Flip-flop circuits	No frequent refreshing needed	Faster	More expensive	Cache memory

2. Read-Only Memory (ROM)

ROM is Non-Volatile Memory — it retains contents even when power is off.

Type	Full Form	Programmability	Erasure Method
PROM	Programmable ROM	Programmed once after manufacturing	Cannot be erased
EPROM	Erasable Programmable ROM	Can be reprogrammed after erasure	Erased using ultraviolet light
EEPROM	Electrically Erasable Programmable ROM	Can be reprogrammed multiple times	Erased using electrical charge

3. Cache Memory

Cache Memory is high-speed memory located close to or within the CPU.

Level	Location	Size	Speed	Sharing
L1 Cache	Within the CPU	Smallest	Fastest	Dedicated to individual core
L2 Cache	On the CPU or nearby	Larger than L1	Slightly slower	Dedicated to individual core
L3 Cache	On the CPU chip	Largest cache level	Slower than L2	Shared among multiple cores

Secondary Memory

Type	Technology	Key Characteristics
HDD	Magnetic rotating platters	Large capacity, lower cost, slower access
SSD	Flash memory (no moving parts)	Faster access, more durable, lower power
Optical Discs (CD, DVD, Blu-ray)	Laser-based read/write	Media distribution, archival; limited capacity
USB Flash Drive	Flash memory	Portable, connects via USB

Type	Technology	Key Characteristics
Memory Cards (SD, microSD)	Flash memory	Compact, used in cameras, phones, tablets
External Hard Drive	HDD or SSD (portable)	Portable, connects via USB
Cloud Storage	Internet-based remote servers	Accessible from any device via Internet

Comparison: Primary Memory vs. Secondary Memory

Parameter	Primary Memory	Secondary Memory
Also Known As	Main memory, internal memory	Secondary storage, external memory
Volatility	Volatile (RAM); Non-volatile (ROM)	Non-volatile
Speed	Very fast; directly accessible by CPU	Slower
Capacity	Smaller	Much larger
Purpose	Data currently being processed	Long-term permanent storage
Examples	RAM, ROM, Cache	HDD, SSD, USB, Optical Disc, Cloud
Data Retention	Lost when power off (RAM)	Retained without power
Cost per Unit	Higher	Lower

Display — Types and Characteristics

A display (monitor/screen) is an output device that visually presents information generated by a computer, including text, images, videos, and graphical interfaces.

Display Type	Technology	Characteristics	Status / Use Case
CRT	Electron beams excite phosphor dots on glass screen.	Bulky, heavy, low resolution, high power consumption.	Phased out; replaced by flat-panel displays.
LCD	Liquid crystals between glass layers with backlight.	Thin, lightweight, energy efficient, good resolution.	Desktops, laptops, smartphones, tablets.
LED	LCD with LED backlighting instead of CCFL.	Better brightness and contrast, energy efficient, slim design.	Current standard for monitors, TVs, mobile devices.
DLP	Digital Micromirror Device (DMD) for projection.	Sharp, high-contrast projected images.	Digital projectors, classrooms, home theatre.

Display Type	Technology	Characteristics	Status / Use Case
OLED	Organic compounds emit light; no backlight needed.	True blacks, superior contrast, wide viewing angles, fast response.	High-end smartphones, premium TVs, select laptops.
Plasma	Ionized gas cells produce light.	High contrast, wide viewing angles, heavier.	Discontinued; replaced by LED and OLED.
Touchscreen	Touch-sensitive layer over LCD/LED/OLED.	Interactive input and output, versatile, multi-touch support.	Smartphones, tablets, kiosks, ATMs, 2-in-1 laptops.

Keyboard — Types of Keys and Functions

A keyboard is a primary input device consisting of keys used for typing text, entering data, executing commands, and interacting with the operating system and software applications.

- Alphanumeric Keys — Letters (A–Z), Numbers (0–9), and Special Characters (@, #, &, *, etc.).
- Modifier Keys — Shift (capitalizes letters), Ctrl (used for shortcuts like Ctrl+C, Ctrl+V), Alt (used for shortcuts and special characters), Fn (accesses secondary functions on laptops).
- Function Keys (F1–F12) — F1 opens Help, F2 renames selected item, F5 refreshes the page, F12 opens Save As dialog.
- Navigation Keys — Arrow Keys (move cursor), Home, End, Page Up/Down, Insert, Delete, Backspace.
- Numeric Keypad — Numbers (0–9), Arithmetic Operators (+, −, ×, ÷), Num Lock toggle, Decimal Point, Enter.
- Special Keys — Enter/Return, Spacebar, Caps Lock, Tab, Esc, PrtScn.
- Multimedia Keys — Volume Control, Play/Pause, Next/Previous Track, Stop.

Shortcut Keys (Hotkeys)

Shortcut	Action
Ctrl + C	Copy
Ctrl + V	Paste
Ctrl + X	Cut
Ctrl + Z	Undo
Ctrl + S	Save
Ctrl + A	Select All
Ctrl + P	Print
Alt + Tab	Switch applications
Alt + F4	Close window
F5	Refresh

Mouse — Components, Types, and Functions

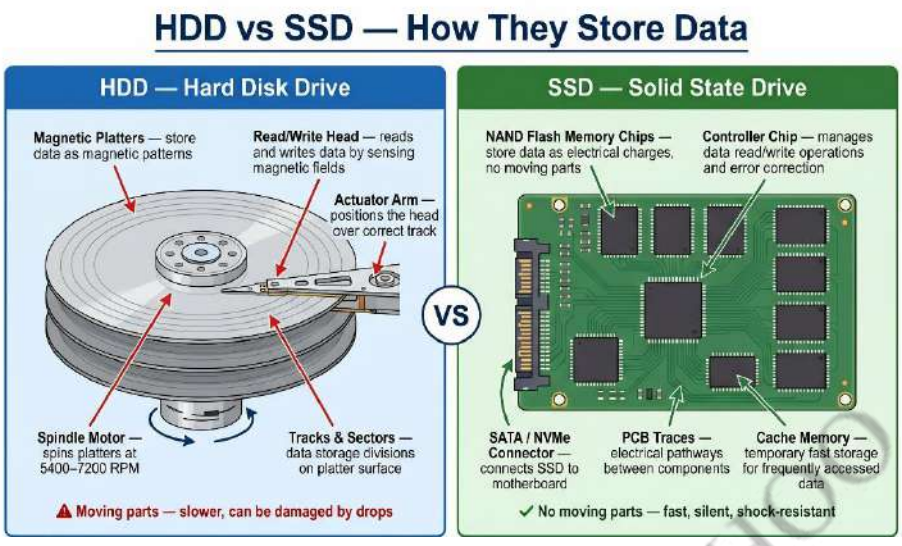
A mouse is a pointing input device used to interact with a computer's Graphical User Interface (GUI). It enables users to move a cursor on the screen, select items, and perform actions through clicking, dragging, and scrolling.

Components of a Mouse

Component	Location	Function
Left Button	Top-left	Primary button for selecting, clicking, interacting.
Right Button	Top-right	Opens context menus with additional options.
Middle Button	Scroll wheel	Special functions (new tab, auto-scroll).
Scroll Wheel	Top-centre	Vertical and horizontal scrolling.
Optical Sensor	Bottom	Detects movement using LED light.
Laser Sensor	Bottom	Higher precision tracking using laser.
Mouse Feet	Bottom	Reduces friction for smooth gliding.
USB Cable (Wired)	Rear	Stable wired connection.
Wireless Receiver	Internal/Dongle	Wireless connection via Bluetooth or USB receiver.

Hard Disk Drives (HDD) and Solid-State Drives (SSD)

Parameter	HDD	SSD
Speed	Slower (mechanical parts)	Faster (no moving parts)
Durability	Vulnerable to physical damage	More durable
Capacity	Up to 16 TB	Typically up to 4 TB
Cost	Cheaper per GB	More expensive per GB
Noise	Generates noise	Silent
Power Consumption	Higher	Lower
Boot Time	Slower	Faster



Other Peripheral Devices

Category	Purpose	Examples
Input Devices	Provide data and control signals	Keyboard, Mouse, Scanner, Microphone, Webcam, Touchscreen, Graphics Tablet, Joystick, Barcode Reader, Fingerprint Scanner
Output Devices	Present processed data to user	Monitor, Printer (Inkjet, Laser, Dot Matrix, 3D), Speakers, Headphones, Projector
Storage Devices	Store and retrieve digital data	External Hard Drive, USB Flash Drive, Memory Card, Optical Drive, NAS
Other Peripherals	Specialized additional functionality	eGPU, Docking Station, UPS, External Sound Card, Modem, Router, Smart Card Reader, Bluetooth Adapter

Type	Technology	Common Use
Inkjet	Sprays ink droplets onto paper	Home/office printing, photo printing
Laser	Uses laser and toner powder	High-volume office printing
Dot Matrix	Pins strike ink ribbon on paper	Industrial use, invoices
3D Printer	Layers materials from digital models	Prototyping, manufacturing, design

UNIT 2

OPERATING SYSTEMS

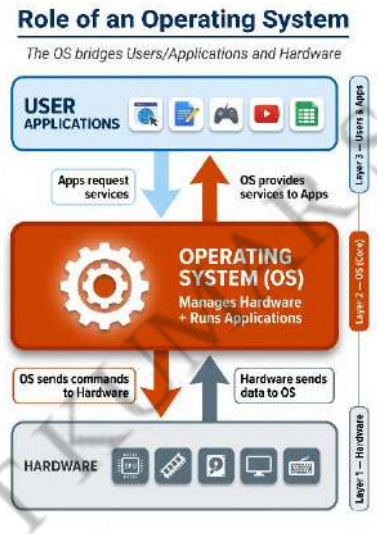
OS Concepts • Popular Operating Systems • Linux & Windows Installation

2.1 What is an Operating System?

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

Main jobs of an OS:

- Controls hardware like CPU, memory, and storage
- Let users interact with the computer
- Manages files and folders
- Runs application programs
- Protects the computer from unauthorised access



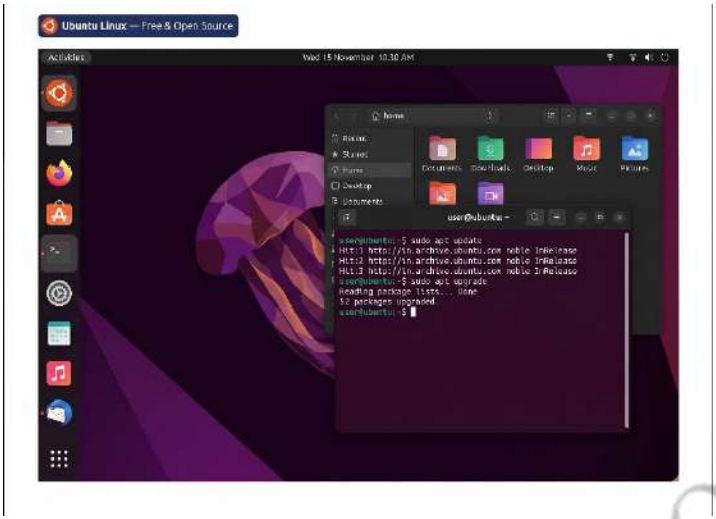
2.2 Popular Operating Systems

1. Windows

- Made by Microsoft
- First released in 1985
- Latest version: Windows 11
- Most commonly used OS in the world
- Has a Start menu for easy access
- Supports gaming, business, and general use
- Works with many types of hardware

2. macOS

- Made by Apple
- First released in 2001
- Latest version: macOS Sonoma
- Works only on Apple Mac computers
- Good for design, video editing, and music
- Very secure and smooth to use
- Connects easily with iPhone, iPad, and iCloud



3. Linux

- Created by Linus Torvalds in 1991
- Free and open-source (anyone can use and modify it)
- Available in many versions called distributions (Ubuntu, Fedora, Debian)
- Very secure and stable
- Used in servers, programming, and cybersecurity
- Has a powerful command-line interface

4. Other Operating Systems

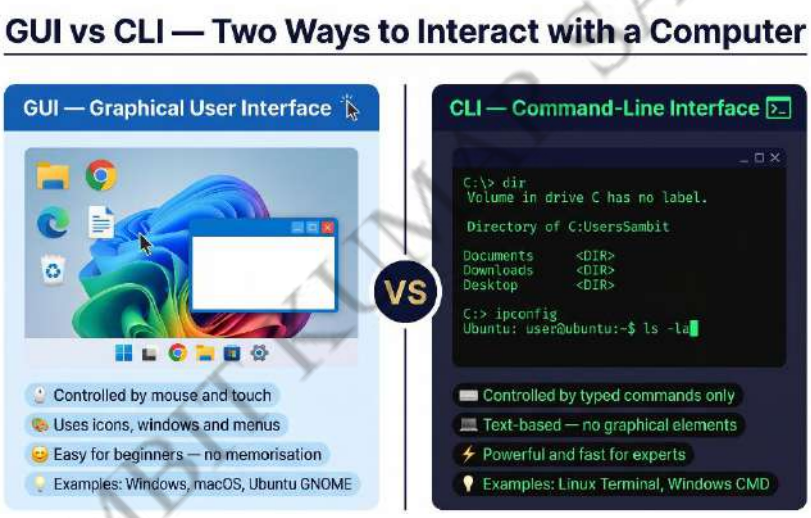
- Chrome OS — Made by Google, used in Chromebooks, runs web-based apps
- Android — Made by Google, used in smartphones and tablets
- iOS — Made by Apple, used in iPhones and iPads

Comparison Table — Popular Operating Systems

Feature	Windows	macOS	Linux
Developer	Microsoft	Apple	Open-source community
Cost	Paid	Included with Mac	Free
Ease of Use	Easy	Easy	Moderate
Customization	Moderate	Limited	Very high
Security	Good	Strong	Very strong
Gaming	Excellent	Limited	Growing
Best For	General use, gaming, business	Creative work, Apple users	Servers, programming

2.3 Important Terms

Term	Full Form	Meaning
OS	Operating System	The main software that runs the computer
GUI	Graphical User Interface	Visual interface with icons and menus
CLI	Command-Line Interface	Text-based interface using typed commands
Kernel	—	Core part of OS that talks to hardware
Open-Source	—	Software that is free to use and modify
IoT	Internet of Things	Devices connected through the Internet



LINUX OS INSTALLATION

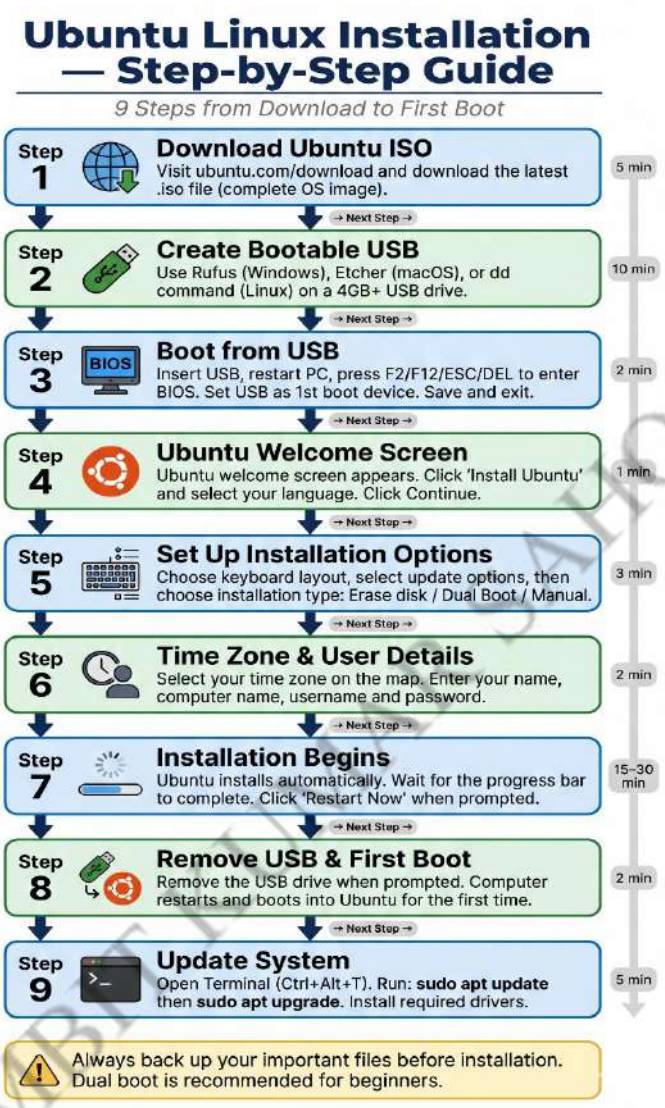
2.4 Before You Install

Always check if your computer meets the minimum requirements before installing any OS.

Requirements for Ubuntu Linux:

- Processor: 2 GHz or faster
- RAM: 4 GB minimum
- Storage: 25 GB free space
- USB port for installation
- Internet connection (recommended)

2.5 Steps to Install Ubuntu Linux



Step 1: Download Ubuntu

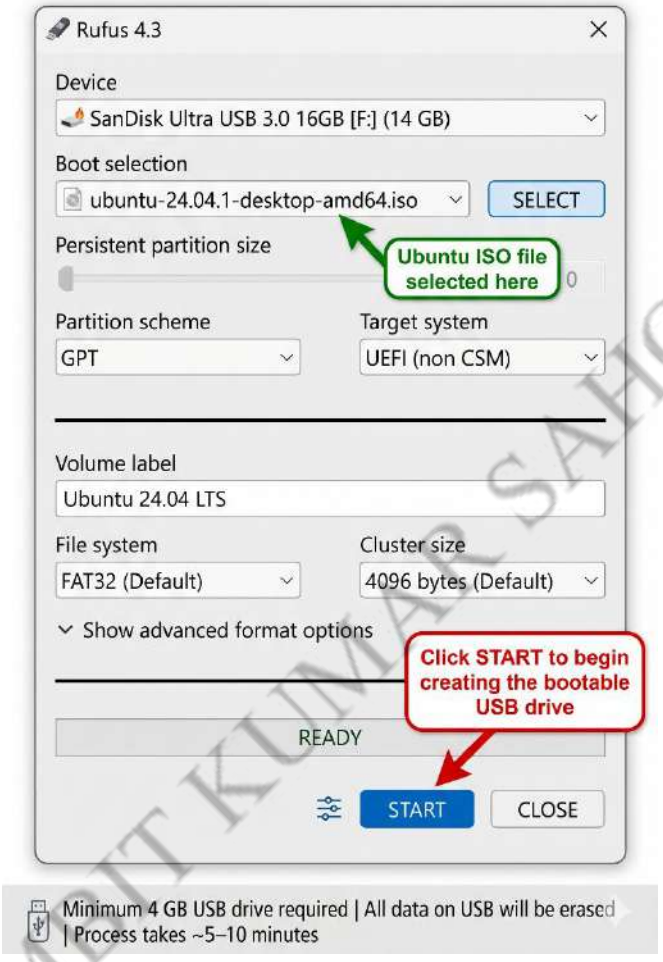
- Go to ubuntu.com/download
- Download the latest ISO file (this file contains the full OS)

Step 2: Create a Bootable USB

- You need a USB drive (at least 4 GB)
- Use one of these tools to put the ISO file on the USB:

Your Current OS	Tool to Use
Windows	Rufus
macOS	Etcher

Your Current OS	Tool to Use
Linux	dd command or UNetbootin



Step 3: Boot from USB

- Plug the USB into your computer
- Restart the computer
- Press the boot key to enter BIOS settings:

Key	Used By
F2	Dell, Lenovo, ASUS
F12	Many PCs (boot menu)
ESC	HP
DEL	Custom PCs

- Set USB as the first boot device

- Save and exit

Step 4: Start Installation

- Ubuntu welcome screen appears
- Choose Install Ubuntu
- Select your language and click Continue

Step 5: Set Up Installation

- Choose your keyboard layout
- Select options to download updates and install extra software
- Choose installation type:

Option	What It Does
Erase the disk and install	Deletes everything, installs only Ubuntu
Install alongside other OS	Keeps your old OS, adds Ubuntu (dual boot)
Something else	Manual setup for advanced users

Step 6: Set Time Zone and User Details

- Select your time zone
- Enter your name, computer name, username, and password
- Choose if you want automatic login or password login

Step 7: Finish Installation

- Installation begins (takes some time)
- When done, click Restart

Step 8: Boot into Ubuntu

- Remove the USB drive
- Computer restarts into Ubuntu
- Log in with your username and password

Step 9: After Installation

- Open terminal: Ctrl + Alt + T
- Update your system using the following commands:

Terminal Commands

```
sudo apt update
sudo apt upgrade
```

- Install any needed drivers and software

Ubuntu Installation — Quick Summary

Step	What To Do
1	Download the Ubuntu ISO file
2	Create a bootable USB drive.
3	Boot from USB (change BIOS settings)
4	Start Ubuntu installation
5	Choose keyboard, updates, and install type.
6	Set time zone and create a user account
7	Wait for installation to finish, restart
8	Remove the USB, boot into Ubuntu.
9	Update the system and install software.

Tips for Linux Installation

- Always back-up your important files before installing
- For better organisation, create these partitions:

Partition	Purpose
/ (root)	Stores OS files
/home	Stores your personal files
swap	Extra memory when RAM is full

- If you have problems, visit Ubuntu's help website

WINDOWS OS INSTALLATION

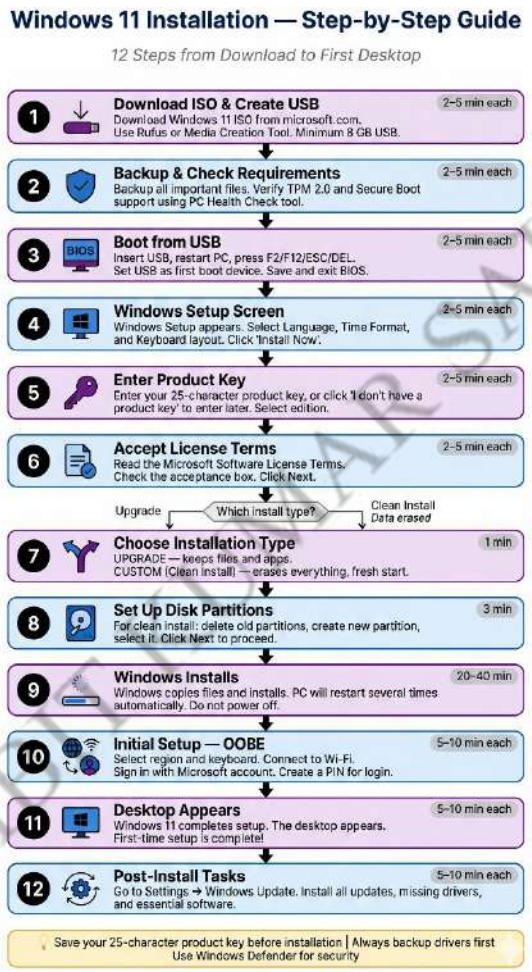
2.7 Before You Install Windows

Check if your computer meets these minimum requirements for Windows 11:

Component	Requirement
Processor	1 GHz, 2 cores, 64-bit
RAM	4 GB
Storage	64 GB free space
Security	TPM 2.0 and Secure Boot

Component	Requirement
Display	720p resolution
Internet	Required for setup

2.8 Steps to Install Windows 11



Step 1: Prepare USB Drive

- Go to microsoft.com and download Windows 11 ISO
- Use Media Creation Tool or Rufus to make a bootable USB
- USB should be at least 8 GB

Step 2: Prepare Your Computer

- Backup all important files
- Check if your PC supports TPM 2.0 and Secure Boot using the PC Health Check tool

Step 3: Boot from USB

- Plug in the USB drive
- Restart and press boot key (F2, F12, ESC, or DEL)
- Set USB as the first boot device
- Save and exit BIOS

Step 4: Start Installation

- Windows Setup screen appears
- Choose language, time format, and keyboard
- Click Install Now

Step 5: Enter Product Key

- Type your 25-character product key
- Or click "I don't have a product key" to enter later
- Select Windows edition (Home, Pro, etc.)

Step 6: Accept License

- Read and accept the license terms
- Click Next

Step 7: Choose Installation Type

Option	What It Does
Upgrade	Keeps your files and apps, updates the OS
Custom (Clean Install)	Erases everything, fresh installation

Step 8: Set Up Disk Partitions

- For a clean install, you will see your drives
- Delete old partitions if needed (this erases data)
- Create new partition and select it
- Click Next

Step 9: Install Windows

- Windows starts copying files
- Computer will restart several times — this is normal
- Wait for installation to complete

Step 10: Set Up Windows

- Choose your region and keyboard layout
- Connect to Wi-Fi or Ethernet
- Sign in with a Microsoft account or create a local account
- Create a PIN for login
- Set your privacy preferences

Step 11: Finish Setup

- Windows completes final setup

- You will see the Windows desktop

Step 12: After Installation

- Go to Settings → Windows Update and install all updates
- Install any missing drivers from the manufacturer's website
- Install needed software (browser, office, etc.)

Windows 11 Installation — Quick Summary

Step	What To Do
1	Download ISO and create a bootable USB
2	Backup data and check system requirements
3	Boot from USB (change BIOS)
4	Select the language and click Install Now.
5	Enter product key or skip.
6	Accept license terms
7	Choose Upgrade or Clean Install
8	Set up disk partitions.
9	Wait for Windows to install
10	Set up region, account, PIN, and privacy.
11	Desktop appears — setup done.
12	Install updates, drivers, and software.

Tips for Windows Installation

- Save your product key — you need it to activate Windows
- Backup drivers before a clean install, especially network drivers
- Use Windows Defender for security, or install antivirus software

Comparison: Ubuntu vs. Windows Installation

Feature	Ubuntu Linux	Windows 11
Download From	ubuntu.com	microsoft.com
USB Tool	Rufus, Etcher, dd	Media Creation Tool, Rufus
Product Key Needed	No (free)	Yes (paid)

Feature	Ubuntu Linux	Windows 11
License	Free, open-source	Paid, proprietary
Install Options	Erase, dual boot, manual	Upgrade, clean install
Updates After Install	Terminal commands	Settings → Windows Update
Special Requirements	None	TPM 2.0, Secure Boot

All Important Terms — OS Installation

Term	Full Form	Simple Meaning
ISO	—	A file that contains the full OS for installation
USB	Universal Serial Bus	Port used to connect devices and bootable drives
BIOS	Basic Input/Output System	Old firmware that starts up the computer
UEFI	Unified Extensible Firmware Interface	New and better version of BIOS
TPM	Trusted Platform Module	Security chip needed for Windows 11
Secure Boot	—	A feature that only allows trusted software to start
Product Key	—	25-character code to activate Windows
Partition	—	A divided section of your hard drive
Swap	—	Linux partition used as extra memory
sudo	Superuser Do	Linux command to run tasks as an administrator
apt	Advanced Package Tool	Linux tool for installing and updating software
Driver	—	Software that helps the OS talk to hardware
Dual Boot	—	Running two OS on one computer

UNIT 3

HTML AND CSS

HyperText Markup Language • Cascading Style Sheets • Web Page Design

3.1 What is HTML?

HTML stands for HyperText Markup Language. It is the standard language used to create web pages.

Two key words in HTML:

- HyperText — Text that contains links (hyperlinks) to other pages or resources. It allows users to click and move between different web pages.
- Markup — A way of adding special instructions (tags) to a document to tell the browser how to display the content.

HTML gives structure to a web page. It lets you add headings, paragraphs, images, links, tables, forms, and more.

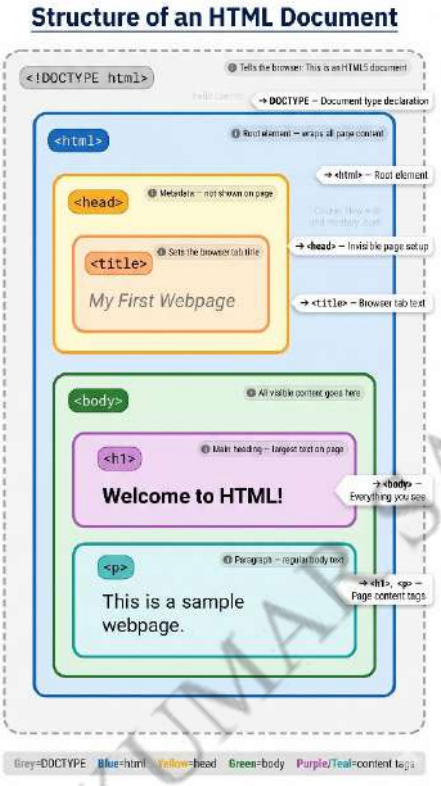
3.2 Structure of an HTML Document

Every HTML page follows a basic structure:

HTML

```
<!DOCTYPE html>
<html>
<head>
    <title>My First Webpage</title>
</head>
<body>
    <h1>Welcome to HTML!</h1>
```

```
    <p>This is a sample webpage.</p>
</body>
</html>
```



Part	What It Does
`<!DOCTYPE html>`	Tells the browser this is an HTML document
`<html>`	Root element — contains all HTML content
`<head>`	Contains page title, metadata, and links to CSS
`<title>`	Sets the title shown on the browser tab
`<body>`	Contains all visible content shown on the page

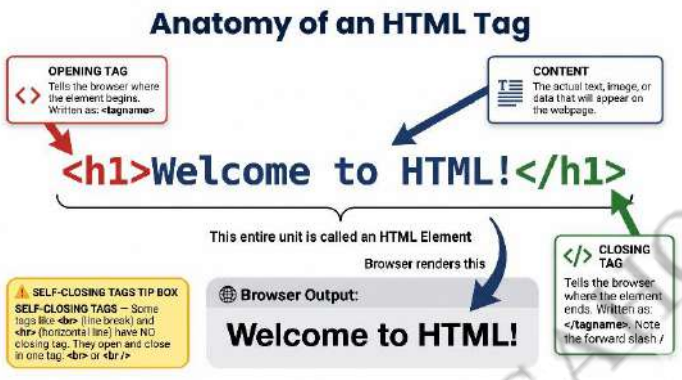
3.3 How to Create a Webpage

Follow these simple steps:

- Open a text editor (example: Notepad)
- Write your HTML code
- Save the file with .html extension (example: index.html)
- Open the file in any web browser to see your webpage

3.4 Basic HTML Tags

Tags are special codes in HTML that tell the browser what to display.

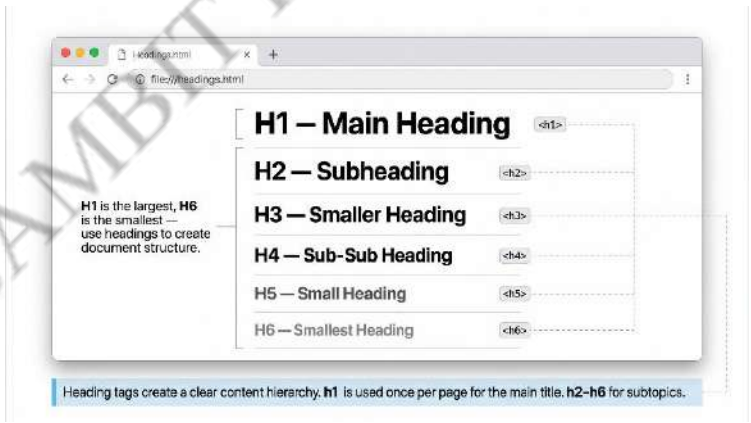


1. Heading Tags

Used to create headings. <h1> is the biggest, <h6> is the smallest.

HTML

```
<h1>Main Heading</h1>
<h2>Subheading</h2>
<h3>Smaller Heading</h3>
```



2. Paragraph Tag

<p> creates a paragraph of text.

HTML

```
<p>This is a paragraph of text.</p>
```

3. Bold and Italic Tags

HTML

```
<b>This text is bold</b>
<i>This text is italic</i>
```

Tag	What It Does
	Makes text bold
	Makes text italic

4. Line Break

 moves text to the next line. It has no closing tag.

HTML

```
First Line<br>Second Line
```

5. Horizontal Line

<hr> draws a horizontal line across the page.

HTML

```
<p>Section 1</p>
<hr>
<p>Section 2</p>
```

6. Hyperlinks

<a> tag creates a clickable link.

HTML

```
<a href="https://www.example.com">Visit Example</a>
```

- href — the web address the link goes to

Basic Tags — Quick Reference Table

Tag	Purpose	Example
<h1> to <h6>	Headings (big to small)	Hello
	Paragraph	Some text
	Bold text	Bold
	Italic text	Italic
 	Line break	Line1 Line2
<hr>	Horizontal line	<hr>
<a>	Hyperlink	Link

3.5 Page Setting Tags

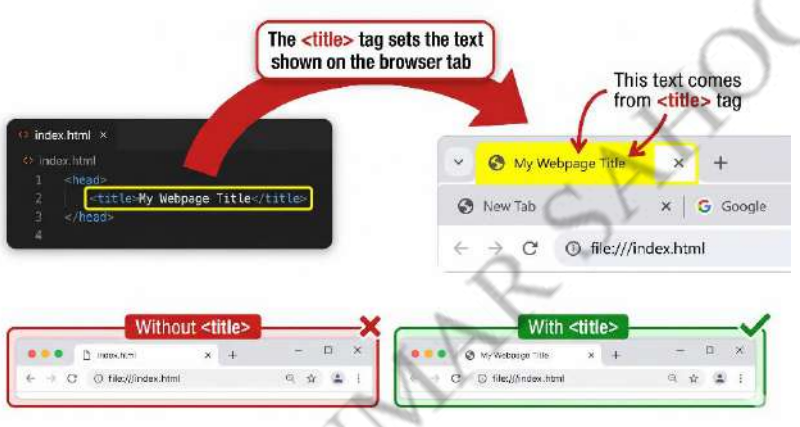
These tags go inside the <head> section and set up the page.

1. Title Tag

Sets the title shown on the browser tab.

HTML

```
<head>
    <title>My Webpage Title</title>
</head>
```



2. Meta Tags

Give extra information about the page to the browser.

HTML

```
<head>
    <meta charset="UTF-8">
    <meta name="description" content="Learn HTML basics">
</head>
```

Tag	Purpose
`<title>`	Sets page title on browser tab
`<meta charset>`	Sets character encoding (use UTF-8)
`<meta name="description">`	Gives a short description of the page

3.6 Listing Tags

Lists are used to display items in an organized way.

1. Ordered List (Numbered)

Uses <ol> tag. Items are numbered automatically.

HTML

```
<ol>
    <li>Item One</li>
    <li>Item Two</li>
    <li>Item Three</li>
</ol>
```

2. Unordered List (Bullets)

Uses <ul> tag. Items get bullet points.

HTML

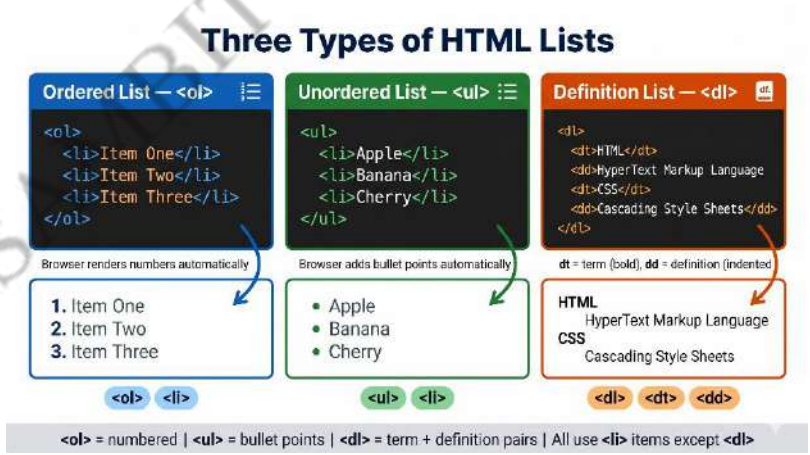
```
<ul>
    <li>Apple</li>
    <li>Banana</li>
    <li>Cherry</li>
</ul>
```

3. Definition List

Uses <dl> tag for terms and their meanings.

HTML

```
<dl>
    <dt>HTML</dt>
    <dd>HyperText Markup Language</dd>
    <dt>CSS</dt>
    <dd>Cascading Style Sheets</dd>
</dl>
```



Tag	Purpose
	Ordered (numbered) list
	Unordered (bullet) list
	List item (used inside ol or ul)

Tag	Purpose
`<dl>`	Definition list
`<dt>`	Definition term
`<dd>`	Definition description

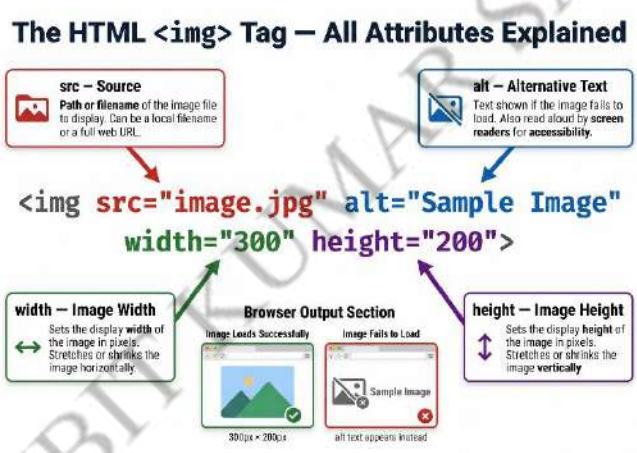
3.7 Adding Graphics to HTML

Images are added using the <img> tag.

1. Image Tag

HTML

```
<img src="image.jpg" alt="Sample Image" width="300" height="200">
```



Attribute	What It Does
src	Path to the image file
alt	Text shown if image cannot load
width	Width of the image in pixels
height	Height of the image in pixels

2. Background Image

HTML

```
<body style="background-image: url('background.jpg');">
```

This sets an image as the background of the whole page.

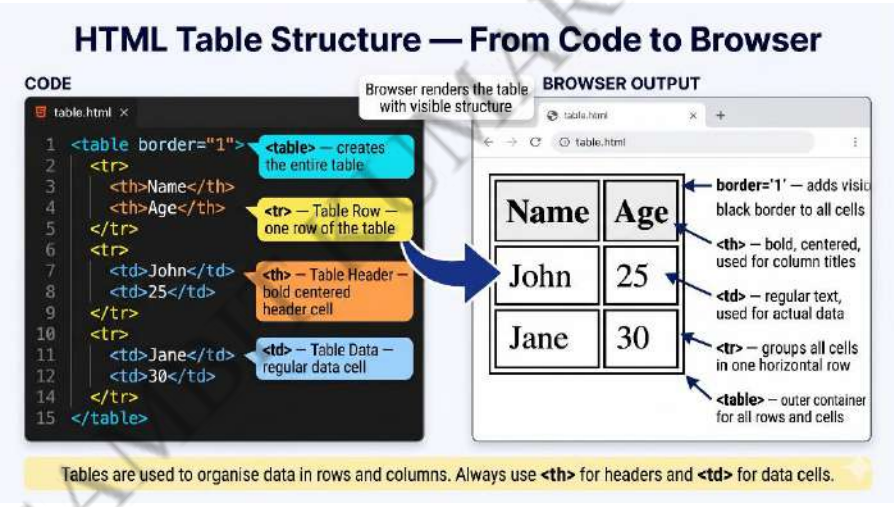
3.8 Working with HTML Tables

Tables arrange data in rows and columns.

Basic Table Example

HTML

```
<table border="1">
    <tr>
        <th>Name</th>
        <th>Age</th>
    </tr>
    <tr>
        <td>John</td>
        <td>25</td>
    </tr>
    <tr>
        <td>Jane</td>
        <td>30</td>
    </tr>
</table>
```



Tag	Purpose
`<table>`	Creates a table
`<tr>`	Creates a table row
`<th>`	Creates a table header cell (bold, centered)
`<td>`	Creates a table data cell
`border="1"`	Adds a visible border to the table

3.9 Linking Webpages

1. Link to Another Page

HTML

```
<a href="page2.html">Go to Page 2</a>
```

2. Open Link in New Tab

HTML

```
<a href="https://www.example.com" target="_blank">Visit
Example</a>
```

3. Image as a Link

HTML

```
<a href="https://www.example.com">
    <img src="logo.jpg" alt="Logo">
</a>
```

Attribute	What It Does
href	The address the link goes to
target="_blank"	Opens link in a new browser tab

3.10 HTML Forms

Forms are used to collect information from users.

1. Basic Form with Input Fields

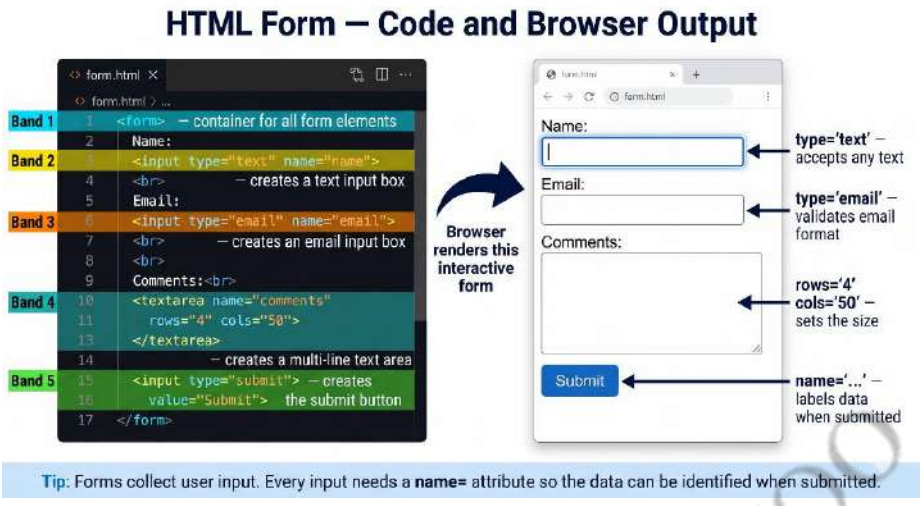
HTML

```
<form>
    Name: <input type="text" name="name"><br>
    Email: <input type="email" name="email"><br>
    <input type="submit" value="Submit">
</form>
```

2. Text Area (For Longer Text)

HTML

```
<form>
    Comments:<br>
    <textarea name="comments" rows="4" cols="50"></textarea>
</form>
```



Tag / Attribute	What It Does
`<form>`	Creates a form
`<input type="text">`	Creates a text box
`<input type="email">`	Creates an email input box
`<input type="submit">`	Creates a submit button
`<textarea>`	Creates a large text input area
`name`	Gives a name to the input field
`rows and cols`	Sets size of text area

All Important Terms — HTML

Term	Full Form	Simple Meaning
HTML	HyperText Markup Language	Language used to create web pages
HyperText	—	Text with clickable links to other pages
Markup	—	Instructions that tell browser how to display content
Tag	—	Code in angle brackets that defines page elements
Element	—	A complete HTML tag with content
Attribute	—	Extra information added inside a tag
href	Hypertext Reference	Specifies the link address in anchor tag
src	Source	Specifies the file path for images
alt	Alternative Text	Text shown when image cannot load

Term	Full Form	Simple Meaning
CSS	Cascading Style Sheets	Language used to style HTML pages
UTF-8	Unicode Transformation Format 8-bit	Character encoding that supports all languages
URL	Uniform Resource Locator	Web address of a page or resource

All HTML Tags — Quick Reference

Tag	What It Does
`<html>`	Root element of the page
`<head>`	Contains metadata and title
`<title>`	Page title on browser tab
`<body>`	Visible page content
`<h1> to <h6>`	Headings (big to small)
`<p>`	Paragraph
`<b>`	Bold text
`<i>`	Italic text
` `	Line break
`<hr>`	Horizontal line
`<a>`	Hyperlink
`<img>`	Image
`<ol>`	Ordered list
`<ul>`	Unordered list
`<li>`	List item
`<dl>`	Definition list
`<dt>`	Definition term
`<dd>`	Definition description
`<table>`	Table
`<tr>`	Table row
`<th>`	Table header
`<td>`	Table data cell
`<form>`	Form

Tag	What It Does
`<input>`	Input field
`<textarea>`	Large text input area
`<meta>`	Page metadata

3.11 Dropdown Box in HTML Forms

A dropdown box lets users pick one option from a list.

HTML

```
<form>
    Choose an option:
    <select name="options">
        <option value="1">Option 1</option>
        <option value="2">Option 2</option>
    </select>
</form>
```

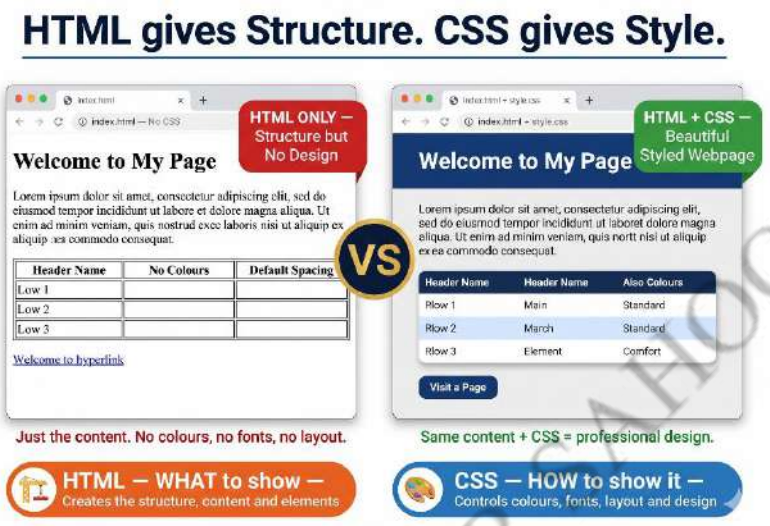
Tag	What It Does
`<select>`	Creates a dropdown list
`<option>`	Adds an item to the dropdown list
`value`	The data sent when the form is submitted
`name`	Gives a name to the dropdown field

All Form Tags — Quick Summary

Tag	What It Creates
`<form>`	A form to collect user input
`<input type="text">`	A text box
`<input type="email">`	An email input box
`<input type="submit">`	A submit button
`<textarea>`	A large text area
`<select>`	A dropdown list
`<option>`	An item inside a dropdown list

CSS — CASCADING STYLE SHEETS

3.12 What is CSS?



CSS stands for Cascading Style Sheets. It is a language used to style and design web pages created with HTML.

- HTML gives the structure of a page (what content to show)
- CSS gives the look of a page (how the content looks)

With CSS, you can control:

- Colors and fonts
- Text size and alignment
- Spacing and borders
- Page layout and background

3.13 Ways to Apply CSS

There are three ways to add CSS to an HTML page:

1. Inline CSS

CSS is written directly inside the HTML tag using the style attribute.

HTML

```
<p style="color: blue; font-size: 16px;">This is styled text.</p>
```

- Used for quick, one-time styling
- Applied to one element only

2. Internal CSS

CSS is written inside the <head> section of the HTML file using the <style> tag.

HTML

```
<head>
    <style>
        body { background-color: lightgray; }
        p { color: green; }
```

```
    </style>
</head>
```

- Styles apply to the whole page
- All CSS code stays inside the HTML file

3. External CSS

CSS is written in a separate .css file and linked to the HTML file.

In HTML file:

```
<link rel="stylesheet" href="styles.css">
```

In styles.css file:

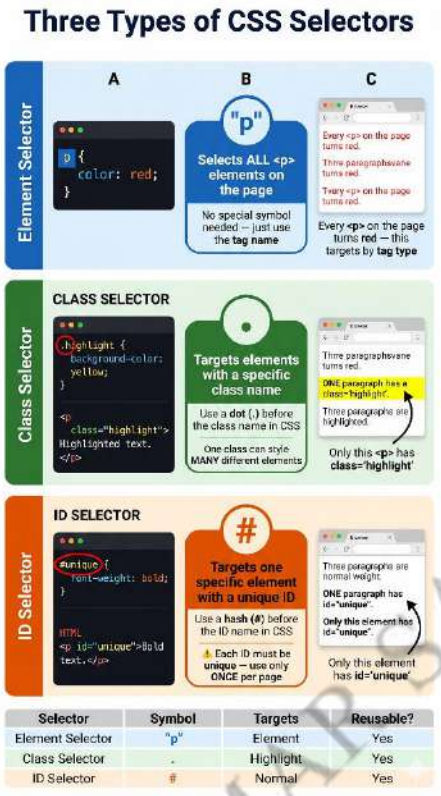
```
body { background-color: white; }
p { color: black; }
```

- Best method for large websites with many pages
- Same CSS file can be used for multiple HTML pages

Method	Where CSS is Written	Best For
Inline CSS	Inside the HTML tag (style attribute)	Quick styling of a single element
Internal CSS	Inside <style> tag in <head> section	Styling a single HTML page
External CSS	In a separate .css file, linked with <link>	Styling multiple pages (large projects)

3.14 CSS Selectors

A CSS selector is used to select which HTML element you want to style. There are three main types:



1. Element Selector

Selects all elements of a specific tag.

CSS

```
p { color: red; }
```

This makes all <p> paragraphs red.

2. Class Selector

Selects elements with a specific class name. Uses a dot (.) before the class name.

CSS:

```
.highlight { background-color: yellow; }
```

HTML:

```
<p class="highlight">This text is highlighted.</p>
```

- One class can be used on many elements
- Same element can have multiple classes

3. ID Selector

Selects one specific element with a unique ID. Uses a hash (#) before the ID name.

CSS:

```
#unique { font-weight: bold; }
```

HTML:

```
<p id="unique">This is a bold paragraph.</p>
```

- Each ID should be used only once on a page

Selector	Symbol	Selects	Can Be Used On
Element Selector	none (just tag name)	All elements of that tag type	Multiple elements
Class Selector	. (dot)	Elements with a specific class	Multiple elements
ID Selector	# (hash)	One element with a unique ID	One element only

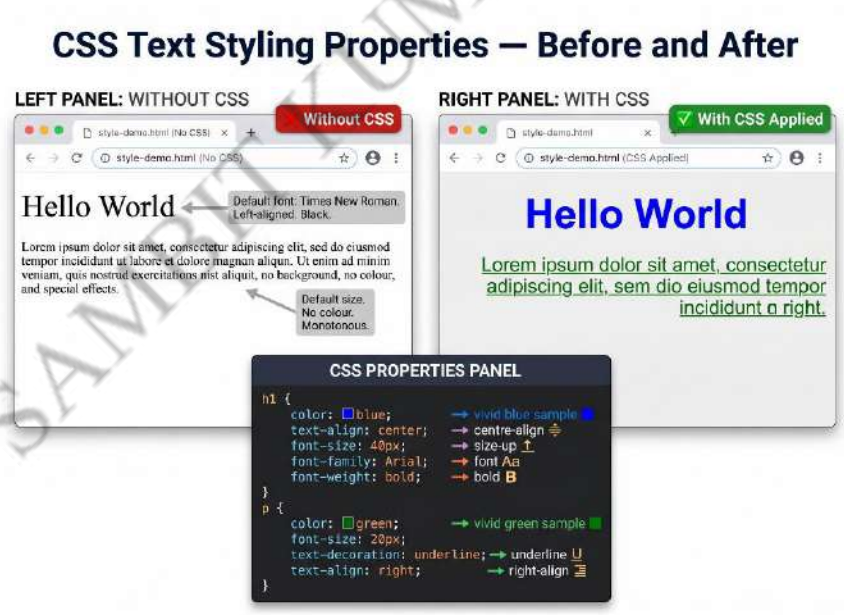
3.15 CSS Properties

1. Text Styling

CSS can change how text looks on a page.

CSS

```
h1 {
    color: blue;
    text-align: center;
}
```



Property	What It Does	Example
color	Changes text color	color: blue;
text-align	Aligns text (left, center, right)	text-align: center;
font-size	Changes text size	font-size: 16px;

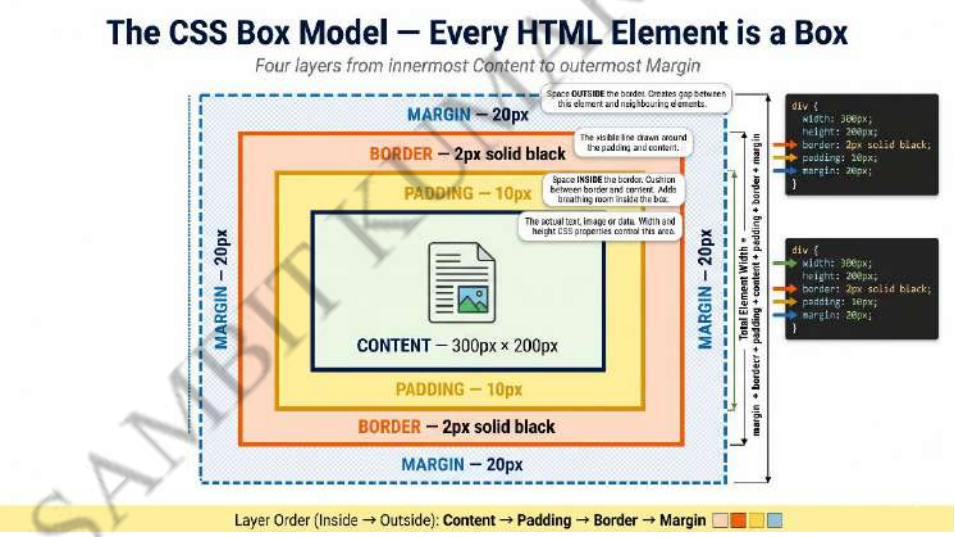
Property	What It Does	Example
font-family	Changes the font type	font-family: Arial;
font-weight	Makes text bold or normal	font-weight: bold;
text-decoration	Adds underline, overline, etc.	text-decoration: underline;

2. CSS Box Model

The Box Model is a very important concept in CSS. Every HTML element is treated as a rectangular box made up of four layers:

CSS

```
div {
    width: 300px;
    height: 200px;
    border: 2px solid black;
    padding: 10px;
    margin: 20px;
}
```



Layer	What It Is
Content	The actual content inside the box (text, image)
Padding	Space between the content and the border (inside the box)
Border	The line around the padding and content
Margin	Space outside the border (between this box and other elements)

Box Model — Layer Order (Inside to Outside):

- Content (innermost)
- Padding
- Border

- Margin (outermost)

Box Model Properties — Quick Reference

Property	What It Controls	Example
width	Width of the content area	width: 300px;
height	Height of the content area	height: 200px;
padding	Space inside the border	padding: 10px;
border	Border around the element	border: 2px solid black;
margin	Space outside the border	margin: 20px;

3.16 HTML vs CSS — Comparison

Feature	HTML	CSS
Full Form	HyperText Markup Language	Cascading Style Sheets
Purpose	Creates the structure of a web page	Controls the design and appearance of a web page
Made Of	Tags surrounding content	Selectors with style rules
Usage	Cannot be used in CSS files	Can be used in HTML files
Focus	What content to show	How content should look
Example	Hello	h1 { color: red; }

All Important Terms — CSS

Term	Full Form	Simple Meaning
CSS	Cascading Style Sheets	Language used to style and design HTML pages
Selector	—	Pattern used to select HTML elements for styling
Property	—	The style feature you want to change (color, size, etc.)
Value	—	The setting you give to a property (blue, 16px, etc.)
Inline CSS	—	CSS written directly inside an HTML tag
Internal CSS	—	CSS written inside the head section of HTML file
External CSS	—	CSS written in a separate .css file

Term	Full Form	Simple Meaning
Class	—	A reusable name given to HTML elements for styling
ID	—	A unique name given to one HTML element for styling
Box Model	—	Concept showing content, padding, border, and margin layers
Padding	—	Space between content and border (inside the box)
Margin	—	Space outside the border (between elements)
Border	—	Line around the padding and content
Font	—	The style of text (type, size, weight)

All CSS Properties — Quick Reference

Property	What It Does
color	Changes text color
background-color	Changes background color
font-size	Changes text size
font-family	Changes font type
font-weight	Makes text bold or normal
text-align	Aligns text (left, center, right)
text-decoration	Adds underline or other text effects
width	Sets element width
height	Sets element height
padding	Adds space inside the border
margin	Adds space outside the border
border	Adds a border around the element

UNIT 4

OPEN OFFICE TOOLS

Writer • Calc • Impress — Apache OpenOffice Suite

4.1 Introduction to Open Office Tools

Office tools are application software that assist users in regular office jobs such as creating, updating, and maintaining documents, handling large amounts of data, creating presentations, and scheduling. Apache OpenOffice (AOO) is a free and open-source office productivity suite available in many languages, compatible with all major operating systems including Apple macOS, Microsoft Windows, and Linux.

Using office tools saves time and effort, and many repetitive tasks can be automated easily.

4.1.1 How to Install Apache OpenOffice

- Visit the official Apache OpenOffice website: www.openoffice.org
- Click the Download button.
- Select your operating system (Windows, macOS, or Linux), preferred language, and version.
- The download starts automatically. Run the downloaded installer file.
- A Customer Information form will appear — fill in your details and click Next.
- Choose the Setup Type (Typical is recommended for most users) and click Next.
- Continue through the wizard until the installation completes, then click Finish.
- A shortcut link will now appear on your desktop.

4.1.2 Advantages of Apache OpenOffice

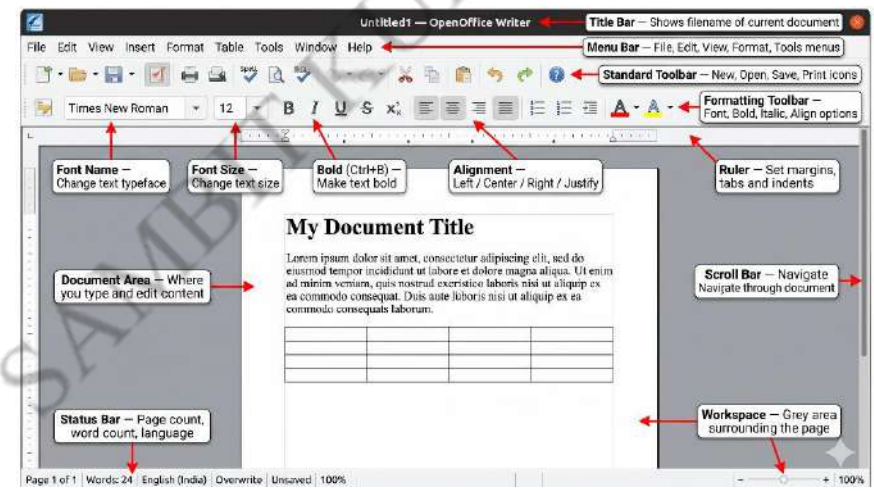
Advantage	Description
No Licensing Fees	It is completely free software. Anyone can use and distribute it without any charge.
Open Source	The source code is openly available for anyone to view, modify, and improve.
Cross Platform	The software can be installed on Windows, macOS, and Linux operating systems.
Extensive Language Support	The user interface is available in more than 40 languages including Hindi, Tamil, and more.

Advantage	Description
Consistent Interface	Provides a similar look and feel across all its components for better ease of use.
File Compatibility	Supports importing and editing of PDF files and various other file formats.
No Vendor Lock-in	Uses Open Document Format (ODF) and XML — files can be opened in any text editor.
Community Support	A worldwide community works to fix issues and enhance the software continuously.

4.2 Open Office Writer

Writer is the word processor component of Apache OpenOffice (AOO). It is a free alternative to Microsoft Word and has all the features expected from a modern, fully-equipped word processor. Using Writer, we can create documents such as reports, letters, books with contents, diagrams, indexes, agendas, minutes, and more.

Writer provides standard word processor features including text entry and editing, spell check, autocorrect, and find and replace.



4.2.1 Parts of the Writer Interface

Part	Description
Title Bar	Situated at the top of the Writer window. Shows the file name of the current document.
Menu Bar	Located just below the Title Bar. Contains menus (File, Edit, View, Insert, Format, Tools). Clicking a menu drops it down to display commands.

Part	Description
File Menu	Contains commands for the entire document: Open, Close, Save, Digital Signature, Print, and Export as PDF.
Edit Menu	Contains commands such as Undo, Repeat, Find and Replace, Cut, Copy, and Paste.
View Menu	Controls the display of the document: Print Layout, Web Layout, Full-Screen View, and Zoom Control.
Insert Menu	Contains commands for inserting headers, footers, pictures, page breaks, special characters, hyperlinks, bookmarks, frames, and objects.
Format Menu	Contains formatting and layout commands using Styles, Paragraph, Bullets, and Numbering options.
Tools Menu	Contains utility functions like Spelling and Grammar, Mail Merge, Wizard, AutoCorrect, and Options.
Toolbars	Provide quick access to frequently used commands. Can be shown/hidden via View → Toolbars.
Status Bar	Located at the bottom of the workspace. Displays page number, page style, language, file save status, digital signature, and zoom controls.

4.2.2 Writer Formula Features

Formula	Description
`=A1+10`	Displays the contents of cell A1 plus 10.
`=A1*16%`	Displays 16% of the contents of A1.
`=A1*A2`	Displays the result of multiplying the contents of A1 and A2.
`=ROUND(A1,1)`	Displays the contents of cell A1 rounded to one decimal place.
`=EFFECT(5%,12)`	Calculates the effective interest for 5% annual nominal interest with 12 payments a year.
`=B8-SUM(B10:B14)`	Calculates B8 minus the sum of cells B10 to B14.
`=SUM(B8,SUM(B10:B14))`	Calculates the sum of B10 to B14 and adds the value to B8.
`=SUM(B1:B1048576)`	Sums all numbers in column B.
`=AVERAGE(BloodSugar)`	Displays the average of a named range called BloodSugar.
`=IF(C31>140,"HIGH","OK")`	If C31 is greater than 140 then HIGH is displayed, otherwise OK is displayed.

4.2.3 Starting a New Document

- Via Operating System Menu — Start → Programs → OpenOffice → Writer

- Via Quick Starter — Tools → Options → OpenOffice → Menu
- Via Start Center — Start → Programs → OpenOffice → Start Center
- Via File Menu — File → New → Text Document (Shortcut: Ctrl+N)

4.2.4 Saving a Document

- Select File → Save
- Select File → Save As
- Click the Save icon on the toolbar
- Keyboard shortcut: Ctrl + S

4.2.5 Closing a Document

- Select File → Close
- Click the Cross (×) icon at the right end of the menu bar
- If the document has unsaved changes, a dialog box will appear — choose Save to save, Discard to lose changes, or Cancel to return to the document.

4.2.6 Printing a Document

- Quick Printing — Click the print icon on the toolbar to print directly to the default printer.
- Controlled Printing — Select File → Print or press Ctrl + P to open the print dialog box with full options.

4.2.7 Selection, Cutting and Pasting

- Keyboard shortcut to Copy: Ctrl + C
- Keyboard shortcut to Cut: Ctrl + X
- Keyboard shortcut to Paste: Ctrl + V
- Menu selection: Edit → Paste
- Contextual menu: Right-click on text and choose Paste

4.2.8 Character Formatting

Formatting Option	Description
Font Name	Changes the typeface of the selected text.
Font Size	Changes the size of the selected text.
Bold	Makes the selected text bold.
Italic	Makes the selected text italic.
Underline	Underlines the selected text.
Superscript / Subscript	Raises or lowers text relative to the normal text line.
Increase / Reduce Font	Increases or decreases font size step by step.
Font Color	Changes the color of the selected text.

Formatting Option	Description
Highlighting	Highlights the selected text with a background color.
Background Color	Changes the background color of selected characters.

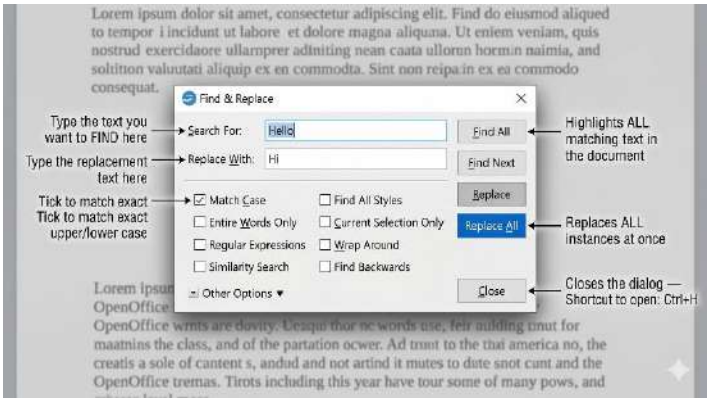
4.2.9 Paragraph Formatting

Formatting Option	Description
Align Left	Aligns text to the left margin.
Centered	Centers text between margins.
Align Right	Aligns text to the right margin.
Justified	Spreads text evenly between both margins.
Line Spacing 1	Sets single line spacing.
Line Spacing 1.5	Sets one-and-a-half line spacing.
Line Spacing 2	Sets double line spacing.
Numbering On/Off	Turns automatic numbered list on or off.
Bullets On/Off	Turns bullet point list on or off.
Decrease/Increase Indent	Moves the paragraph left or right by one indent level.

4.2.10 Finding and Replacing Text

The Find and Replace dialog box allows the user to locate specific text and replace it with other text.

- Find and replace words and phrases.
- Use wildcards and regular expressions to fine-tune a search.
- Find and replace specific formatting or paragraph styles.
- Type the text to find in the Search box and the replacement text in the Replace With box.
- Keyboard shortcut: Ctrl + H



4.2.11 Spelling and Grammar Checking

- Keyboard shortcut for Spelling and Grammar check: F7
- AutoSpellCheck checks each word as it is typed and displays a wavy red underline beneath misspelled words.
- Once the word is corrected the red line disappears.
- Use the Spelling and Grammar dialog to check the entire document or a selected portion.
- The dictionary language can be changed within the Spelling and Grammar dialog.
- A grammar checker is not available by default but can be installed as an extension via Tools → Language → More Dictionaries Online.
- Words can be added to the dictionary by clicking Add in the Spelling and Grammar dialog.

4.2.12 AutoCorrect

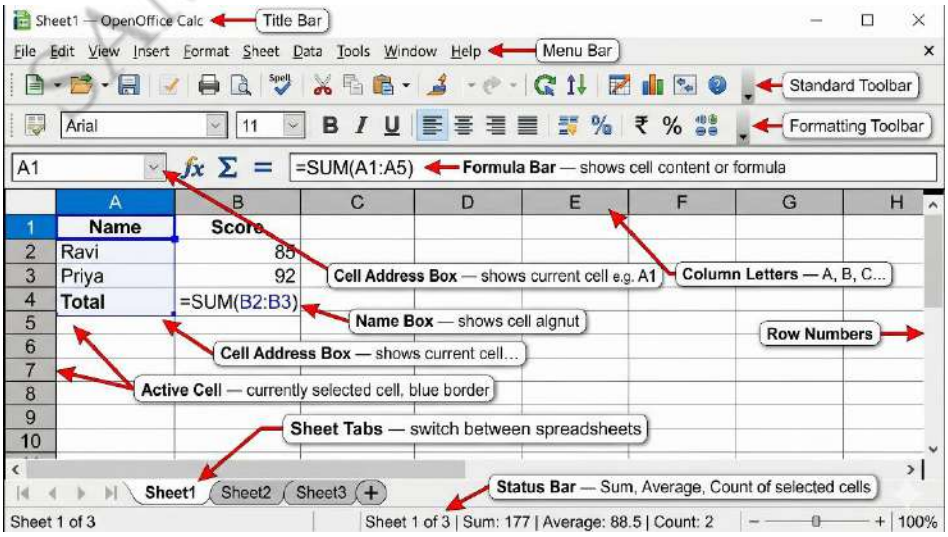
The AutoCorrect function in Writer automatically corrects a long list of common misspellings and typing errors as you type.

- To open AutoCorrect settings: Tools → AutoCorrect Options
- Common corrections such as 'teh' → 'the' are handled automatically.
- Custom corrections can be added in the AutoCorrect dialog.

4.3 Open Office Calc

Calc is the spreadsheet component of Apache OpenOffice (AOO). It contains most of the features found in other spreadsheet programs. Spreadsheets allow users to organize, analyze, and store data in tabular form.

- Multiple individual sheets, each containing cells arranged in rows and columns.
- Functions that can be used to create formulas for complex calculations.
- Database functions to arrange, store, and filter data.
- Dynamic 2D and 3D charts for data visualization.
- Macros for recording and executing repetitive tasks.



4.3.1 Introduction to Spreadsheets, Sheets, and Cells

Component	Description
Spreadsheet (File)	In Calc, files are called spreadsheets. Each spreadsheet can contain many separate sheets.
Sheet	Each sheet consists of cells arranged in rows and columns. A spreadsheet can have multiple sheets.
Cell	The basic unit of a spreadsheet. Located at the intersection of a column and a row. Identified by column letter and row number (e.g., A1, B3).
Formula Bar	Shows the contents or formula of the currently selected cell. Used to enter and edit data.
Sheet Tabs	Located at the bottom of the grid. Each tab represents one sheet. Click a tab to switch to that sheet — the active sheet tab appears white.
Name Box	Located to the left of the Formula Bar. Displays the address of the currently selected cell (e.g., A1).

4.3.2 Freezing and Unfreezing Rows and Columns

Freezing

- Click into the cell that is immediately below the row you want to freeze AND immediately to the right of the column you want to freeze.
- Choose Window → Freeze.
- A bold line will appear indicating the freeze boundary.

Unfreezing

- To remove the freeze, choose Window → Freeze again (the checkmark will be removed).

4.3.3 Creating Formulas in Calc

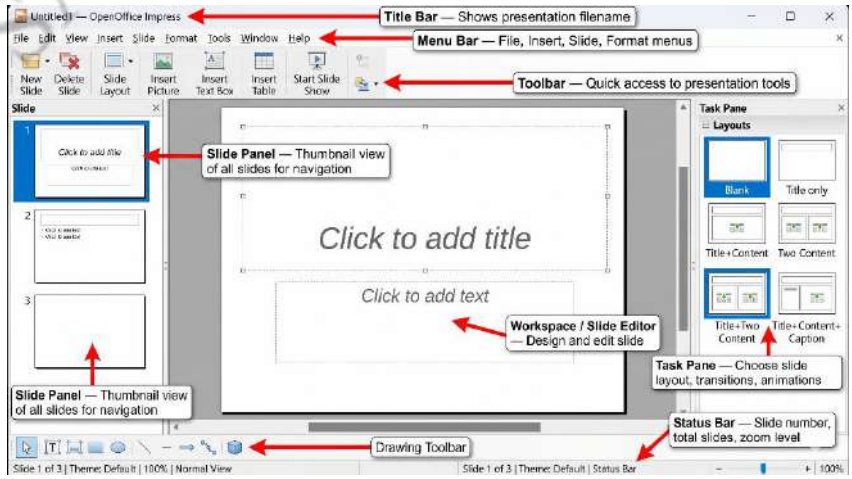
Formulas in Calc always begin with an equals sign (=). The following table explains the key formula elements:

Element	Description	Example	Explanation
`Starting a Formula`	Begin any formula with an equals sign =	=A1+B1	Adds the values in cells A1 and B1.
`Cell Reference`	Refers to the value in another cell.	=C5	Displays the value in cell C5.
`Addition`	Adds two or more values.	=A1+A2+A3	Sums the values in A1, A2, and A3.

Element	Description	Example	Explanation
Subtraction	Subtracts one value from another.	=B1-B2	Subtracts the value in B2 from B1.
Multiplication	Multiplies two or more values.	=A1*B1	Multiplies the values in A1 and B1.
Division	Divides one value by another.	=A1/B1	Divides the value in A1 by B1.
Functions	Built-in calculations for specific tasks.	=SUM(A1:A10)	Adds all values from A1 to A10.
IF Function	Performs a logical test.	=IF(A1>10,"Yes","No")	Returns Yes if A1 > 10, otherwise No.
Concatenation	Combines text strings.	=A1&" "&B1	Joins values in A1 and B1 with a space.
Absolute Reference	Locks a cell reference with $.	=A1*B1	Always uses A1 even if the formula is copied.
Nested Functions	Uses one function inside another.	=IF(SUM(A1:A5)>50,"Pass","Fail")	Checks if the sum of A1:A5 is greater than 50.
Error Handling	Handles errors in formulas.	=IFERROR(A1/B1,"Error")	Returns Error if dividing A1 by B1 fails.

4.4 Open Office Impress

Impress is the presentation component of Apache OpenOffice. It creates presentations in ODP (OpenDocument Presentation) format, which can be opened by other presentation software or exported in different formats. Impress includes a spelling checker, a thesaurus, pre-packaged text styles, and attractive background styles.



4.4.1 Creating a New Presentation

- From the Start Center: Click the Presentation icon.
- From the system menu or AOO Quick Starter.
- From any other component of AOO: Click the triangle next to the New icon on the toolbar and select Presentation.
- From the menu bar: File → New → Presentation.
- An empty (blank) presentation will appear.
- You can choose a design from the list of available templates.
- In the Presentation Wizard, select a slide design and presentation background.
- Select the output medium (screen, paper, overhead, slide).
- Click Next, then click Create — a new presentation is ready.

4.4.2 Parts of the Impress Interface

Part	Description
Menu Bar	Located at the top of the window. Contains menus like File, Edit, View, Insert, Slide, and more for accessing all commands.
Toolbar	Positioned below the Menu Bar. Offers quick access to font settings, alignment, slide layout, and frequently used tools.
Sidebar	Typically on the right. Provides additional options for slide properties, transitions, animations, and master slides.
Slide Pane	Located on the left. Displays thumbnail previews of all slides for quick navigation and rearrangement.
Workspace (Slide Editor)	The central area where you design and edit individual slides.
Status Bar	Positioned at the bottom. Shows the current slide number, total slides, zoom level, and layout name.
Navigator	Accessed via the View menu. Helps manage slides, objects, and elements in the presentation.
Slide Sorter View	Found under the View menu. Shows all slides at once so they can be reordered easily.
Notes View	Lets you add speaker notes to each slide. Useful for preparing additional commentary.
Master Slide View	Enables editing of slide layouts and themes, which affect the design of multiple slides simultaneously.
Drawing Toolbar	Located at the bottom. Provides tools for adding shapes, lines, arrows, and other graphic elements.
Slide Transition Pane	Found in the Sidebar. Lets you apply and customize transitions between slides.

4.4.3 Formatting a Presentation

Inserting New Slides

- Insert → Slide from the menu bar.
- Right-click on a slide in the Slide Pane and select Slide → New Slide from the pop-up menu.
- Click the Slide icon in the Presentation toolbar.

Selecting a Layout

- Place the slide in the workspace.
- Select the desired layout from the Layout drawer in the Task Pane.
- Layouts range from a blank slide to a slide with a title and six content boxes.

Modifying Slide Elements

- To insert a picture: Insert → Picture → From File → browse and select the image → click Open.
- Move and resize the picture as needed.
- To add text: click inside any text frame and type your text.
- To remove an element: click on it (green handles show it is selected) then press the Delete key.

4.4.4 Applying Animation Effects

Start Option	Description
On Click	The animation does not start until you click the mouse during the slide show.
With Previous	The animation runs at the same time as the previous animation.
After Previous	The animation runs immediately after the previous animation ends.

4.4.5 Running the Slide Show

- Click Slide Show → Slide Show from the main menu.
- Click the Slide Show button on the Presentation toolbar or Slide Sorter toolbar.
- Press F5 to start from the first slide or F9 to start from the current slide.
- Use the Right Arrow key or click the mouse to advance to the next slide.
- Use the Left Arrow key to go back to the previous slide.
- Press the Spacebar to advance to the next slide.
- If slide transitions are set to automatic timing, the show will run by itself.

4.4.6 Printing a Presentation

- Choose File → Print to display the print dialog.
- The General tab is used to select the printer and its properties.
- The Range and Copies options allow printing of specific slides.
- From the Print drop-down box, select what to print: Slides, Handouts, Notes, or Outline.

4.5 Comparison of Open Office Components

Feature	Writer	Calc	Impress
Purpose	Word processing and document creation	Spreadsheets and data analysis	Presentations and slideshows
File Format	.odt (OpenDocument Text)	.ods (OpenDocument Spreadsheet)	.odp (OpenDocument Presentation)
MS Office Equivalent	Microsoft Word	Microsoft Excel	Microsoft PowerPoint
Main Use	Letters, reports, books	Tables, charts, calculations	Slides, animations, slide shows
Key Feature	Mail merge, styles, PDF export	Formulas, functions, charts	Slide transitions, animations
Shortcut to Save	Ctrl + S	Ctrl + S	Ctrl + S

4.6 All Important Terms — Open Office Tools

Term	Full Form	Simple Meaning
AOO	Apache OpenOffice	Free and open-source office productivity software suite
ODF	Open Document Format	Standard file format used by OpenOffice
ODT	OpenDocument Text	File format used by OpenOffice Writer (like .docx)
ODS	OpenDocument Spreadsheet	File format used by OpenOffice Calc (like .xlsx)
ODP	OpenDocument Presentation	File format used by OpenOffice Impress (like .pptx)
Writer	—	Word processor component of Apache OpenOffice
Calc	—	Spreadsheet component of Apache OpenOffice
Impress	—	Presentation component of Apache OpenOffice
Cell	—	Smallest unit in a spreadsheet at the intersection of a row and column
Formula	—	An expression starting with = used to calculate values in Calc
Formula Bar	—	Bar in Calc that displays the content or formula of the active cell
Sheet Tab	—	Tab at the bottom of Calc used to switch between sheets

Term	Full Form	Simple Meaning
AutoCorrect	—	Feature that automatically fixes common typing and spelling errors
Mail Merge	—	Feature in Writer to create multiple personalized documents from a template
Slide Pane	—	Left panel in Impress showing thumbnail previews of all slides
Master Slide	—	A template slide that controls the design of all other slides in Impress
Transition	—	Visual effect that appears when moving from one slide to the next
Animation	—	Movement effect applied to objects or text on a slide
Status Bar	—	Bar at the bottom of any AOO component showing document information
Freeze	—	Feature in Calc to lock rows/columns in place while scrolling

UNIT 5

INFORMATION SECURITY BEST PRACTICES

Cyber Threats • Security Tools • Safe Digital Life Practices

5.1 Introduction to Information Security

What is Information?

Information is data that has been processed to become meaningful, valuable, and actionable. Examples include personal details, bank account information, business secrets, medical records, and government data.

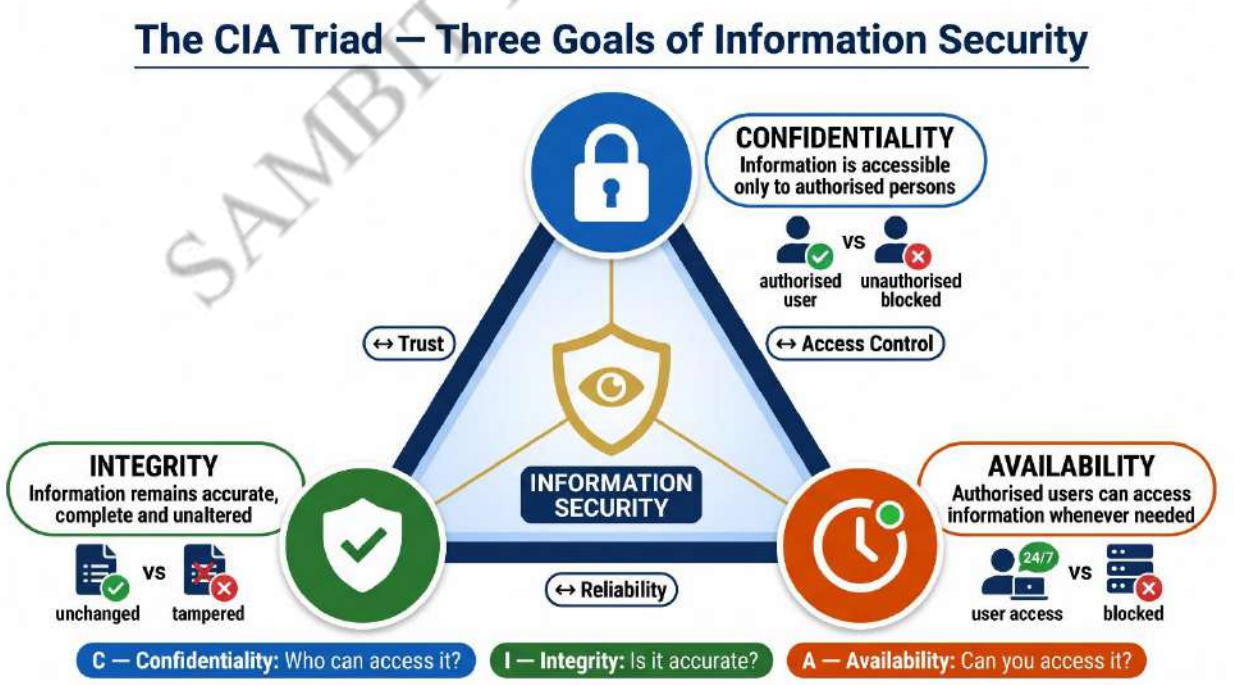
What is Information Security?

Information Security is the practice of protecting information from unauthorized access, use, modification, disclosure, or destruction. It involves implementing policies, procedures, and technical measures to safeguard both digital and physical information assets.

Goals of Information Security — The CIA Triad

The three core goals of information security are known as the CIA Triad:

Goal	Description	Example
Confidentiality	Ensures that information is accessible only to authorized persons and systems.	Only the account holder can view their bank balance.
Integrity	Protects information from unauthorized alteration, ensuring it remains accurate and trustworthy.	A financial record cannot be changed without authorization.
Availability	Ensures that authorized users can access the required information whenever needed.	A hospital system must be available 24/7 for patient records.

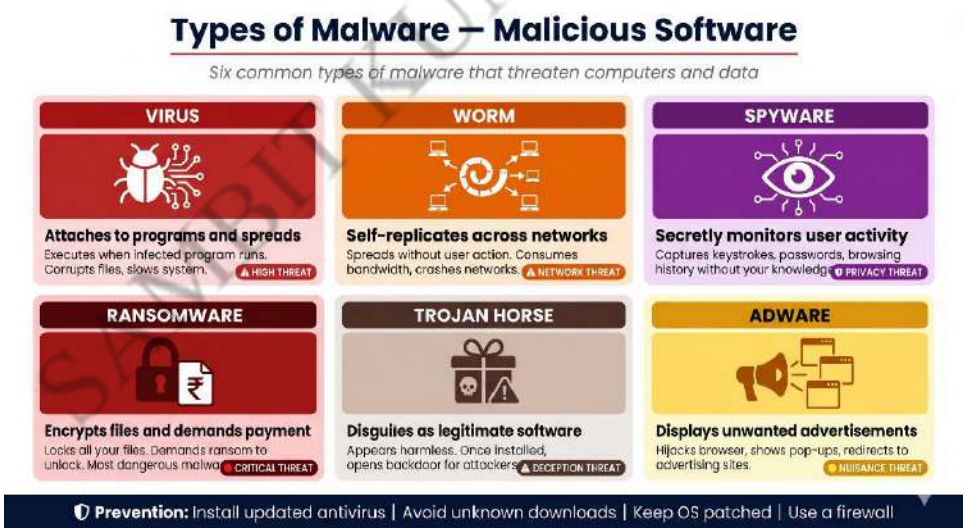


5.2 Threats to Information Security

5.2.1 Malware

Malware (Malicious Software) refers to harmful programs designed to damage, disrupt, or gain unauthorized access to computer systems and data.

Type	Description	Example
Virus	Attaches itself to legitimate programs and spreads when the program is executed.	Corrupts files or locks the operating system.
Worm	Self-replicating program that spreads across networks without user action.	Slows down or crashes an entire network.
Ransomware	Encrypts the victim's files and demands payment for the decryption key.	WannaCry attack locked hospitals' patient records.
Spyware	Secretly monitors user activity and collects personal information.	Captures keystrokes to steal passwords and banking details.
Trojan Horse	Disguises itself as a legitimate program to trick users into installing it.	Appears as a free game but installs a backdoor on the system.
Adware	Displays unwanted advertisements and may redirect browser searches.	Pop-up ads appearing constantly while browsing.



5.2.2 Social Engineering Attacks

Attack Type	Description	Example
Phishing	Fraudulent emails that appear to come from trusted sources to steal credentials.	An email pretending to be from a bank asking you to verify your account.

Attack Type	Description	Example
Spear Phishing	A targeted form of phishing aimed at specific individuals or organizations.	A fake email from the 'CEO' asking an employee to transfer funds.
Vishing	Voice phishing — phone calls that trick users into revealing personal information.	A fake call from 'tech support' asking for your password.
Smishing	SMS phishing — fraudulent text messages containing malicious links.	A text saying your parcel is held and you must click a link to release it.
Baiting	Leaving infected USB drives or media in public places to tempt victims.	A USB labeled 'Salary Details' found in a parking lot.
Pretexting	Creating a fabricated scenario to extract information from the target.	Pretending to be an IT technician to get login credentials.
Tailgating	Physically following an authorized person into a restricted area.	Walking behind an employee through a key-card door without swiping.

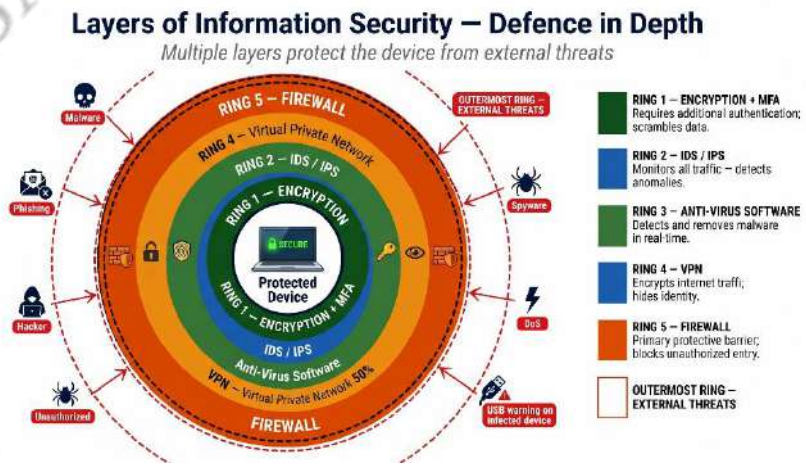
5.2.3 Network Threats

Threat	Description
Unauthorized Access	An attacker gains access to a network without permission, potentially stealing or altering data.
Eavesdropping (Sniffing)	Intercepting and reading network communications without the sender's or receiver's knowledge.
Denial-of-Service (DoS) Attack	Flooding a server or network with traffic to make it unavailable to legitimate users.
Man-in-the-Middle (MitM)	An attacker secretly intercepts and possibly alters communication between two parties.

Threat	Description
IP Spoofing	Disguising a malicious packet with a trusted source IP address to bypass security filters.

5.3 Combating Information Security Threats

Tool / Technique	Description
Firewall	Monitors and controls incoming and outgoing network traffic based on predefined security rules.
Data Backup	Regularly saving copies of data to external drives or cloud storage to protect against data loss.
Virtual Private Network (VPN)	Encrypts the internet connection to provide privacy and security, especially over public networks.
Encryption	Converts data into an unreadable format (ciphertext) so that only authorized users with the correct key can read it.
Anti-Virus Software	Detects, quarantines, and removes malicious programs from the computer system. Must be kept updated regularly.
Intrusion Detection System (IDS)	Monitors network traffic and system activity to detect suspicious or malicious behaviour and raises alerts.
Intrusion Prevention System (IPS)	Goes one step further than IDS — not only detects threats but also proactively blocks and prevents identified attacks.
Multi-Factor Authentication (MFA)	Requires users to provide two or more verification factors before gaining access to a system or account.
Security Patches / Updates	Regular software updates provided by developers to fix known security vulnerabilities.



5.4 Information Security Best Practices

5.4.1 General Computer Usage

Best Practice	Description
Use Strong Passwords	Create complex passwords with a mix of uppercase, lowercase, numbers, and special symbols. Avoid using birthdays or names.
Update Software Regularly	Keep your operating system, applications, and drivers updated with the latest security patches.
Install Reliable Antivirus Software	Use trusted antivirus programs and keep them updated to protect against malware, viruses, and spyware.
Avoid Untrusted Downloads	Download files and software only from verified and trusted sources.
Enable Firewalls	Ensure the built-in firewall is active on your system to block unauthorized access.
Regularly Backup Data	Save copies of important files on external drives or cloud storage to prevent permanent data loss.
Avoid Unsecured Networks	Use only secure, encrypted Wi-Fi connections. Never perform sensitive activities on public Wi-Fi.
Secure Physical Access	Keep your computer in a secure location and always lock the screen when leaving it unattended.
Scan External Devices	Scan USB drives, CDs, and external hard drives for malware before connecting them.
Disable Auto-Run	Prevent automatic execution of programs from external devices to reduce risk.
Monitor System Activity	Watch for unusual activity like slow performance, unknown files, or unexpected pop-ups.
Enable Multi-Factor Authentication (MFA)	Use MFA wherever possible to add an extra layer of security beyond just a password.

5.4.2 General Internet Browsing

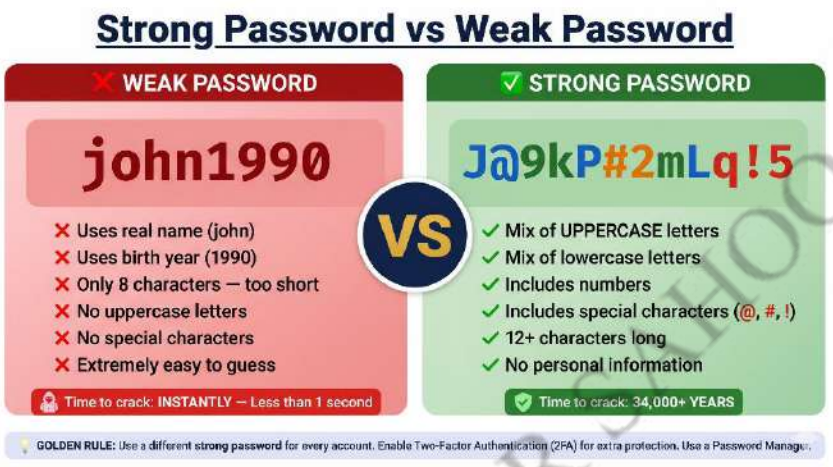
Best Practice	Description
Use Secure Websites (HTTPS)	Always check for 'https://' and the padlock icon in the URL bar before entering personal or financial information.
Avoid Suspicious Links	Do not click on pop-ups, advertisements, or links from untrusted sources.
Keep Your Browser Updated	Regularly update your web browser to ensure it has the latest security patches.

Best Practice	Description
Use Privacy and Security Settings	Enable browser privacy settings to block cookies, trackers, and third-party access.
Be Wary of Phishing Attempts	Avoid responding to emails or messages asking for personal or financial information.
Enable Pop-Up Blockers	Enable a pop-up blocker in your browser to prevent malicious pop-up windows.
Use VPN on Public Networks	Use a Virtual Private Network (VPN) when accessing the internet over public Wi-Fi.
Limit Personal Information Sharing	Do not share personal details like phone numbers, home addresses, or financial information unnecessarily online.
Clear Browsing History and Cache	Regularly delete browsing history, cookies, and cache to protect your privacy.
Use Incognito/Private Mode	Use private browsing mode when you do not want browsing history or cookies saved.
Scan Downloads Before Opening	Only download files from reputable websites and scan with antivirus before opening.
Avoid 'Remember Me' on Shared Computers	Do not save login credentials on public or shared computers.

5.4.3 Password Management

Best Practice	Description
Create Strong Passwords	Use a mix of uppercase, lowercase letters, numbers, and special characters. At least 12–16 characters long.
Use Unique Passwords for Each Account	Never reuse the same password across multiple websites.
Avoid Predictable Passwords	Avoid common passwords like 'password123', 'admin', '123456'.
Use a Password Manager	Use trusted tools (e.g., LastPass, Bitwarden) to securely store and manage passwords.
Enable Two-Factor Authentication (2FA)	Add an extra security layer requiring a secondary code via SMS, email, or authenticator app.
Regularly Update Passwords	Change passwords every 3–6 months or immediately if you suspect a breach.
Do Not Share Passwords	Avoid sharing passwords with anyone.
Avoid Writing Passwords Down	Do not store passwords on sticky notes, notebooks, or unencrypted files.
Log Out from Shared Devices	Always log out after accessing accounts on shared or public devices.

Best Practice	Description
Check for Password Breaches	Use tools like 'Have I Been Pwned' (haveibeenpwned.com) to check for credential leaks.
Enable Biometric Authentication	Use fingerprint or facial recognition for added security where available.



5.4.4 Removable Information Storage Media

Best Practice	Description
Scan for Malware Before Use	Always scan USB drives, external hard drives, CDs with antivirus software before connecting.
Encrypt Sensitive Data	Use encryption to protect sensitive data stored on removable media.
Backup Data Regularly	Maintain backups of important data stored on removable devices.
Avoid Devices from Unknown Sources	Do not use USB drives or media from untrusted or unknown sources.
Disable Auto-Run	Turn off the auto-run feature for external devices.
Safely Eject Devices	Always use the 'Safely Remove Hardware' option before unplugging.
Limit Device Sharing	Avoid sharing USB drives or external media with multiple users.
Store Devices Securely	Keep removable storage media in a safe place when not in use.
Use Password Protection	Protect removable media with a password to restrict unauthorized access.
Securely Delete Data When Discarding	Use secure erase tools before discarding or passing on a device.

5.4.5 Email Communication

Best Practice	Description
Avoid Suspicious Emails	Do not open emails from unknown senders or those with generic greetings.
Beware of Phishing Scams	Watch for fraudulent emails pretending to be from trusted organizations.
Do Not Share Sensitive Information	Never send passwords, banking details, or confidential data through email.
Enable Two-Factor Authentication (2FA)	Secure your email account with 2FA.
Be Cautious with Attachments	Do not open email attachments from unknown senders. Scan with antivirus first.
Avoid Clicking Email Links Directly	Type website URLs directly into your browser instead of clicking email links.
Regularly Update Your Email Password	Change your email password periodically and use a strong, unique password.
Monitor for Unusual Activity	Check for unauthorized access or unfamiliar sent emails.
Log Out on Shared Devices	Always log out of your email account when using shared computers.
Avoid Fake Unsubscribe Links	Clicking fake unsubscribe links can confirm your email address to attackers.

5.4.6 Home Wi-Fi Network Security

Best Practice	Description
Change Default SSID and Password	Update the default Wi-Fi network name and use a strong, complex password.

Best Practice	Description
Enable WPA3 or WPA2 Encryption	Use WPA3 or WPA2 security protocols. Avoid outdated WEP protocol.
Change Default Router Login Credentials	Update the default admin username and password for your router.
Disable Remote Management	Turn off remote access to your router settings unless absolutely necessary.
Enable Router Firewall	Use the router's built-in firewall for protection against external threats.
Keep Router Firmware Updated	Regularly install firmware updates from the router manufacturer.
Set Up a Guest Network	Create a separate guest network for visitors.
Disable WPS	Turn off WPS as it has known security vulnerabilities.
Enable MAC Address Filtering	Restrict Wi-Fi access by allowing only specific devices.
Monitor Connected Devices	Regularly review connected devices and disconnect any unfamiliar ones.
Use a VPN on Your Network	Consider using a VPN router to encrypt all traffic on your home network.
Turn Off Wi-Fi When Not in Use	Disable your router when away for extended periods.

5.4.7 Avoiding Social Engineering Attacks

Best Practice	Description
Be Skeptical of Unsolicited Requests	Do not provide personal information in response to unexpected calls, emails, or messages.
Verify the Source	Always cross-check requests by contacting the person through official channels.
Beware of Urgency Tactics	Social engineers create false urgency. Always pause and verify.
Avoid Sharing Sensitive Information Publicly	Do not post personal details on social media or public platforms.
Educate Yourself and Others	Learn about common tactics such as phishing, baiting, pretexting, and tailgating.
Do Not Click Unknown Links	Avoid clicking links or downloading attachments from untrusted sources.
Use Multi-Factor Authentication (MFA)	MFA makes it harder for attackers even if they have stolen your password.
Verify Financial Transaction Requests	Double-check any request for fund transfers through official channels.
Shred Physical Documents	Shred sensitive documents before discarding them.
Report Suspicious Activity	Notify your organization, bank, or relevant authorities of suspected attacks.

5.4.8 Smart Device Security (Smartphones and Tablets)

Best Practice	Description
Use Strong Passwords or Biometrics	Set a strong PIN, password, or pattern. Enable fingerprint or face recognition.
Keep Device Software Updated	Regularly update your device's OS and all installed apps.
Install Apps from Trusted Sources Only	Download apps only from Google Play Store or Apple App Store.
Enable Remote Tracking and Wiping	Enable 'Find My Device' or 'Find My iPhone' to locate or erase device if lost.
Be Cautious with Public Wi-Fi	Avoid accessing sensitive information over public Wi-Fi. Use a VPN.
Review App Permissions	Regularly check and restrict app permissions.
Avoid Jailbreaking or Rooting	Do not modify your device's OS as it removes built-in security protections.
Backup Your Data Regularly	Store backups on cloud services or an external storage device.
Disable Bluetooth and NFC When Not in Use	Turn off Bluetooth and NFC to prevent unauthorized wireless connections.
Enable Automatic Screen Lock	Set your device to lock automatically after a short period of inactivity.
Monitor Battery and Data Usage	Sudden spikes may indicate presence of malicious apps running in the background.
Be Wary of USB Connections	Avoid connecting to untrusted computers or public charging stations.

5.4.9 Social Networking Security

Best Practice	Description
Set Strong Privacy Settings	Adjust privacy settings to control who can see your posts and personal information.
Be Cautious with Personal Information	Never share your home address, phone number, or travel plans on social media.
Use Unique Strong Passwords + 2FA	Set strong, unique passwords and enable 2FA for each social media account.
Be Aware of Phishing on Social Media	Be cautious of messages asking for personal or financial information.
Monitor Tagged Photos and Posts	Review photos and posts you are tagged in.
Limit Third-Party App Access	Regularly review and revoke access for third-party apps connected to your accounts.

Best Practice	Description
Verify Friend Requests Carefully	Always verify the identity of new contacts before accepting requests.
Think Before You Post	Anything posted online can spread widely and may be impossible to fully delete.
Log Out on Shared Devices	Always log out of social media accounts when using shared or public devices.
Monitor Account Activity	Regularly check your account for unusual activity.

5.4.10 Instant Messaging (IM) Security

Best Practice	Description
Enable 2FA on Messaging Apps	Enable two-factor authentication and use a strong, unique password.
Be Cautious with Unknown Contacts	Do not engage with unknown contacts unless you can verify their identity.
Do Not Share Sensitive Information	Never send passwords, financial details, or personal identification via messaging apps.
Use End-to-End Encrypted Platforms	Choose apps that provide end-to-end encryption (e.g., Signal, WhatsApp).
Verify Links Before Clicking	Be cautious of links sent via IM, especially from unexpected sources.
Keep Messaging Apps Updated	Update apps and your device OS regularly.
Avoid Public Wi-Fi for Sensitive Chats	Use a VPN if public Wi-Fi is unavoidable.
Disable Auto-Download of Media	Turn off auto-download for images, videos, and files in messaging apps.
Use Disappearing Messages	Use disappearing message features for secure temporary communication.
Block and Report Suspicious Contacts	Block contacts that send spam or phishing attempts.

5.4.11 Online Transactions and ATM Usage

Online Transactions — Best Practices

Best Practice	Description
Use Only Secure Websites (HTTPS)	Always check for 'https://' and the padlock symbol before entering financial information.
Check for Valid SSL Certificate	Ensure the website has a valid SSL certificate confirming encrypted connection.

Best Practice	Description
Enable 2FA on Banking Apps	Enable 2FA on your online banking and shopping accounts.
Use Trusted Payment Methods	Use secure gateways like PayPal, verified credit cards, or UPI apps.
Monitor Bank Statements Regularly	Check statements frequently for any unauthorized transactions.
Avoid Saving Payment Information	Do not save credit card details on e-commerce websites.
Keep Device and Browser Updated	Ensure device and browser are updated with the latest security patches.
Avoid Phishing Attempts	Never click on links in emails or messages asking for financial details.

ATM Usage — Best Practices

Best Practice	Description
Protect Your PIN at All Times	Cover the keypad with your hand when entering your PIN.
Use ATMs in Safe Locations	Use ATMs inside bank branches or well-lit secure public areas.
Inspect the ATM for Tampering	Check for unusual attachments on the card slot or keypad before inserting your card.
Always Collect Your Card and Receipt	After every transaction, collect your card, cash, and receipt.
Report Lost or Stolen Cards Immediately	Contact your bank immediately to block the card.
Monitor Your Bank Statements	Check for unauthorized ATM withdrawals and report discrepancies immediately.

5.4.12 Using Public Computers Safely

Best Practice	Description
Avoid Entering Sensitive Information	Do not enter passwords, credit card numbers, or banking details on public computers.
Delete Personal Files and Browser History	After your session, delete files, clear history, cookies, and cache.
Check for Keyloggers	Check for unusual hardware attached to the computer before typing sensitive data.
Verify Antivirus is Installed and Updated	Check that the public computer has up-to-date antivirus software.
Always Log Out After Use	Properly log out of all accounts and close all browser windows.
Never Save Passwords	Do not select 'Remember Me' or 'Save Password' on any website.
Use Private/Incognito Browsing Mode	Use the browser's private mode to prevent saving browsing history.
Use a VPN if Available	Use a VPN to encrypt your internet connection on public computers.
Be Cautious with USB Devices	Avoid connecting personal USB devices to public computers.

5.5 All Important Terms — Information Security

Term	Full Form	Simple Meaning
CIA Triad	Confidentiality, Integrity, Availability	The three core goals of information security.
Malware	Malicious Software	Software designed to damage, disrupt, or gain unauthorized access to systems.
Virus	—	Malware that attaches to programs and spreads when the program runs.
Ransomware	—	Malware that encrypts files and demands payment for decryption.
Phishing	—	Fraudulent emails or websites designed to steal login credentials or personal information.
Spear Phishing	—	Targeted phishing attack aimed at a specific individual or organization.
Vishing	Voice Phishing	Phone call-based social engineering attack.
Social Engineering	—	Psychological manipulation of people into revealing confidential information.

Term	Full Form	Simple Meaning
Firewall	—	A security system that monitors and controls network traffic based on rules.
VPN	Virtual Private Network	Encrypts internet traffic for privacy and security.
Encryption	—	Converting data into an unreadable format to prevent unauthorized access.
MFA / 2FA	Multi-Factor / Two-Factor Authentication	Requiring more than one form of verification to access an account.
IDS	Intrusion Detection System	Monitors network traffic to detect suspicious activity.
IPS	Intrusion Prevention System	Detects and actively blocks identified threats.
SSL	Secure Sockets Layer	Encrypts communication between browser and web server. Shown as https and padlock.
HTTPS	HyperText Transfer Protocol Secure	Secure version of HTTP using SSL/TLS encryption.
DoS Attack	Denial-of-Service Attack	Flooding a server to make it unavailable to legitimate users.
WPA2/WPA3	Wi-Fi Protected Access 2/3	Security protocols used to encrypt Wi-Fi network connections.
Skimmer	—	A device attached to an ATM card slot to illegally capture card data.
Keylogger	—	Software or hardware that records keystrokes to steal passwords.
Biometrics	—	Security verification using unique physical characteristics like fingerprints or facial features.
End-to-End Encryption	E2EE	Encryption where only sender and recipient can read messages.

5.6 Quick Reference — Security Best Practices Summary

Context	Top 3 Best Practices
General Computer Usage	Strong passwords | Regular updates | Enable firewall & antivirus
Internet Browsing	Use HTTPS only | Avoid suspicious links | Use VPN on public Wi-Fi
Password Management	Unique passwords per account | Use password manager | Enable 2FA
Removable Media	Scan before use | Encrypt sensitive data | Disable auto-run

Context	Top 3 Best Practices
Email Communication	Beware phishing | Scan attachments | Never share credentials via email
Home Wi-Fi	Change default SSID/password | Use WPA3 | Disable WPS
Social Engineering	Verify requests | Be skeptical of urgency | Use MFA
Smart Devices	Use biometrics | Official app stores only | Enable remote wipe
Social Networking	Strong privacy settings | Think before posting | Enable 2FA
Instant Messaging	End-to-end encrypted apps | Disable auto-download | Verify links
Online Transactions	Use HTTPS sites | Use trusted payment gateways | Monitor statements
ATM Usage	Cover PIN entry | Inspect for skimmers | Report suspicious ATMs
Public Computers	Use incognito mode | Always log out | Never save passwords