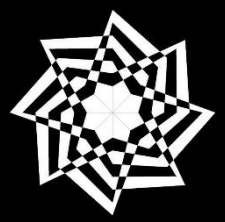

Unit – 5
Basics of Internet and Emerging Technologies

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Introductory Points

- Definition of Internet:
  - The Internet is a global network of interconnected computers that enables communication, information sharing, and access to digital services across the world.
- History of Internet:
  - The Internet originated from the ARPANET project in the late 1960s and has since evolved into a critical infrastructure supporting countless applications and services.
- Basic Components of the Internet:
  - It includes hardware (servers, routers, modems), software (browsers, protocols), and services (email, websites, cloud storage).

Introductory Points

- How the Internet Works:
  - Data is transferred in packets through a set of communication protocols, mainly TCP/IP, which ensure secure and reliable delivery between devices.
- Internet Services and Applications:
  - Key services include Web browsing, Email, Online streaming, E-commerce, Social Media, and Cloud Computing.
- Emerging Technologies Overview:
  - Emerging technologies refer to advanced innovations currently in development or early adoption stages, such as Artificial Intelligence (AI), Blockchain, Internet of Things (IoT), 5G, and Virtual Reality (VR).

Introductory Points

- Artificial Intelligence (AI):
  - AI enables machines to mimic human intelligence through learning and decision-making processes, powering applications like virtual assistants and self-driving cars.
- Internet of Things (IoT):
  - IoT connects physical devices (like sensors, appliances, and vehicles) to the Internet, allowing them to collect and exchange data for automation and smart control.
- Cybersecurity Importance:
  - With increasing Internet usage and digital innovation, securing data, networks, and devices against cyber threats is more critical than ever.
- Impact on Society and Industry:
  - The Internet and emerging technologies are transforming industries (healthcare, education, agriculture) and enabling smarter cities, digital governance, and global connectivity.

Basic Requirements of an Internet Connection

- Device (Computer, Smartphone, Tablet, etc.)
  - – A digital device capable of running software (like a browser) and connecting to a network.
  - A good processor speed
  - Memory at least 200 MB of free space
- Network Interface (NIC / Wi-Fi Adapter)
  - – Hardware that allows the device to connect to a network (via Ethernet cable or wireless).
- Internet Service Provider (ISP)
  - – A company (like BSNL, Jio, Airtel) that provides access to the Internet, often through subscription plans.

Basic Requirements of an Internet Connection

- Modem
  - – A device that connects your local network to your ISP’s infrastructure, converting signals between analog and digital.
- Router (for multiple devices)
  - – Distributes the Internet connection to multiple devices, wired or wireless (Wi-Fi).
- Cables or Wireless Connection
  - – Ethernet cables or wireless signals (Wi-Fi/4G/5G) to transmit data between the modem/router and the devices.

Basic Requirements of an Internet Connection

- IP Address (Dynamic or Static)
  - – An Internet Protocol address assigned to your device or network by the ISP for identification on the web.
- Web Browser or Internet Application
  - – Software (like Chrome, Firefox) that lets users access websites and online services.
- Valid Internet Plan/Data Pack
  - – An active subscription or data plan from the ISP to allow continuous access to the Internet.
- Power Supply and Connectivity
  - – Uninterrupted power supply to modem/router and stable signal coverage for continuous connectivity.

World Wide Web (WWW) / The Web / W3

- The **World Wide Web (WWW)**, also called **"the Web"** or simply **W3**, is **a system of interlinked hypertext documents and resources accessed through the Internet**.
- The **World Wide Web** is an **information-sharing system** that uses the Internet as its transport mechanism. It allows users to access and interact with multimedia content (text, images, video, links) via web browsers.
- **Inventor:** The Web was **invented by Tim Berners-Lee** in **1989** while working at **CERN** (European Organization for Nuclear Research).

Key Components:

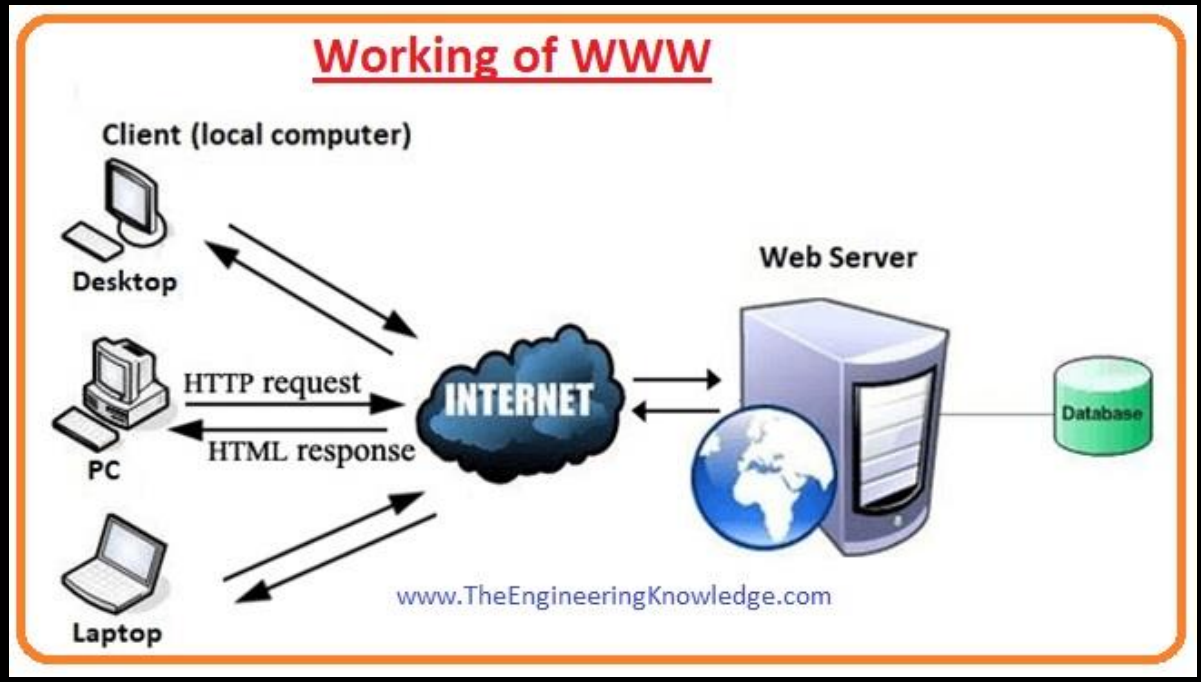
- **Web Browser** – Software like Chrome, Firefox, or Safari used to access and display web pages.
- **Web Server** – A system that hosts websites and delivers web content on request.
- **Web Page** – A document written in **HTML** that can include text, images, links, videos, etc.
- **URL (Uniform Resource Locator)** – The unique address of a web page (e.g., https://example.com).
- **HTTP/HTTPS (HyperText Transfer Protocol)** – The protocol used to request and deliver web content.

Difference Between Internet and Web

- **Internet** = The network infrastructure (hardware, cables, routers).
- **Web (WWW)** = The collection of information and services (websites, pages) accessed over the Internet.
- **Purpose:** To **share information**, connect users globally, and allow interaction with online services like **e-commerce, education, communication, entertainment**, and more.

Working of World Wide Web (WWW)

- User Enters a URL
  - Example: You type https://www.example.com in a browser like Chrome.
  - This is a Uniform Resource Locator (URL), the address of the web page you want to access.
- DNS (Domain Name System) Lookup
  - The browser contacts the DNS server to convert the domain name (e.g., example.com) into an IP address (e.g., 192.168.1.1).



Working of World Wide Web (WWW)

- Request Sent via HTTP/HTTPS
  - The browser sends a request to the web server using HTTP or HTTPS protocol.
  - This request asks for the content (HTML file, images, videos, etc.) of the web page.
- Web Server Responds
  - The web server (where the website is hosted) receives the request.
  - It locates the requested file/page and sends it back to the user's browser.
- Browser Receives and Interprets HTML
  - The browser downloads the HTML content.
  - It then renders (displays) the page by loading text, images, styles (CSS), and functionality (JavaScript).
- User Views the Web Page
  - The user can now interact with the web page—click links, submit forms, watch videos, etc.

Technologies Involved

- HTML (HyperText Markup Language) – Structure of web pages
- CSS (Cascading Style Sheets) – Styling and layout
- JavaScript – Interactivity
- HTTP/HTTPS – Communication protocol
- DNS – Domain name resolution
- Web Server – Content delivery

Important Terms Related to Networking

- Network
  - A group of two or more connected computers/devices that can share data and resources (e.g., printers, files).

- IP Address (Internet Protocol Address)
  - A unique numeric identifier assigned to each device on a network (e.g., 192.168.1.1).

- MAC Address (Media Access Control Address)
  - A permanent, unique hardware address assigned to a network interface card (NIC).

Important Terms Related to Networking

- Router
  - A device that connects multiple networks and directs data packets between them (e.g., between a home network and the Internet).
- Modem (Modulator-Demodulator)
  - A device that converts digital signals into analog (and vice versa) to connect to the Internet via telephone or cable lines.
- Switch
  - A network device that connects multiple devices in a LAN and efficiently routes data only to the intended recipient.

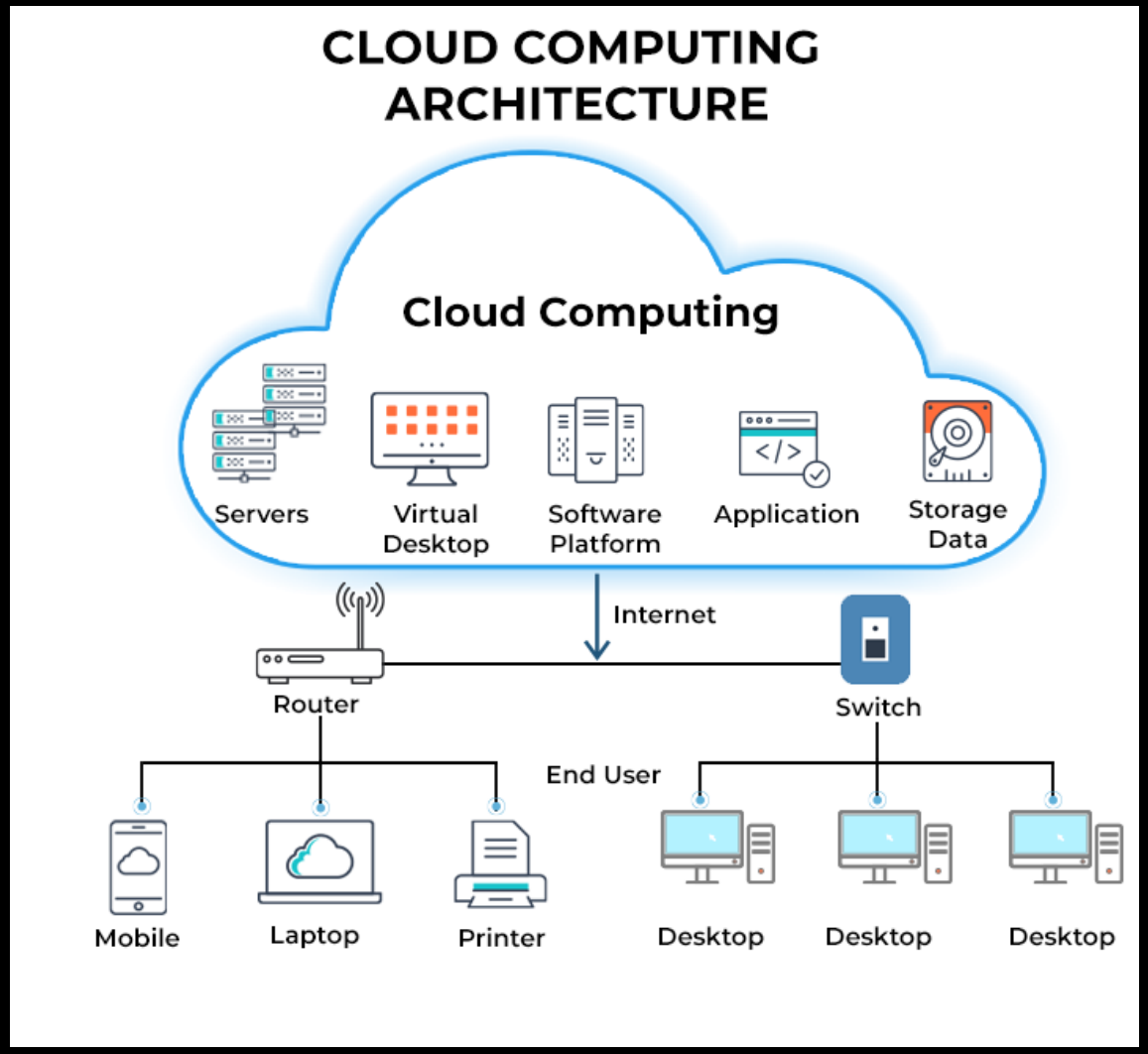
Important Terms Related to Networking

- LAN (Local Area Network)
  - A small network covering a limited area like a home, school, or office.
- WAN (Wide Area Network)
  - A large network that connects computers across cities, countries, or even the globe (e.g., the Internet).
- Wi-Fi (Wireless Fidelity)
  - A wireless technology that allows devices to connect to a network without cables.

Important Terms Related to Networking

- Bandwidth
  - The maximum amount of data that can be transmitted over a network in a given time, usually measured in Mbps or Gbps.
- Firewall
  - A security system (hardware or software) that monitors and controls incoming/outgoing network traffic.
- DNS (Domain Name System)
  - Translates human-readable domain names (e.g., google.com) into IP addresses that computers use.
- Protocol
  - A set of rules that govern data communication (e.g., TCP/IP-Transmission Control Protocol/Internet Protocol, HTTP-(Hypertext Transfer Protocol), FTP-File Transfer Protocol, SMTP-Simple Mail Transfer Protocol).
- Packet
  - Small unit of data transmitted over a network; messages are broken into packets for transfer.
- Server
  - A powerful computer that provides services or data to other computers (clients) over a network.

Cloud (Cloud Computing)



Cloud (Cloud Computing)

- Cloud refers to the delivery of computing services (like storage, servers, databases, software) over the Internet — instead of using a local computer or physical server.
- Cloud = Using other companies' computers over the Internet to store, access, and process your data.

- Key Features of Cloud
  - On-demand access – Use services whenever needed.
  - Scalability – Increase or decrease resources as per need.
  - Remote Access – Access from anywhere with an Internet connection.
  - Pay-as-you-go – Pay only for what you use.

Types of Cloud Services (Models)

- IaaS (Infrastructure as a Service)
  - – Provides virtual machines, servers, storage
  - – Example: Amazon Web Services (AWS)

- PaaS (Platform as a Service)
  - – Provides tools and platforms for app development
  - – Example: Google App Engine

- SaaS (Software as a Service)
  - – Provides ready-to-use applications over the web
  - – Example: Google Drive, Microsoft Office 365

Types of Cloud Deployment

- Public Cloud – Services shared and managed by third-party providers (e.g., Google Cloud, Azure)
- Private Cloud – Cloud infrastructure used by a single organization
- Hybrid Cloud – Combination of public and private clouds
- Common Uses of Cloud
  - Storing files (e.g., Google Drive, Dropbox)
  - Running websites and apps
  - Data backup and disaster recovery
  - Online collaboration (e.g., MS Teams, Zoom)
- Benefits of Cloud
  - Cost-efficient
  - Reliable and secure
  - Accessible from any device
  - Automatic updates and maintenance

Applications of Cloud Computing

- 1. Data Storage and Backup
  - Store files, photos, videos, and documents securely online.
  - Access from any device, anywhere.
  - Examples: Google Drive, Dropbox, OneDrive
- 2. Software as a Service (SaaS)
  - Use software directly through the Internet without installing it.
  - Ideal for office tools, email, video conferencing, etc.
  - Examples: Microsoft 365, Google Workspace, Zoom
- 3. Website Hosting
  - Host websites and applications using cloud servers.
  - Provides high availability, load balancing, and automatic scaling.
  - Examples: Amazon Web Services (AWS), Google Cloud Platform, GoDaddy Cloud

Applications of Cloud Computing

- 4. Online Collaboration Tools
  - Allows teams to work together in real-time.
  - Share, edit, and comment on documents simultaneously.
  - Examples: Google Docs, Microsoft Teams, Trello, Slack
- 5. Cloud-Based Education (E-Learning)
  - Deliver educational content and live classes online.
  - Store course materials and conduct assessments.
  - Examples: Google Classroom, Coursera, Zoom for Education
- 6. Cloud Gaming
  - Play high-end video games without powerful hardware.
  - Game is streamed from cloud servers.
  - Examples: NVIDIA GeForce NOW, Xbox Cloud Gaming, Google Stadia

Applications of Cloud Computing

- 7. Business Applications
  - Manage operations like CRM, ERP, and accounting online.
  - Useful for startups and enterprises.
  - Examples: Salesforce, SAP, QuickBooks Online
- 8. Data Analytics and Big Data
  - Process and analyze large volumes of data quickly.
  - Use cloud-based tools for visualization and insights.
  - Examples: Google BigQuery, AWS Redshift, Azure Synapse
- 9. Disaster Recovery
  - Automatically backup and recover data in case of failure.
  - Ensures business continuity.
  - Examples: Acronis Cloud Backup, Veeam, Carbonite
- 10. Internet of Things (IoT)
  - Cloud supports IoT devices to collect, store, and analyze data remotely.
  - Used in smart homes, cities, vehicles, etc.
  - Examples: AWS IoT, Azure IoT Hub, Google Cloud IoT

Website

- Definition
  - A website is a collection of web pages that are linked together and available on the Internet under a common domain name (e.g., www.example.com).
  - Websites are accessed through web browsers like Chrome, Firefox, or Safari.

- Examples of Websites
  - Search Engine: www.google.com
  - Social Media: www.facebook.com
  - E-Commerce: www.amazon.in
  - Educational: www.khanacademy.org

Components of a Website

- Web Pages – Individual documents (like Home, About, Contact).
- Homepage – The main or first page of a website.
- Navigation Menu – Helps users move between pages.
- Content – Text, images, videos, links, etc.
- Domain Name – The address of the website (e.g., www.xyz.com).
- Web Hosting – A service that stores website files and makes them accessible on the Internet.

Types of Websites

- Static Website – Fixed content, does not change unless edited manually.
- Dynamic Website – Content changes based on user interaction (e.g., Facebook, YouTube).
- Personal Website – For individual use (e.g., blogs, portfolios).
- Business Website – For company or commercial use.
- Educational Website – For learning and teaching content.

How to Access a Website?

- Open a web browser.
- Type the URL (e.g., https://www.wikipedia.org) in the address bar.
- Press Enter.
- The web server sends the requested page to your browser.

Purpose of a Website

- Share information
- Promote businesses
- Sell products or services
- Connect people
- Provide education, entertainment, or news

Web Servers

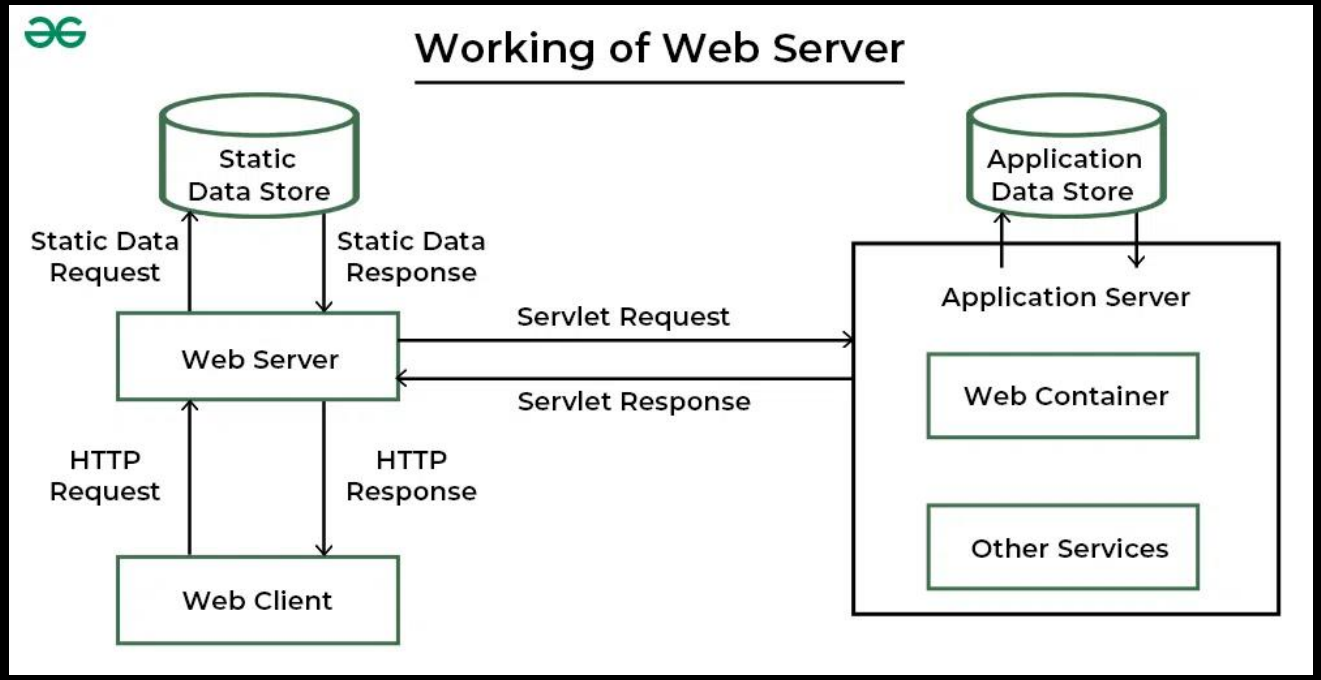
- Definition
  - A Web Server is a computer system or software that stores, processes, and delivers websites (web pages) to users over the Internet using HTTP/HTTPS protocols.
  - When you open a website in your browser, the request goes to a web server, which sends back the web page to be displayed.
- Functions of a Web Server
  - Store website files (HTML, CSS, images, videos, etc.)
  - Process user requests made through browsers.
  - Deliver the correct web pages to users.
  - Run web applications (dynamic websites).
  - Ensure security using HTTPS (SSL certificate).

Types of Web Servers

- Apache HTTP Server – Most popular open-source web server.
- Nginx – Lightweight and high-performance server used for large websites.
- Microsoft IIS (Internet Information Services) – Web server from Microsoft.
- LiteSpeed – Fast and secure web server for high-traffic sites.
- Tomcat – Specially used for Java-based web applications.

Working of a Web Server

- User (Browser) → sends request → Web Server → fetches data → sends response → Web Page displayed
- For example:
  - You type www.example.com → Your browser sends a request to the server → Server sends back the HTML/CSS files → Website loads.



Web Server vs. Web Hosting

Term	Meaning
Web Server	The software/hardware that handles web requests.
Web Hosting	The service that rents out web servers to store websites.

Basic Settings of a Web Browser

- A web browser (like Google Chrome, Mozilla Firefox, Microsoft Edge, Safari) has various settings that help users control how websites are displayed, stored, and interacted with.
- 1. Homepage Setting
  - Set your default start page (e.g., Google, school website).
  - Found under:
  - Settings → On startup → Open a specific page
- 2. Search Engine Setting
  - Choose your default search engine (Google, Bing, DuckDuckGo).
  - Found under:
  - Settings → Search engine

Basic Settings of a Web Browser

- 3. Privacy and Security Settings
  - Manage:
  - Cookies (website data)
  - Tracking protection
  - Site permissions (location, camera, mic)
  - Found under:
  - Settings → Privacy and Security
- 4. Clear Browsing Data
  - Remove history, cached files, cookies, and saved passwords.
  - Helps in improving speed and privacy.
  - Shortcut:
  - Ctrl + Shift + Del

Basic Settings of a Web Browser

- 5. Bookmarks / Favorites
  - Save your favorite web pages for quick access.
  - Add by clicking the ★ star icon next to the address bar.

- 6. Extensions / Add-ons
  - Add tools to your browser (e.g., Ad Blocker, Translator, Grammarly).
  - Found under:
  - Settings → Extensions or Add-ons

- 7. Default Download Location
  - Choose where downloaded files are saved.
  - Found under:
  - Settings → Downloads → Location

Basic Settings of a Web Browser

- 8. Theme and Appearance
  - Change browser theme (light/dark mode), font size, and zoom level.
  - Found under:
  - Settings → Appearance
- 9. Pop-up Blocker
  - Control whether websites can show pop-up windows.
  - Found under:
  - Settings → Site Settings → Pop-ups and redirects
- 10. Password and Autofill
  - Save or manage:
  - Passwords
  - Addresses
  - Payment methods
  - Found under:
  - Settings → Autofill

Email Services

- What is an Email Service?
- An Email Service allows users to send, receive, store, and manage electronic messages (emails) over the Internet using email servers and clients.
- Example: Sending a message to someone at abc@example.com using Gmail or Outlook.

Types of Email Services

Type	Description	Examples
Web-based	Accessed via browser	Gmail, Yahoo Mail
Client-based	Uses software to access emails	Microsoft Outlook, Thunderbird

Popular Email Service Providers

- Gmail – Provided by Google
- Outlook / Hotmail – Provided by Microsoft
- Yahoo Mail – Provided by Yahoo
- ProtonMail – Encrypted and privacy-focused
- Zoho Mail – Business-friendly email service
- Rediffmail – Popular in India
- Apple Mail (iCloud) – For Apple device users

Basic Features of Email Services

- Send/Receive Emails – Text, images, attachments
- Inbox/Outbox/Sent/Spam – Organize emails
- Attachments – Share documents, files, photos
- Folders/Labels – Organize mails for easy access
- Search – Find messages quickly
- Contacts/Address Book – Save email addresses
- Spam Filter – Blocks unwanted emails
- Drafts – Save messages before sending
- Email Forwarding – Send a received email to others
- Security – SSL/TLS encryption, 2-factor authentication

Protocols Used in Email

- SMTP (Simple Mail Transfer Protocol) – For sending emails
- POP3 (Post Office Protocol) – Downloads email to your device
- IMAP (Internet Message Access Protocol) – Accesses email from the server without downloading

Abbreviations in Email Writing

Abbreviation	Full Form	Meaning / Use
ASAP	As Soon As Possible	For urgent tasks
FYI	For Your Information	Sharing info only
BTW	By The Way	Adding extra info
IMO	In My Opinion	Expressing view
IDK	I Don't Know	Informal reply
BRB	Be Right Back	Temporary pause
LOL	Laughing Out Loud	Funny reaction
OMG	Oh My God	Surprise/shock
TBA	To Be Announced	Info coming later
EOD	End Of Day	Deadline indication
RSVP	Répondez S'il Vous Plaît (French)	Please reply (for invites)
Re:	Regarding	Used in subject lines
FW:	Forward	Indicates a forwarded message
CC	Carbon Copy	Sending email copy to others
BCC	Blind Carbon Copy	Sends copy secretly to others

Common Emoticons (ASCII Text Faces)

Emoticon	Meaning
:-) or :)	Smile / Happy
:-D	Big smile
:-(or :(	Sad
;-)	Wink
:-O	Shock / Surprise
:-P	Playful / Tongue out
:-/	Confused / Uneasy
:'-)	Happy tears
`:-	`
<3	Heart / Love
:-@	Angry
:-X	Lips sealed / Secret
^_^	Cheerful
-_-	Tired / Not impressed

Chat

- Chat is a form of real-time text communication between two or more people over the Internet or a local network using digital devices.
- Chat allows people to talk by typing messages and sending them instantly to each other using chat apps or websites.

Type	Description	Example
One-to-One Chat	Private conversation between two people	WhatsApp, Messenger
Group Chat	Conversation among multiple users	Telegram Groups, Teams
Live Chat (Customer Support)	Website-based support messaging	Amazon Help Chat
Chat Rooms	Open forums where users discuss topics	Discord, Reddit chat

Common Chat Applications

- WhatsApp
- Telegram
- Facebook Messenger
- Google Chat
- Microsoft Teams
- Slack
- Discord
- Instagram DM

Features of Chat

- Instant Messaging – Send and receive messages in real-time
- Typing Indicators – Shows when the other person is typing
- Read Receipts – Shows if the message has been seen
- Emojis and Emoticons – Add expression to messages
- File Sharing – Send images, videos, PDFs
- Voice & Video Calls – Many chat apps also support calling
- Group Chats – Talk to many people at once
- Stickers, GIFs, and Reactions – Fun ways to interact

Uses of Chat

- Personal communication with friends & family
- Team collaboration at workplaces
- Customer support on websites
- Online classes or study groups
- Gaming or social communities

Video Conferencing

- What is Video Conferencing?
- Video conferencing is a live, face-to-face communication between two or more people using audio and video over the Internet, no matter where they are in the world.
- Video conferencing lets people see and talk to each other in real-time, using a computer or mobile device with a camera and microphone.

Popular Video Conferencing Platforms

- Zoom
- Google Meet
- Microsoft Teams
- Cisco Webex
- Skype
- JioMeet (India)

Basic Requirements for Video Conferencing

- Device – Smartphone, tablet, laptop, or desktop
- Webcam – For video (built-in or external)
- Microphone & Speaker/Headphones – For audio
- Stable Internet Connection – For smooth communication
- Video Conferencing App – Zoom, Meet, etc.

Key Features - Video Conferencing

- Video & Audio Chat – Talk and see others in real-time
- Screen Sharing – Show your screen to others
- Chat Box – Type messages while in a video call
- Recording – Record the meeting for later use
- Raise Hand / Reactions – Non-verbal participation
- Virtual Background – Hide your real background
- Waiting Room & Passwords – For security

Uses of Video Conferencing

Field	Use
Education	Online classes, webinars
Business	Remote meetings, client calls
Healthcare	Telemedicine, online consultation
Government	Virtual conferences, official reviews
Personal	Family calls, social meetups

Advantages

- Saves time and travel cost
- Connects people globally
- Useful for remote work and distance learning

e-Learning

- e-Learning (Electronic Learning) means learning through digital devices like computers, tablets, or smartphones using the Internet.
- e-Learning allows students and teachers to learn and teach anytime, anywhere through online platforms, videos, quizzes, and interactive content.
- Examples of e-Learning Platforms
  - Google Classroom
  - BYJU'S
  - Khan Academy
  - Coursera
  - Udemy
  - SWAYAM (India)
  - edX

Types of e-Learning

Type	Description
Synchronous	Real-time learning with live classes (Zoom, Google Meet)
Asynchronous	Learn anytime with pre-recorded videos and notes
Blended Learning	Mix of online and face-to-face teaching

Key Features of e-Learning

- **Online Classes** – Live or recorded lectures
- **Interactive Quizzes** – Instant feedback on understanding
- **Assignments & Tests** – Submit work online
- **Discussion Forums** – Ask questions and share ideas
- **Certificates** – Proof of course completion

Benefits of e-Learning

- Learn at your own pace
- Available 24x7
- Saves time and travel
- Access from anywhere
- Multimedia (videos, animations) makes learning fun and engaging

Requirements for e-Learning

- **Device** – Smartphone, tablet, laptop
- **Internet Connection** – For accessing online content
- **Learning Platform or App** – Google Classroom, Zoom, etc.
- **Headphones and Mic** – For better sound and interaction

e-Shopping (Online Shopping)

- e-Shopping or online shopping means buying products or services using the Internet from websites or mobile apps.
- You can order things like clothes, mobiles, books, food, etc., from home using your phone or computer.
- Popular e-Shopping Websites / Apps
  - Amazon
  - Flipkart
  - Snapdeal
  - Myntra
  - Ajio
  - Meesho
  - BigBasket / Grofers (Blinkit) – for groceries

e-shopping

- Steps in e-Shopping
  - Browse products on the website or app
  - Add to Cart – Select what you want to buy
  - Checkout – Enter address and contact info
  - Payment – Choose Cash on Delivery (COD), UPI, Card, Wallet
  - Delivery – Product is shipped to your doorstep
- Benefits of e-Shopping
  - Shop from home anytime (24x7)
  - Compare prices and read reviews
  - Discounts & Offers
  - Wide range of products
  - Easy returns & replacements

e-shopping

- Drawbacks
  - Cannot physically check the product
  - Delivery delays sometimes
  - Risk of fraud or fake products on unknown sites
- Types of Products You Can Buy
  - Electronics (Mobiles, Laptops)
  - Clothes & Accessories
  - Books, Stationery
  - Groceries & Medicines
  - Furniture & Home Appliances

e-Reservation (Electronic Reservation)

- e-Reservation means booking tickets or services through the Internet using a computer or mobile phone.
- You can book train, bus, flight, hotel, or movie tickets online without standing in a queue.
- Examples of e-Reservation Systems
  - IRCTC – Indian Railway ticket booking
  - RedBus – Bus ticket booking
  - MakeMyTrip, Yatra, Goibibo – Train, Bus, Flight, Hotel booking
  - BookMyShow – Movie and event ticket booking
  - Uber, Ola – Cab booking

e-Reservation (Electronic Reservation)

- Steps in e-Reservation
  - Visit the website or app
  - Search for required service (train/flight/hotel)
  - Select date, time, destination
  - Enter personal details (name, age, ID proof)
  - Make payment using UPI, card, net banking, etc.
  - Get e-Ticket via SMS or email
- Where e-Reservation is used
  - 🚆 Railway ticket booking (IRCTC)
  - 🚌 Bus reservation (RedBus)
  - ✈️ Flight tickets (IndiGo, SpiceJet, etc.)
  - 🛏️ Hotels and rooms (Oyo, Agoda)
  - 🎬 Cinema and events (BookMyShow)

e-Reservation

- Advantages of e-Reservation
  - 24x7 booking from anywhere
  - Instant confirmation
  - Avoid standing in lines
  - Compare multiple options and prices
  - Paperless ticketing (eco-friendly)
- Disadvantages
  - Requires Internet access
  - Digital payment issues sometimes
  - Risk of fraud on unknown/unofficial sites

Social Networking

- Social networking means using websites or apps to connect with friends, family, or people with similar interests, to share ideas, photos, videos, and messages.
- It's an online platform where people talk, share, and stay connected.
- Examples of Social Networking Sites
  - Facebook – Sharing updates, photos, groups, pages
  - Instagram – Photo/video sharing, reels, stories
  - Twitter (X) – Short messages (tweets), news, trends
  - LinkedIn – Professional networking, job search
  - Snapchat – Chat and share photos/videos
  - WhatsApp – Messaging, calling, groups (now considered social messaging)

Social Networking

- Key Features
  - Profiles: Create personal profile with photo and bio
  - Posts & Stories: Share text, images, videos
  - Messaging: Chat privately or in groups
  - Friend/Follow System: Connect with others
  - Notifications: Get alerts for updates and reactions
  - Live Streaming: Share live videos
- Benefits of Social Networking
  - Stay connected with friends and family
  - Discover news, trends, and events
  - Build professional connections (e.g., LinkedIn)
  - Promote business, products, or personal brand
  - Collaborate and communicate quickly

Social Networking

- Risks / Disadvantages
  - Privacy concerns
  - Cyberbullying and online harassment
  - Fake news and misinformation
  - Addiction and time-wasting
  - Data theft or hacking risks
- Uses in Education & Work
  - Study groups on Facebook or WhatsApp
  - Sharing educational content via Instagram/YouTube
  - Job networking via LinkedIn
  - Conducting surveys, polls, and discussions

Emerging Technologies

- IoT stands for Internet of Things – a network of everyday devices connected to the internet that can collect, send, and receive data.
- IoT means smart devices talking to each other and working automatically using the internet.
- Examples of IoT Devices
  - Smart Bulbs – Turn on/off using phone
  - Smart TVs – Watch YouTube, Netflix online
  - Smart Watches – Track steps, heart rate
  - Smart Refrigerators – Send alerts for expiry
  - Smart Door Locks – Control from anywhere
  - Smart Thermostats – Auto-adjust temperature
  - Voice Assistants – Alexa, Google Home

How IoT Works?

- Device with sensor collects data
- Connects to internet via Wi-Fi, Bluetooth, or SIM
- Sends data to cloud/server
- App or software processes the data
- User monitors/controls device remotely
- Common Technologies in IoT
  - Sensors
  - Wi-Fi / Bluetooth / 5G
  - Cloud computing
  - Mobile apps
  - Artificial Intelligence (AI)

Applications of IoT

- Smart Homes – Lights, fans, AC, cameras
- Healthcare – Smart watches, health monitors
- Agriculture – Soil sensors, smart irrigation
- Industry (IIoT) – Machine monitoring, automation
- Transport – Smart traffic, GPS tracking
- Cities – Smart street lights, waste bins

IoT

- Advantages
  - Automation & convenience
  - Real-time monitoring
  - Saves energy & time
  - Improves safety
- Challenges
  - Internet required always
  - Cybersecurity risks
  - Cost of setup
  - Device compatibility issues

AI (Artificial Intelligence)

- Artificial Intelligence (AI) means the ability of a computer or machine to think, learn, and make decisions like a human.
- AI is making machines smart!
- Examples of AI
  - Google Assistant / Siri / Alexa – Answer your questions
  - ChatGPT – Answers and generates content
  - Self-driving Cars – Drive using sensors and AI
  - Face Recognition – Unlock phones, security
  - Email Spam Filter – Removes unwanted emails
- Types of AI
  - Narrow AI – Performs one task (e.g., Google Maps, Alexa)
  - General AI – Human-level thinking (still in research)
  - Super AI – Beyond human (future concept)

ML (Machine Learning)

- Machine Learning (ML) is a branch of AI where machines learn from data and improve automatically without being programmed again.
- ML is teaching a machine how to learn from experience.
- Examples of ML
  - YouTube / Netflix Recommendations – Suggests what to watch
  - Online Shopping – Suggests products
  - Spam Detection – Learns from spam data
  - Credit Card Fraud Detection – Learns patterns of fraud
- How ML Works?
  - Collect data
  - Train the machine with algorithms
  - Test the model
  - Make predictions or decisions

AI & ML

- Applications
  - Smart Assistants (Alexa, Siri)
  - Healthcare – Disease prediction
  - Education – Smart tutoring systems
  - Banking – Fraud detection, loan approvals
  - Agriculture – Crop prediction
  - Industry – Robotics, automation
- Benefits
  - Faster decision making
  - Increased accuracy
  - Saves time and cost
  - Works 24x7
- Challenges
  - Requires huge data
  - Risk of job automation
  - Privacy and security issues
  - Ethical concerns

☞ Drone Technology

- A drone is an unmanned aerial vehicle (UAV) — meaning it can fly without a human pilot onboard. It is usually controlled remotely using a controller, smartphone, or computer.
- A drone is a flying robot that can be operated remotely or fly on its own.
- Basic Parts of a Drone
  - ✈ Propellers – Help the drone fly
  - 🔋 Battery – Powers the drone
  - 📷 Camera (optional) – For photos/videos
  - 📡 GPS/Controller – For navigation and control
  - ⚙ Sensors – To detect objects, height, etc.

Applications of Drone Technology

📌 Area	🚁 Drone Use
📸 Photography	Aerial photos and videos
🚜 Agriculture	Crop monitoring, pesticide spraying
🚚 Delivery	Delivering packages, medicines
🛡️❓ Defense	Surveillance, spying, bomb detection
🚨 Disaster Management	Rescue operations, flood/fire monitoring
🏗️❓ Infrastructure	Bridge and building inspection
🌾 Forest & Wildlife	Monitoring animals and poachers
🎥 Film Industry	Cinematic shots from above

Drones

- Types of Drones
  - Recreational Drones – For fun, hobby flying
  - Commercial Drones – Used for photography, delivery, etc.
  - Military Drones – Used by defense forces
- Advantages of Drones
  - Access hard-to-reach areas
  - Fast and cost-effective
  - Real-time video and images
  - Reduce human risk in dangerous tasks
- Challenges of Drone Use
  - Privacy concerns
  - Flying restrictions (need permission in many areas)
  - Limited battery life
  - Risk of accidents if not handled properly

Future of Drone Technology

- Autonomous drones with AI
- Drone taxis and air delivery
- Smart farming with drone swarms
- Surveillance and disaster control using live sensors

3-D Printing

- 3-D Printing (Three-Dimensional Printing) is a modern technology that creates real, physical objects from a digital file by adding material layer by layer.
- 🔧 It is also called Additive Manufacturing because it adds material to build the final shape.
- How Does It Work?
  - Design: A digital 3D model is made using CAD (Computer-Aided Design) software.
  - Slicing: The model is sliced into thin layers by software.
  - Printing: The 3D printer adds material (like plastic, metal, resin) layer by layer until the full object is created.
  - Digital file → Printer → Real Object

Materials Used in 3D Printing

- Plastic (PLA, ABS) – most common
- Metal (Steel, Titanium) – for industry
- Resin – for medical/dental use
- Chocolate & food paste – for food printing
- Biomaterials – for tissue or organ research

Applications of 3-D Printing

Area	Use of 3-D Printing
Industry	Machine parts, tools
Healthcare	Prosthetics, dental models
Architecture	Model houses, structures
Automotive	Car parts, prototypes
Education	Teaching models and experiments
Food	Custom cakes, chocolates
Fashion	Customized jewellery, shoes

3-D Printing

- Advantages
  - Fast prototyping
  - Custom designs possible
  - Less material waste
  - Low-cost models for testing
  - Supports innovation
- Challenges
  - Expensive printers (for large-scale)
  - Limited material choices
  - Slower for mass production
  - Legal issues (e.g., printing weapons)
- Future of 3-D Printing
  - Printing human organs for transplants
  - 3D-printed houses and bridges
  - Food printing for space and disaster zones
  - Personal home 3D printers for daily use

Blockchain Technology

- Blockchain is a digital ledger or record book that stores data in a chain of blocks.
- Each block contains information (like transactions), and once added, it cannot be changed or deleted.
- It's decentralized, transparent, and secure.
- How Does It Work?
  - A Transaction happens (e.g., sending money).
  - The transaction is verified by computers (nodes) in the network.
  - Once verified, it is added to a block.
  - That block is added to the chain in a secure way.
  - Block → 🔗 Chain → 🕮 Permanent Record

Key Features of Blockchain

Feature	Meaning
🔐 **Secure**	Uses cryptography to protect data
🌐 **Decentralized**	No central control (like banks or companies)
📊 **Transparent**	Anyone can view the public ledger
❓ **Immutable**	Data, once written, cannot be changed
⛓️ **Distributed**	Shared across multiple computers/nodes

Real-Life Applications : Blockchain

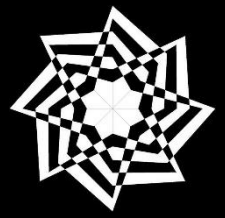
Area	Use
Finance	Cryptocurrencies (e.g., Bitcoin, Ethereum)
Supply Chain	Tracking goods and materials
Healthcare	Secure patient records
Voting	Transparent and secure online voting
Government	Land records, ID systems
Education	Secure certificates and degrees

Popular Terms : Blockchain

- Bitcoin – The first cryptocurrency using blockchain
- Ethereum – A blockchain for smart contracts
- Smart Contract – A self-running program on blockchain
- Node – A computer in the blockchain network
- Mining – Solving puzzles to verify and add blocks

Blockchain

- Advantages
  - High security
  - No middlemen needed
  - Quick and cheap transactions
  - Trustworthy system
- Limitations
  - ⚠ Energy usage (especially in mining)
  - ⚠ Still new and complex for many
  - ⚠ Scalability issues (slow when too many users)
  - ⚠ Legal and regulation uncertainty
- Future of Blockchain
  - Digital identity systems
  - Blockchain in education, banking, insurance
  - Interoperable blockchains (one chain talking to another)



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