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الحقيبة التعليمية لمادة

تطبيقات الانترنيت Internet Applications

الصف الثاني

م . د. ماجد جاسب عبدالله

الفصل الدراسي الاول

وصف الحقيبة التعليمية

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Computer

A computer is an electronic device wherein we need to input raw data to be processed with a set of programs to produce a desirable output. Computers have the ability to store, process, and manipulate data. The term “computer” is derived from the Latin word “computare,” which means “to calculate.” A computer is made to run programs and apps by using both hardware and software. It also has a memory to store data, programs, and what they produce. The Full Form of Computer is “Common Operating Machine Purposely Used for Technological and Educational Research.”

A computer is an electronic device that can process and store data and information. It can perform calculations, manipulate data, and execute instructions to accomplish specific tasks.

History of the computer

The **first digital computer** and what most people think of as a computer was called the ENIAC (Electronic Numerical Integrator and Computer). It was built during World War II (1943-1946) and was designed to help automate the calculations being done by human computers. By doing these calculations on a computer, they could achieve results much faster and with fewer errors.

Components of a Computer

Following are the different components of a computer

- **Central Processing Unit (CPU) :** The CPU is the brain of the computer. All the important decisions and manipulations are carried out by the CPU. CPU is further divided into the Arithmetic Logic Unit(ALU) and the Control Unit(CU).
- **Motherboard:** The motherboard is the main circuit that connects all the components of a computer.
- **Memory:** The RAM(Random Access Memory) is used for quick access of data.
- **Storage:** The storage components include Hard Disk Drives(HDD) and the Solid State drives(SDD). They are used for storing data for the long term.
- **Input devices:** The various devices via which we can input data into the computer from the user are called input devices. Examples of input devices include keyboard, mouse, scanners.
- **Output devices:** Output devices are the devices via which the computer gives out the output to the users. Examples of output devices include printers and speakers.

Concepts Related to Computers

Some related concepts that can help in understanding computers include:

- **Binary code:** Computers communicate and process information using a binary code, which is a system of ones and zeroes. Each binary digit (or bit) represents a simple “on” or “off” state, and combinations of bits can represent more complex information.
- **Algorithms:** An algorithm is a set of instructions or steps that a computer program follows to solve a problem or complete a task. Algorithms are used to perform a wide range of tasks, from sorting data to searching for patterns.
- **Programming languages:** Programming languages are used to write computer programs. There are many different programming languages, each with its own syntax and set of rules.
- **Hardware vs. software:** Hardware refers to the physical components of a computer, such as the CPU, memory, and storage devices. Software, on the other hand, refers to the programs and instructions that tell the hardware what to do.

- **Networks:** Computers can be connected together in networks, which allows them to communicate and share resources. Networks can be wired or wireless and can be used for tasks such as sharing files, accessing the internet, or playing multiplayer games.
- **User interfaces:** User interfaces are the means by which humans interact with computers. They can be graphical, such as a desktop or mobile operating system, or text-based, such as a command line interface.

Types of Computers

There are different types of computers based on different parameters. Following are different categories.

1. Types of Computers Based on Size

- **Microcomputers:** Microcomputers are meant for individual use. They are small, compact and very mini. For example smartphones and desktops.
- **Minicomputers:** They are used in businesses that are mid sized and are more powerful than microcomputers. Servers are an example of minicomputers.
- **Mainframe computers:** These are used by large organizations. They help in processing of bulk data.
- **Supercomputers:** These are extremely powerful computers that help in carrying out complex calculations. They aren't for meant for personal use and are often used for research purpose.

2. Types of Computers Based on Processing Power

- **Personal computers (PCs):** These are the most common type of computer and are designed for personal use. PCs include desktops, laptops, and tablets.
- **Servers:** Servers are designed to manage and distribute resources and data to multiple users or devices. They are often used in businesses or organizations to store and share data and run applications.
- **Mainframes**: Mainframe computers are large, powerful machines that are designed to handle massive amounts of data and perform complex operations. They are often used in large corporations or government agencies.
- **Supercomputers:** Supercomputers are extremely powerful computers that are designed to process data at extremely high speeds. They are often used for scientific research and other specialized applications.
- **Embedded systems:** Embedded systems are small computers that are built into other devices, such as appliances, cars, and medical devices. They are designed to perform specific functions and operate without human intervention.
- **Wearable computers:** Wearable computers are small, portable devices that are worn on the body, such as smartwatches or fitness trackers. They are designed to track data and provide information on the go.

3. Types of Computers Based on Functionality

- **Analog computers:** In analog computers data is stored using continuous physical quantities. Mechanical integrator is an example of analog computer.
- **Digital computers:** These are the most common types of computers found in the market today. Data is processed in digital computers using discrete values. Smartphone is a common example of digital computers.
- **Hybrid computers:** These are a combination of both analog and digital computers. Examples include complex medical equipment.

There are various types of computers that are used today based on the need of user. Some of the types are:

- **Desktop:** Desktops are mainly used for regular use and they have separate components mounted together like the monitor, keyboard, mouse, CPU etc. Since the system is primarily kept on a desk for better usability it is called as desktops. They have powerful processors in them which accounts for a wide variety of tasks that they are capable of doing.
- **Laptop:** Laptops are a portable version of the desktops, with all the components integrated in a single unit thus providing mobility to the system. They are great for on the go work and come with built-in eb cams, Bluetooth and Wi-Fi.
- **Servers:** Servers are special types of computers that are used to manage network resources. They provide services to other systems and computers. Some of the primary tasks of servers include creating databases, hosting and proving support to other applications. They are backed up by multiple processors and high capacity storage.
- **Tablets:** Tablets are even portal than laptops. They are smaller than laptops but are larger in size than smartphones. They come with touchscreens with makes it perfect for browsing the web, consuming content and personal communications.
- **Other devices:** Other devices include smartphones, game console, Smart TV's etc.

Advantages of Computers

- **Increased efficiency and productivity:** Computers can perform tasks much faster and more accurately than humans, allowing for increased efficiency and productivity in various industries.
- **Storage and organization of information:** Computers can store large amounts of data and organize it in a way that is easily accessible and searchable.
- **Improved communication:** Computers enable people to communicate easily and instantly with others, regardless of their location.
- **Access to information and resources:** The internet provides access to a vast amount of information and resources that would otherwise be difficult or impossible to obtain.
- **Automation of repetitive tasks:** Computers can automate repetitive and mundane tasks, freeing up time and resources for more important work.

Disadvantages of Computers

- **Dependence on technology:** Over-reliance on computers can lead to problems if they break down or malfunction, leading to loss of productivity and data.
- **Security risks:** Computers can be vulnerable to viruses, malware, and hacking, leading to data breaches and other security risks.
- **Social isolation:** The overuse of computers can lead to social isolation and reduced face-to-face interaction, leading to social and emotional problems.
- **Environmental impact:** The production and disposal of computers can have a negative impact on the environment due to the use of resources and the creation of electronic waste.
- **Job displacement:** Automation and the use of computers can lead to job displacement in certain industries, requiring workers to adapt to new skill sets or find new employment.

Components of a Computer

A computer mainly has two components i.e. hardware and software wherein the components of the computers having a physical structure such as wires, transistors, circuits, and hard disk make up the hardware whereas the programs and data make up the software. Some other important components of a Computer are discussed below.

CPU The CPU (Central Processing Unit) is the brain of a computer, executing instructions and performing calculations to run software and process data for overall system functionality.

Computer Memory Computer memory stores data for the computer to use. RAM (Random Access Memory) is for temporary storage, and storage devices like hard drives store data permanently.

Arithmetic Logic UnitThe Arithmetic Logic Unit (ALU) in a computer performs mathematical and logical operations, like addition and comparison, enabling the CPU to execute tasks and make decisions.

Motherboard The motherboard is a computer's main circuit board, connecting and facilitating communication between components like CPU, RAM, and Peripherals. It provides the foundation for the system to foundation for the system to function.

The motherboard acts as the central hub connecting all the computer's components. It houses the CPU, memory modules, expansion slots, and connectors, facilitating communication and data transfer between different parts of the system.

Functionality of a Computer

Computers possess remarkable versatility and can perform a multitude of tasks. Some basic Functionalities and uses of a Computer are discussed below.

Data Processing: Computers excel at processing vast amounts of data quickly and accurately. They can manipulate numbers, perform complex calculations, analyze patterns, and generate reports.

Information Storage: With their vast storage capacities, computers can store massive amounts of information, from personal files to entire databases. They enable quick retrieval and organization of data for efficient access and analysis.

Communication: Computers facilitate seamless communication through various means, such as email, instant messaging, video conferencing, and social media. They enable global connectivity and information sharing on an unprecedented scale.

Multimedia and Entertainment: Computers serve as multimedia powerhouses, allowing users to watch movies, listen to music, view images, play games, and edit videos. They provide immersive experiences and entertainment options for users of all ages

Finally, a computer is a remarkable electronic device that processes data, performs calculations, and executes tasks based on programmed instructions. It comprises various components working together to facilitate the input, processing, and output of information. From their ability to process data at incredible speeds to their role in communication, entertainment, and information storage, computers have revolutionized every aspect of our lives. The Computer was invented by Charles Babbage. So he is known as the father of computers.

What are the different types of input devices?

The device through which we enter data and program into the computer is called the input device. There are many types of input devices. Some input devices (keyboard, mouse, etc)are used directly to enter data and some input devices(scanner, microphone etc) are used indirectly to enter data.

Different Types of Input Devices

- **Keyboard:** The most commonly found input device is the keyboard. Everyone would have already seen and used a keyboard. It is the device used to enter text.
- **Mouse:** This is another most familiar input device, the mouse. It is a pointing device that controls the cursor.
- **Joystick:** This is the joystick you would have found this control device in kids play zones for controlling video games.
- **Light Pen:** The light is a light sensitive pointing device. It was used for the older CRT monitors to highlight the text on the screen.
- **Track Ball:** The trackball is similar to a mouse instead of moving the whole device. You simply roll the moveable ball on top of the trackball. Track ball is rarely used in place of a mouse.
- **Scanner:** This is again a familiar input device, the scanner. It scans or captures images for computer editing.
- **Passport Scanner:** The passport scanner is another input device. This scanner is designed for quick scanning of passports, id cards, resident permits, and driving licences. You can find these scanners in airports, security ports,international hotel check-ins etc.
- **Pen Scanner:** Pen scanners are designed to enter printed text from magazines, newspapers, letters etc into the computer screen. Slide the pen over any text and in less than a second, it appears on your screen. The pen scanners are particularly

useful for reading large numbers on forms, entering small text portions in Word processors where manual entering would make mistakes.

- **Barcode Reader:** This is the device which has become an essential requirement of every shopping mall. The barcode reader can read printed barcodes, decode the data contained in the barcode and send the data to a computer.
- **OMR Reader:** OMR stands for optical mark recognition. For instance, the OMR sheets could be used for answering multiple-choice questions in exams. The OMR scanner then reads pencil or pen marks in OMR sheets. The evaluation of answers is made instantaneous with an OMR reader.
- **Webcam:** Webcams have become very popular. It is found in almost every home these days. The webcams can be used for recording videos and also during a live video on the Internet.
- **Graphics Tablet:** A graphics tablet allows users to hand-draw images with a special pen-like stylus. The image is then displayed on the computer monitor.

What are Different Output Devices?

1. Monitor:

A computer's principal output device is a monitor, often known as a visual display unit (VDU). It displays the processed data like text, images, videos, audios, etc. It makes images by arranging microscopic dots in a rectangular pattern, known as pixels. The sharpness of an image is determined by the number of pixels

2. Printer

Printers are information output devices that allow you to print data on paper. Or in other words, it is an output device that creates a hard copy of the processed data or information. Printers are divided into two categories:

- **Impact Printer:**
- **Non-Impact Printers**

3. Plotter

A plotter is a device that prints high-quality graphics in a variety of color formats. It works in a similar way to a printer, although it has more advanced features. It is used to print large maps, architectural drawings, large-format printing, and create pictures, 3D postcards, advertising signs, charts, and various designs of the internal structure of building machines, as well as create pictures, 3D postcards, advertising signs, charts, and various designs of the internal structure of building machines.

4. Projector

A projector is a device that allows users to project their output onto a large area, such as a screen or a wall. It can be used to project the output of a computer and other devices onto a screen. It magnifies texts, photos, and movies using light and lenses. As a result, it's an excellent output device for giving presentations or teaching big groups of people.

5. Speakers

Speakers are connected to computers to allow sound to be output. For the working of speakers, sound cards are required. From simple two-speaker output devices to surround-sound multi-channel sets, speakers come in a variety of shapes and sizes. They take audio input from the computer's sound card and output sound waves as audio output.

6. Headphones

To hear the sound, use earbuds with your computer, laptop, or smartphone. It enables you to hear the sound without causing any inconvenience to others. To translate electronic

signals into sounds without causing inconvenience to others. They can be wired or wireless and can be connected to computers, laptops, mobile phones, etc. They are connected with the devices via Bluetooth.

7. Sound Card

Sound cards are computer output devices that are inserted into the computer. A sound card, either external or internal, is required to produce sound on any computer (built-in). An external sound card enables for better overall sound generation and is required for wide and clear sound recording, as well as sound without noise and interference.

8. Video Card

An extension card via which a computer can transfer graphical data to a video display device like a TV, or monitor. It processes photos and video, as well as other functions that the CPU generally does. As they have a good processing capability and video RAM, Gamers utilize video cards.

9. Speech Synthesizer

A speech synthesizer is a computerized device that takes in data, interprets it, and generates audible words. It might be a computer card, a box connected by a cable, or software that works with the computer's sound card.

10. GPS

The Global Positioning System (GPS) is a radio-based satellite navigation system that uses radio signals to pinpoint a specific position. The sender sends a radio signal to satellites, which collect data such as time, location, speed, and other variables and deliver it to the reception computer for analysis. Because this processed data can be evaluated to obtain information, it is considered as an output device.

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What is computer networking?

Networking, or computer networking, is the process of connecting two or more computing devices, such as desktop computers, mobile devices, routers or applications, to enable the transmission and exchange of information and resources.

Networked devices rely on communications protocols—rules that describe how to transmit or exchange data across a network—to share information over physical or wireless connections.

A computer network is a system that connects many independent computers to share information (data) and resources. The integration of computers and other different devices allows users to communicate more easily.

Before contemporary networking practices, engineers would have to physically move computers to share data between devices, which was an unpleasant task at a time when computers were large and unwieldy. To simplify the process (especially for government workers), the Department of Defense funded the creation of the first functioning computer network (eventually named ARPANET) in the late 1960s.

Since then, networking practices—and the computer systems that drive them—have evolved tremendously. Today's computer networks facilitate large-scale inter-device communication for every business, entertainment and research purpose.

Before we delve into more complex networking topics, it's important to understand fundamental networking components, including:

- **IP address:** An IP address is the unique number assigned to every network device in an Internet Protocol (IP) network; each IP address identifies the device's host network and its location on the network
- **Nodes:** A node is a network connection point that can receive, send, create or store data.

Types of computer networks

Here, we'll discuss the most common and widely used computer network types in three broad categories.

Network types by geographical area

The network types in this category are distinguished by the geographical area the network covers.

Local area network (LAN)

A LAN connects computers over a relatively short distance, such as those within an office building, school or hospital. LANs are typically privately owned and managed.

Wide area network (WAN)

As the name implies, a WAN connects computers across large geographical areas, such as regions and continents

Metropolitan area network (MAN)

MANs are larger than LANs but smaller than WANs. Cities and government entities typically own and manage MANs.

Personal area network (PAN)

A PAN serves one person. If a user has multiple devices from the same manufacturer (an iPhone and a MacBook, for instance), it's likely they've set up a PAN that shares and syncs content—text messages, emails, photos and more—across devices.

Network types by transmission medium

Network nodes can send and receive messages using either wired or wireless links (connections).

Wired networks

Wired network devices are connected by physical wires and cables, including copper wires and Ethernet, twisted pair, coaxial or fiber optic cables.

Wireless networks

Wireless networks forgo cables for infrared, radio or electromagnetic wave transmission across wireless devices with built-in antennae and sensors.

Network types by communication type

Computing networks can transmit data using a range of transmission dynamics, including:

Multipoint networks

In a multipoint network, multiple devices share channel capacity and network links.

Point-to-point networks

Network devices establish a direct node-to-node link to transmit data.

Broadcast networks

On broadcast networks, several interested "parties" (devices) can receive one-way transmissions from a single sending device. Television stations are a great example of broadcast networks.

Virtual private networks (VPNs)

A VPN is a secure, point-to-point connection between two network endpoints. It establishes an encrypted channel that keeps a user's identity and access credentials, as well as any data transferred, inaccessible to hackers.

Network architectures

Computer network architecture establishes the theoretical framework of a computer network, including design principles and communications protocols.

Primary types of network architectures

- **Peer-to-peer (P2P) architectures:** In a P2P architecture, two or more computers are connected as "peers," meaning they have equal power and privileges on the network. A P2P network doesn't require a central server for coordination. Instead, each computer on the network acts as both a client (a computer that needs to access a service) and a server (a computer that provides services to clients). Every peer on the network makes some of its resources available to other network devices, sharing storage, memory, bandwidth and processing power across the network.

- **Client-server architectures:** In a client-server network, a central server (or group of servers) manages resources and delivers services to client devices on the network; clients in this architecture don't share their resources and only interact through the server. Client-server architectures are often called tiered architectures because of their multiple layers.
- **Hybrid architectures:** Hybrid architectures incorporate elements of both the P2P and client-server models.

Why use computer networks?

Computer networks provide numerous benefits, including:

Efficient data transfer

Networking enables every form of digital communication, including email, messaging, file sharing, video calls and streaming.

Without networking, organizations would have to store data in individual data repositories, which is unsustainable in the age of big data. Computer networks help teams keep centralized data stores that serve the entire network, freeing up valuable storage capacity for other tasks.

Streamlined knowledge sharing

Users, network administrators and developers alike stand to benefit from how networking simplifies resource and knowledge sharing

Stronger network security

Not only are well-built networking solutions more resilient, but they also offer businesses more options for cybersecurity and network security.

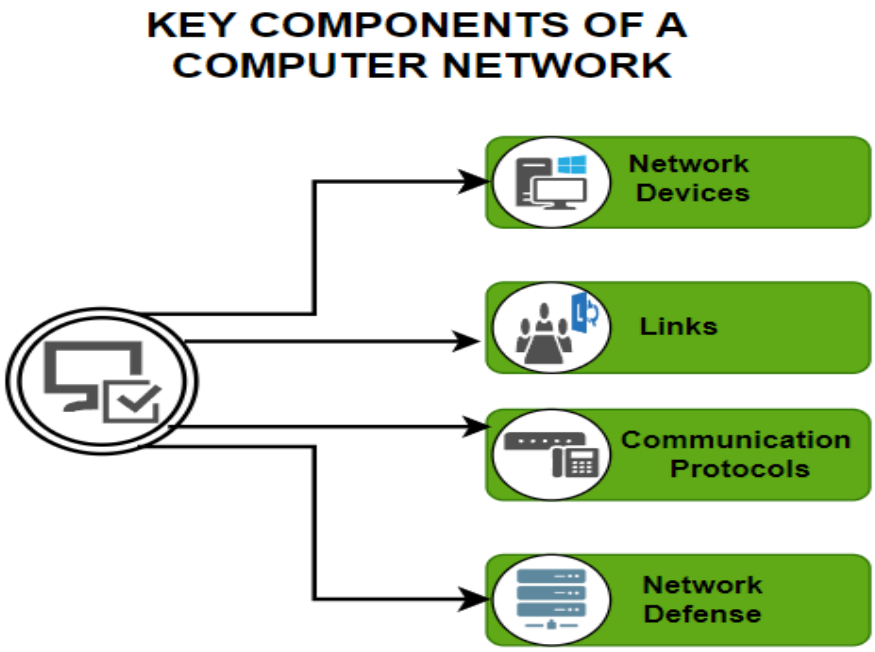
What Do Computer Networks Do?

Computer Networks are one of the important aspects of Computer Science. In the early days, it is used for data transmission on telephone lines and had a very limited use, but nowadays, it is used in a variety of places.
Computer Networks help in providing better connectivity that helps nowadays. Modern computer networks have the following functionality:

- Computer Networks help in operating virtually
- Computer Networks integrate on a large scale
- Computer Networks respond very quickly in case of conditions change
- Computer Networks help in providing data security

The Components of a Computer Network

In simple terms, a computer network is made up of two main parts: devices (called nodes) and connections (called links). The links connect the devices to each other. The rules for how these connections send information are called communication protocols. The starting and ending points of these communications are often called ports**.**



Key Components of Computer Network

1. Network Devices

Basic hardware interconnecting network nodes, such as Network Interface Cards (NICs), Bridges, Hubs, Switches, and Routers, are used in all networks. In addition, a mechanism for connecting these building parts is necessary, which is usually galvanic cable and optical cable are less popular (“optical fiber”)The following are the network devices :

- **NIC (Network Interface Card):** A network card, often known as a network adapter or NIC (network interface card), is computer hardware that enables computers to communicate via a network
- **Repeater:** A repeater is an electrical device that receives a signal, cleans it of unwanted noise, regenerates it, and retransmits it at a higher power level or to the opposite side of an obstruction, allowing the signal to travel greater distances without degradation.
- **Hub:** A hub is a device that joins together many twisted pairs or fiber optic Ethernet devices to give the illusion of a formation of a single network segment.

The device can be visualized as a multiport repeater. A network hub is a relatively simple broadcast device

- **Bridges:** Bridges broadcast data to all the ports but not to the one that received the transmission. Bridges, on the other hand, learn which MAC addresses are reachable through specific ports rather than copying messages to all ports as hubs do.
- **Switches:** A switch differs from a hub in that it only forwards frames to the ports that are participating in the communication, rather than all of the ports that are connected..
- **Routers:** Routers are networking devices that use headers and forwarding tables to find the optimal way to forward data packets between networks. A router is a computer networking device that links two or more computer networks and selectively exchanges data packets between them
- **Gateways:** To provide system compatibility, a gateway may contain devices such as protocol translators, impedance-matching devices, rate converters, fault isolators, or signal translators.

2. Links

Links are the ways information travels between devices, and they can be of two types:

- **Wired:** Communication done in a wired medium**.** Copper wire, twisted pair, or fiber optic cables are all options. A wired network employs wires to link devices to the Internet or another network, such as laptops or desktop PCs.
- **Wireless:** Wireless means without wire, media that is made up of electromagnetic waves (EM Waves) or infrared waves. Antennas or sensors will be present on all wireless devices. For data or voice communication, a wireless network uses radio frequency waves rather than wires.

3. Communication Protocols

A communication protocol is a set of rules that all devices follow when they share information. Some common protocols are TCP/IP, IEEE 802, Ethernet, wireless LAN, and cellular standards. TCP/IP is a model that organizes how communication works in modern networks. It has four functional layers for these communication links:

- **Network Access Layer**: This layer controls how data is physically transferred, including how hardware sends data through wires or fibers.
- **Internet Layer**: This layer packages data into understandable packets and ensures it can be sent and received.
- **Transport Layer**: This layer keeps the communication between devices steady and reliable.
- **Application Layer**: This layer allows high-level applications to access the network to start data transfer.

Most of the modern internet structure is based on the TCP/IP model, although the similar seven-layer OSI model still has a strong influence.

IEEE 802 is a group of standards for local area networks (LAN) and metropolitan area networks (MAN). The most well-known member of the IEEE 802 family is wireless LAN, commonly known as WLAN or Wi-Fi.

4. Network Defense

While nodes, links, and protocols are the building blocks of a network, a modern network also needs strong defenses. Security is crucial because huge amounts of data are constantly being created, moved, and processed.

How Does a Computer Network Work?

Computer Networks simply work using nodes and links. Data communication equipment is simply termed as Nodes. For example, Modems, Hubs, Switches, etc. whereas links in Computer networks can be referred to as a connection between two nodes. We have several types of links like cable wires, optical fibers, etc.
Whenever a Computer Network is working, nodes have the work of sending and receiving data via the links. Computer Network provides some set of protocols that help in following the rules and protocols.

Criteria of a Good Network

- **Performance:** It can be measured in many ways, including transmit time and response time. Transit time is the amount of time required for a message to travel from one device to another. Response time is the elapsed time between an inquiry and a response. The performance of the network depends on a number of factors, including the number of users, the type of medium & Hardware.
- **Reliability:** In addition to accuracy is measured by frequency of failure, the time it takes a link to recover from failure, and the network's robustness in catastrophe.
- **Security:** Network security issues include protecting data from unauthorized access, protecting data from damage and development, and implementing policies and procedures for recovery from breaches and data loss.

The Objectives of Creating and Deploying a Computer Network

No industry—whether it's education, retail, finance, tech, government, or healthcare—can function without well-designed computer networks. The larger the organization, the more complex the network becomes. Before starting the challenging job of creating and setting up a computer network, here are some key objectives to consider.

1. Resource Sharing

Today's enterprises are spread across the globe, with critical assets being shared across departments, geographies, and time zones. Clients are no more bound by location. A network allows data and hardware to be accessible to every pertinent user. This also helps with interdepartmental data processing. For example, the marketing team analyzes customer data and product development cycles to enable executive decisions at the top level.

2. Resource Availability & Reliability

A network ensures that resources are not stuck in isolated areas and can be accessed from multiple locations. High reliability comes from having various sources of supply. Important resources are backed up across multiple machines, so they remain accessible even if there are hardware problems.

3. Performance Management

As a company grows, its workload increases. Adding one or more processors to the network boosts the overall performance of the system and allows it to handle this growth. Storing data in well-designed databases can significantly speed up searching and retrieving information.

4.Cost Savings

Big mainframe computers are costly, so it's smarter to add processors strategically throughout the system. This boosts performance and saves money. Networks let

employees access information quickly, saving operational time and costs. Centralized network administration means fewer investments are needed for IT support**.**

5. Increased Storage Capacity

Network-attached storage devices are great for employees who handle lots of data. For instance, the data science team doesn't each need their own data storage for the large number of records they process. Centralized repositories are more efficient. As businesses deal with record amounts of customer data, the ability to expand storage capacity is crucial**.**

6. Streamlined Collaboration & Communication

Networks greatly influence how companies operate daily. Employees can share files, see each other's work, sync calendars, and exchange ideas more efficiently. Internal messaging systems like Slack facilitate easy flow of information and conversations within modern enterprises. However, emails remain the formal mode of communication with clients, partners, and vendors.

7. Reduction of Errors

Networks decrease errors by ensuring everyone gets information from one source, even if they're in different places. Backed-up data ensures consistency and continuity. Standard versions of customer and employee manuals can be easily accessed by many people without much trouble**.**

8. Secured Remote Access

Computer networks offer flexibility, which is crucial during uncertain times like now when natural disasters and pandemics are affecting the world. A secure network guarantees that users can access and work on sensitive data safely, even when they're not at the company's location. Mobile devices registered to the network can also provide multiple layers of authentication, ensuring that unauthorized users can't access the system.

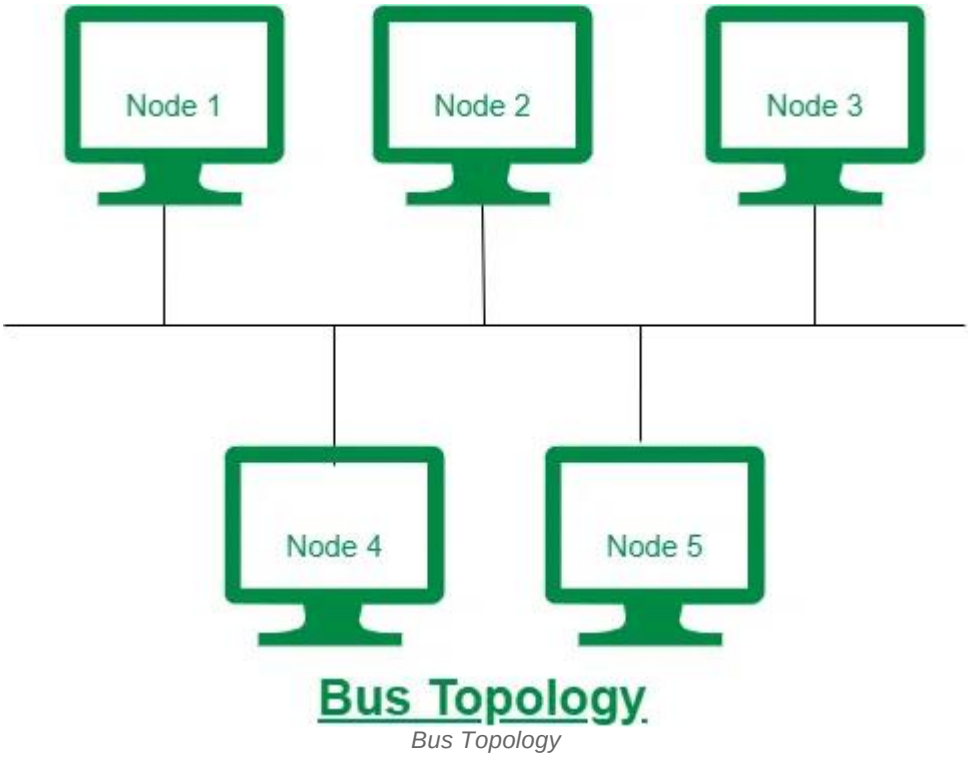
What is Network Topology?

The structure of the network and how each component is connected to the others are defined by the network topology. Different types of network topology are mentioned below:

•

Bus Topology

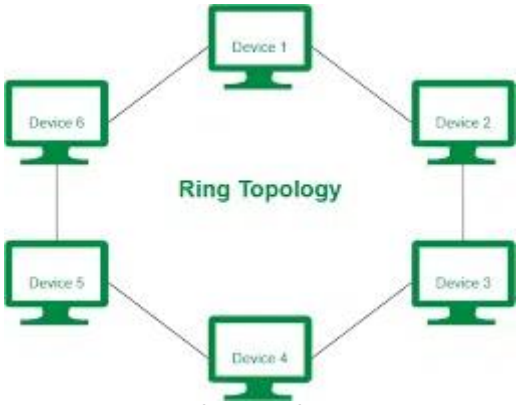
Every computer and network device is connected to a single cable in a bus topology network. Linear Bus topology is defined as having exactly two terminals.



Bus Topology

Ring Topology

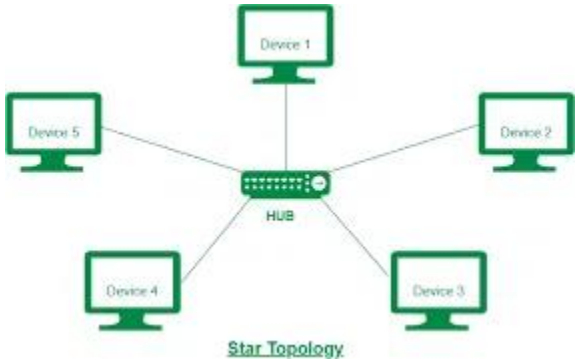
The topology is named ring topology because one computer is connected to another, with the final one being connected to the first. Exactly two neighbors for each device. A signal is passed along the ring in one direction. Each ring incorporates a repeater.



Ring Topology

Star Topology

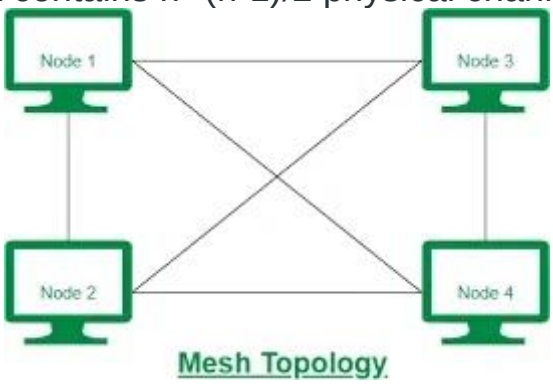
Each device in a star topology has a dedicated point-to-point link to a central controller, which is commonly referred to as the HUB. There is no direct connection between the devices. Traffic between the devices is not allowed in this topology. As an exchange, the controller is used.



Star Topology

Mesh Topology

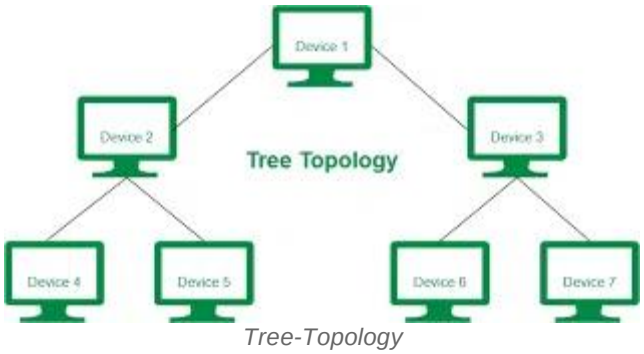
Every device in a mesh topology has dedicated point-to-point connectivity to every other device. The term “dedicated” refers to the fact that the link exclusively transports data between the two devices it links. To connect n devices, a fully connected mesh network contains n *(n-1)/2 physical channels.



Mesh Topology

Tree Topology

The topology of a tree is similar to that of a star. Nodes in a tree, like those in a star, are connected to a central hub that manages network traffic. It has a root node, which is connected to all other nodes, producing a hierarchy. Hierarchical topology is another name for it. The number of Star networks is connected via Bus in Tree Topology.



Tree-Topology

What is Internet?

The Internet is a larger network that allows computer networks controlled by enterprises, governments, colleges, and other organizations all over the world to communicate with one another. As a result, there is a tangle of cables, computers, data centers, routers, servers, repeaters, satellites, and Wi-Fi towers that allow digital data to go around the world.

The Internet is a vast network of networks that functions as a networking infrastructure. It links millions of computers throughout the world, creating a network in which any computer can talk with any other computer as long as they are both linked to the Internet. The Internet is a global network of interconnected computers that communicate and share information using a standardized Internet Protocol Suite.

How to Connect to the Internet?

We can connect to the internet in the following ways:

- **Dial-Up:** In order to access the Internet, in this type of connection, users must connect their phone line to a computer. This link prevents the user from using tier home phone service to make or receive calls.
- **Broadband:** Broadband is a high-speed internet connection that is frequently utilized nowadays and is provided by cable or phone companies.
- **Wireless Connections:** Internet access is accomplished by radio waves, thus it is possible to connect to the Internet from any location. Wi-Fi and mobile service providers are examples of wireless connections.

Advantages of the Internet

- **Source of Entertainment:** Online gaming, talking, browsing, music, movies, dramas, and TV series are quickly becoming the most popular ways to pass the time.
- **Source of Information:** There is no better place to conduct research than the internet. We can learn about the latest trends, communicate with experts without having to physically visit them, and seek professional advice over the Internet.
- **E-Commerce:** With the advancement of internet technology, large online E-commerce enterprises such as Amazon, Ali Baba, myntra, etc. have emerged.
- Working from home, collaborating with others, and having access to a global workforce are all advantages.
- **Keeps Updated:** Because there are hundreds of thousands of newsgroups and services that keep you updated with every tick of the clock, the Internet is a source of the most recent news.

Disadvantages of the Internet

- **Time Wastage:** Most people believe that spending too much time on the internet is unhealthy for young people and leads to obesity.
- **Money Laundering:** Aside from reputable sites, there are some Social Media Advertising sites that try to steal your personal information, credit card information, and even your pin code. You can easily become a victim of money scams if they get this information.
- **Exposure to Private Data:** It is now quite easy to decipher someone's chat or email communication thanks to the hacking community. As we all know, data is transmitted in packets, which hackers can simply detect and reconstruct.
- **Harassment & Threatening:** Bullies exist online, just as they do in real life, and they can lower your self-esteem by harassing and threatening you

Internet vs. intranet vs. extranet:

Internet, intranet, extranet — the words sound similar but these terms refer to very different types of networks.

These networks have very different security implications and business uses. So before you share essential company documents on any of them, it's important to know the difference.

Understanding how to use the internet, intranet, and extranet helps to keep your resources secure and in the right place.

What is an Intranet?

An intranet is a local, private network that only people within an organization can access. It's a restricted network mainly used to share files and information securely within an organization.

An intranet is a private network that is contained within an enterprise. It uses the same Internet Protocol (IP) standards and Transmission Control Protocol/Internet Protocol (TCP/IP) infrastructure as the public Internet, but its access is restricted to authorized users. An intranet can facilitate communication within an organization and share information and resources among employees.

What is the Internet?

The internet is a global collection of computer networks known as the World Wide Web. This network is accessible to anyone.

The Internet is a global network of computers that allows users to communicate with each other and access information from around the world. The Internet comprises millions of individual networks, each with its collection of computers and devices. Users can access the Internet from anywhere in the world using various devices, including personal computers, laptops, smartphones, and tablets. The Internet provides users with vast information and resources, including news, entertainment, education, businesses, and more.

What is the difference between the internet and intranet?

- The internet and the intranet are both online networks. Their core framework is provided by internet protocol and World Wide Web standards.
- The main difference between the intranet and the internet comes down to access.
- The internet is a global collection of computer networks. It's an open network, accessible to anyone with a device and an internet connection.
- In contrast, the intranet is a closed, online network, only accessible to company employees. Employees use some form of login to access the company intranet.

What is the Extranet?

As explained above, an intranet is a local network that only the employees of an organization get to access. And the internet is an open network that anyone can access.

Extranets fall somewhere in the middle. They allow for some connections outside of the company but, like intranets, they're not available to the public.

- Extranets are a way to give third-parties — including vendors, suppliers, partners, and customers — access to restricted information.

Why companies use extranet

An extranet is a platform via which you can share resources and collaborate with partners. So companies use extranets to give trusted customers, partners, and vendors access to sensitive information.

For example, if you have a customer who places regular orders with your business, they could use your secure extranet to update orders, process invoices, and message your team. It's a reliable way to streamline your interactions while keeping data secure.

what's the difference?

You may use the internet, intranet, and extranet for company comms and operations. But think carefully about which information you put on each of these networks.

- Use the internet when you want to share information with everyone.
- Use an extranet for collaboration with partners, customers, suppliers, and vendors.
- And use an intranet as your secure digital workspace. This is a platform where employees can access resources, connect with one another, and follow company news. And where your comms and HR teams can easily and efficiently give workers all the information and resources they need.

Key Differences between Intranet and Internet

Accessibility

One key difference between the internet and intranets is that while anyone can access resources on the Internet, an intranet requires authentication – meaning that only authorized users can access its resources. This makes an intranet more secure than the Internet, as it limits who can see and use its information.

Security

Also an intranet is secure while the Internet is not. When you access an intranet, you are behind a firewall that protects your data from being accessed by unauthorized people. The Internet does not have this type of security, which means that your data could be accessed by anyone who knows how to find it.

Purpose

The Internet is a global computer network that allows for information exchange between devices. An intranet is a private network that is only accessible to members of an organization. An intranet is internal and only accessible to members of an organization. In contrast, the Internet is external and can be accessed by anyone with an internet connection.

Scalability

Also an intranet can be rapidly scaled up or down to accommodate changes in organizational needs, whereas the Internet is designed to be scalable from the ground up. This means that it can continue to grow and support more users without major changes or additions to the infrastructure.

Functionality

Furthermore, Another difference between an intranet and the Internet is that an intranet is a closed network, while the Internet is an open network. An intranet can be used to share company information and resources among employees, but no one outside the company can access it. On the other hand, the Internet can be accessed by anyone with an Internet connection.

Internet in Organizations

The Internet has become an integral part of daily life for many people, and organizations are no exception. While the Internet is a public network that anyone can access, an intranet is a private network that is only accessible to members of an organization.

Use cases for Internet in organizations

There are many different ways that organizations can use the Internet. Some common uses include:

- Communicating with customers and clients: Organizations can use the Internet to communicate with their customers and clients. This can be done through email, social media, or websites.
- Research and development: Organizations can use the Internet for research and development purposes. This includes accessing online databases, conducting surveys, and using search engines to find information.
- Marketing and advertising: Organizations can use the Internet for marketing and advertising their products and services. This can be done through banner ads, pay-per-click advertising, or email marketing campaigns.
- Training and education: Organizations can use the Internet to provide training and education to their employees. This can be done through online courses, webinars, or eLearning platforms.

Businesses can use the Internet to reach a wide audience of potential customers at a relatively low cost. This makes it an attractive option for small businesses in particular. There are many ways to market a business online. The most effective approach will vary depending on the products or services offered, the target market, and available resources. Some of these ways include:

- Website: A well-designed website is essential for any business that wants to market itself online. The website should be easy to navigate, informative, and appealing to potential customers. It should also be optimized for search engines so potential customers can find the site when they conduct online searches.
- Social media platforms like Facebook, Twitter, and LinkedIn offer businesses powerful tools for reaching out to potential customers. Businesses can use social media to create engaging content that draws people in and encourages them to learn more about what they offer. Social media can also build relationships with potential customers and create a community around the brand.
- Email marketing is another effective way to reach potential customers and promote your products or services. By sending targeted emails with relevant

Intranet in Organizations

An intranet is a private network that is contained within an organization. It uses the same Internet Protocol (IP) address scheme as the public Internet. Still, all components – including web servers, DNS servers, and routers – are privately owned and maintained by the organization. An intranet allows an organization to share information and resources among its employees securely. There are several benefits to using an intranet within an organization:

- **Communication:** An intranet can improve employee communication by providing a central place for announcements, news, and company directories.
- **Collaboration:** Employees can use an intranet to collaborate on projects, share files, and develop ideas.
- **Productivity:** An intranet can help employees be more productive by providing quick and easy access to the resources they need when they need them.
- **Security**: An intranet can help protect an organization's sensitive data and resources from unauthorized access and misuse.
- **Cost Savings:** Intranets are often more cost-effective than traditional communication methods, such as printed materials or mailings.

Use cases for Intranet in organizations

There are different ways that an organization can use an intranet. Some common use cases include:

- **Collaboration**: Intranets can facilitate collaboration between employees within an organization. This can include sharing documents, posting updates and announcements, and holding virtual meetings.
- **Communication:** Intranets can be used as a communication tool between employees and management. This can include sending out company-wide announcements, providing a forum for employee questions and feedback, and posting company news and updates.
- **Training and Development**: Intranets can deliver training content to employees. This can include online courses, video tutorials, job aids, and other resources.
- **Human Resources**: Intranets can be used to manage employee data and records. This includes maintaining employee profiles, tracking vacation days and sick leave, and managing performance reviews.
- **Document Management**: Intranets can store and share documents within an organization. This includes policies and procedures, forms, and other important documents.

What is the Difference between Internet and Intranet?

INTERNET	**INTRANET**
Simultaneously link computers on different network / global network	Owned by local or private organisations / companies
Support multiple users	Users are limited
Unsafe, not protected	Protected and secured
It’s a public network with more traffic	A private network and traffic is less
Can transfer unlimited data	Can transfer only limited data
Can be widely accessed and used	Company or organisation employees or admin with access to login details can only use this
More data or information can be accessed or availed	Data or information accessible over intranet will be limited and specific to the company records or details

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What is a network protocol?

In networking, a protocol is a standardized way of doing certain actions and formatting data so that two or more devices are able to communicate with and understand each other.

To understand why protocols are necessary, consider the process of mailing a letter. On the envelope, addresses are written in the following order: name, street address, city, state, and zip code. If an envelope is dropped into a mailbox with the zip code written first, followed by the street address, followed by the state, and so on, the post office won't deliver it. There is an agreed-upon protocol for writing addresses in order for the postal system to work. In the same way, all IP data packets must present certain information in a certain order, and all IP addresses follow a standardized format.

A network protocol is a mechanism or a set of procedures that enables devices to communicate back and forth across the internet. In order to communicate together, two devices must support the same protocol or a gateway will need to be used to translate the communication.

There are three main types of network protocols you need to be aware of:

- Network management protocols – These protocols set out policies designed to monitor, manage and maintain a network. Examples include SNMP, FTP, POP3 and Telnet.
- Network communication protocols – A group of protocols used to establish rules and formatting (such as syntax, synchronization and semantics) for exchanging data across a network. Types of network communication protocols include TCP, UDP, IP, HTTP, IRC, BGP and ARP.
- Network security protocols – Security protocols are protocols that use security measures such as cryptography and encryption to protect data. Examples include SFTP, SSL and HTTPS.

What is an IP address? How does IP addressing work?

An IP address is a unique identifier assigned to a device or domain that connects to the Internet. Each IP address is a series of characters, such as '192.168.1.1'. Via DNS resolvers, which translate human-readable domain names into IP addresses, users are able to access websites without memorizing this complex series of characters. Each IP packet will contain both the IP address of the device or domain sending the packet and the IP address of the intended recipient, much like how both the destination address and the return address are included on a piece of mail.

IPv4 vs. IPv6

The fourth version of IP (IPv4 for short) was introduced in 1983. However, just as there are only so many possible permutations for automobile license plate numbers and they have to be reformatted periodically, the supply of available IPv4 addresses has become depleted. IPv6 addresses have many more characters and thus more permutations; however, IPv6 is not yet completely adopted, and most domains and devices still have IPv4 addresses. For more on IPv4 and IPv6, see What is my IP address?

What is an IP packet?

IP packets are created by adding an IP header to each packet of data before it is sent on its way. An IP header is just a series of bits (ones and zeros), and it records several pieces of information about the packet, including the sending and receiving IP address. IP headers also report:

- Header length Packet length Which transport protocol is being used (TCP, UDP, etc.)
- Time to live (TTL), or the number of network hops a packet can make before it is discarded

In total there are 14 fields for information in IPv4 headers, although one of them is optional.

What is TCP/IP?

The Transmission Control Protocol (TCP) is a transport protocol, meaning it dictates the way data is sent and received. A TCP header is included in the data portion of each packet that uses TCP/IP. Before transmitting data, TCP opens a connection with the recipient. TCP ensures that all packets arrive in order once transmission begins. Via TCP, the recipient will acknowledge receiving each packet that arrives. Missing packets will be sent again if receipt is not acknowledged.

TCP is designed for reliability, not speed. Because TCP has to make sure all packets arrive in order, loading data via TCP/IP can take longer if some packets are missing.

TCP and IP were originally designed to be used together, and these are often referred to as the TCP/IP suite. However, other transport protocols can be used with IP.

Network Protocol vs. Communication Protocol

Network management and communication protocols are two of the most important types of protocols.

Essentially, communication protocols including TCP/IP and HTTP are designed to enable two devices to exchange data, whereas network management protocols are designed to help manage and troubleshoot performance.

For example, network management protocols such as Simple Network Management Protocol (SNMP) can monitor and troubleshoot the connection between an endpoint and the network so that administrators can better understand the status and availability of infrastructure.

In contrast, communication protocols are mainly concerned with defining formatting and syntax rules to set out a framework for two devices to exchange data with each other.

Below we're going to look at nine types of network protocols that empower and drive modern networking.

1. Transmission Control Protocol (TCP) A.K.A. Internet Protocol (IP)

TCP is a protocol that converts data into packets so that it can be sent between a server and a client. Organizations use TCP to transfer content such as files, text, images and emails because it guarantees that the packets will be delivered accurately and in the correct order.

It's worth noting that TCP will establish a connection between the origin and the destination devices before attempting to transfer data.

2. User Datagram Protocol (UDP)

UDP is a communication protocol that's designed to send packets from one device to another on a network. Many organizations use UDP as an alternative to TCP because it offers higher transfer speeds.

3. File Transfer Protocol (FTP)

FTP is a network protocol that's used to transfer files from one device to another over an unencrypted TCP/IP connection. With FTP, a user can load up a web browser or FTP client such as FileZilla or FTP Voyager and send up to 2GB at once.

4. Hypertext Transfer Protocol (HTTP)

HTTP is a communication protocol that enables systems to communicate on the World Wide Web. With HTTP, a client will send a hypertext message request to a web server asking for access to the resources needed to load a web page.

The server hosting the content will then respond and enable the client to load all the necessary text, images and videos featured on the page.

5. Simple Network Management Protocol (SNMP)

SNMP is an application layer protocol that's used to collect management information from devices such as computers, routers, switchers, firewalls and printers.

Network monitoring platforms often use SNMP to monitor the performance and status of devices throughout a network in real time.

6. Internet Control Message Protocol (ICMP)

ICMP is a network protocol that devices use to warn about connectivity issues and errors. ICMP can notify devices that a forwarded message was too long or arrived out of order, and will issue an error message requesting that the device resend the content.

7. Post Office Protocol (POP)

POP3 is a network protocol that enables a server to retrieve emails from a remote server and download them to the local device. Whenever the client connects to the server via TCP, it automatically downloads all the new messages to it, making them accessible to the user both online and off-line.

Email platforms like Microsoft Outlook can use POP3 to collect email messages from remote servers via TCP/IP so that they're available off-line.

8. Internet Message Access Protocol (IMAP)

IMAP is another protocol that's used for retrieving emails. With IMAP, whenever a user clicks on an email, it isn't downloaded or stored on their computer locally but remains on the remote server, enabling the user to check their email from multiple devices.

9. Simple Mail Transfer Protocol (SMTP)

SMTP is a mail delivery protocol that allows a device to send and deploy email to a remote endpoint with a TCP connection. Many providers including Microsoft Outlook, Gmail and Yahoo Mail use SMTP to send messages to remote servers.

What role do network protocols play in communication?

Network protocols are essential for communication between computers, as they enable standardised and efficient messages to be sent.

Without network protocols, computers would find it difficult to communicate consistently and reliably. They also guarantee the security and confidentiality of data.

There are different types of network protocol, each with its own characteristics and functions. For example, TCP (Transmission Control Protocol) is used to ensure reliable communication between computers, while UDP (User Datagram Protocol) is used for faster but less reliable communication.

In addition, network protocols are used in many fields, such as telecommunications, computing, industry and medicine. For example, DICOM (Digital Imaging and Communications in Medicine) is used for medical images, while VoIP (Voice over Internet Protocol) is used for voice communications over the Internet.

Web address

What Is a URL?

A URL, short for a uniform resource locator serves as a web address that guides users to specific resources on the internet, including domain names, paths, and protocol identifiers.

A web address, or a Uniform Resource Locator (URL), is a unique reference that directs you to a specific page, file or photo on the internet. Without a web address, users cannot access a webpage.

The web address was developed by Sir Tim Berners-Lee and the URL working group of IEFT (Internet Engineering Task Force) in the year 1994. It is a name that points to the location of a particular web page in the internet world. It can be the address of anything like the address of a particular file, directory, photo, video, etc. Every web page on the internet has a unique web address, with the help of which the user accesses those web pages. It is the same as the address of your house or school or any place on this planet. Web Address is also known as URL i.e. uniform resource locator. For example:

Your web address establishes your online presence when you're planning how to create a website. Without a web address, users can't visit your website.

Components of a web address

Every web address follows the same format. Let's use this page's URL as an example to explore the individual components:

Example:
https://www.wix.com/encyclopedia/web-address/

- **Domain name:** A domain name is a text name that corresponds to the numeric IP (Internet Protocol) address of the website, followed by the top-level domain name(eg: .gov, .org, .com, etc). Domain names are used to make it easier for the user to access a particular website. Basically, it tells which web server is being requested. For example, the domain name to access GeeksForGeeks is geeksforgeeks.org, where .org is the top-level domain name.

- **Path:** Path specifies the entire path to a particular web page that the user wants to access. The user can define the entire path of the particular web page (if he/she knows).

If no path is specified and only the domain name is entered by the user then the browser loads the default page, also known as the home page, of the website from where the user can navigate to the desired web page.

- **Parameters:** Parameters are the query string that begins with a question mark(?) after the Path. This is the list of key pairs separated by an ampersand(&) sign. You must have seen it when you have searched for a query on Google or on youtube or any platform. Each web browser has its own rules for passing the parameters. For example, https://www.google.com/search?q=gfg+login&rlz=1C1CHBD_enIN919IN919&… , here are the strings after the question mark(?) is the query string or the parameters.

- **Anchor:** Anchors are like bookmarks it tell the browser which particular part of a web page the user wants to access. They are written after the Parameters and begin with a hashtag(#).

If we combine all the above parts of the web address then the web address looks like this:

Types of Web Address

There are two types of web addresses:

- **Absolute web address:** An absolute web address is the web address that contains the domain name and the entire address of the file/directory to which it points. It is the web address that is normally seen in the address bar of the browser and it can be accessed from anywhere in the world. It begins with the protocols like “http”, “https”, “ftp” etc, and have the structure like:

```
Protocol://Domain name/Path
```

- **Relative web address:** Relative web address is the web address that can be accessed only if you are on the home page or on any web page of the particular website. It tells the web address is in relation to the current user location(hence it is named Relative web address). Since it is assumed that the user is already present on the website, a relative web address only contains the domain name and the location, e.g.

```
 <a href = "./geeksforgeekscourses.html"
```

A URL (uniform resource locator) it’s a type of uniform resource identifier (URI) that provides a way to access information from remote computers, like a web server and cloud storage.
URLs play a vital role in web navigation and online communication by providing a structured way to locate and access various web resources and hyperlinks.

It contains various elements, including the network communication protocol, a subdomain, a **domain name**, and its extension.
Luckily, site owners can modify their URLs. A well-crafted URL can be a powerful tool to improve user experience, resulting in better **search engine optimization (SEO)** performance. Therefore, optimizing URLs can be a great way to boost your website's rankings on search engine result pages (SERPs). This article covers everything you need to know about what is a URL, from the definition to examples, its general structure, and how to custom-create URLs.

Download glossary for web beginners

What's the difference between a URL and a web address?

There is no difference between a URL and a web address. A domain name and a URL, on the other hand, differ. A domain name is the master web address and the name of your website. For a business, the domain name typically contains the company name (e.g. Wix's domain name is wix.com). The absolute URL for Wix's homepage is https://www.wix.com, which is also the web address.

Browsers use URLs to access resources like HTML pages, images and CSS documents. Ideally, each URL corresponds to a unique resource, but there are exceptions, such as when a resource no longer exists or has been relocated.

How to choose a web address

1. Choose a domain name
2. Decide on a domain extension
3. Organize your URL paths

Your website's URL contributes to your brand's professional authority. Follow these steps to choose a web address that represents your website accordingly:

01. Choose a domain name
Choosing a domain name strategically distinguishes your web address. In fact, when you purchase a web address, you'll find out you're actually learning how to register a domain name. It means that you own the specific web address name, and can add paths as you see fit. When learning how to create a website, you'll find that it's best to include your business name in the domain name. In fact, check that the domain is available when developing your business name to ensure that you have the rights to both.

02. Decide on a domain extension
Most websites use .com, .org and .net as domain extensions, but you can choose from many other top-level domain (TLD) options, including generic top-level domains (gTLD) and country code top-level domains (ccTLD). A few gTLDs are .edu (post-secondary educational institutions), .info (informational websites) and .gov (American government website). A ccTLD is any country-specific extension, such as .ca (Canada) or .de (Germany).
Learn more: **What makes a good website**

03. Organize your URL paths
Your domain name and extension are your website's primary web address and will lead users to your home page. Additionally, your website will have multiple pages and links that will require web addresses. As the website owner, you can control the path's layout. Typically, you want your paths to be clear and logical so users can see the journey they've taken to arrive on their current page.

Learn more about website infrastructure with our guide.

How to use a Web Address?

Web addresses can be accessed in 4 simple steps:

Step 1: *Go to your web browser.*
Step 2: *Type the website name in the address bar, or you can type the entire web address of the web page you want to access(if you know the entire web address).*
Step 3: *Press Enter.*
Step 4: *This will take you to the home page of the respective website. You can navigate to the desired web page from the home page of the website.*

Example:

Let’s say we want to access the GeeksForGeeks website so the above steps can be followed as:

- Open the Chrome browser (or any browser which you use).

- Type “www.geeksforgeeks.org” or you can directly write your desired web page name after the domain name, for e.g. “www.geeksforgeeks.org/courses”.

Type “www.geeksforgeeks.org” in the address bar.

- Press Enter.
- This will take you to the respective web pages of geeksforgeeks.

Components of a web address

A web address is written in the following format:

Scheme://Domain name/Path/?Parameters#Anchor

Now we discuss each part in detail:

- **Scheme:** It is the protocol that is associated with every URL. It tells the browser what type of address the user is trying to access so that the browser connects correctly. Generally, http or https protocol is used to connect with the browser, but other types of the protocol are also available like rtp, dns, chrome, etc.

What Is an Example of a URL Address

Hostinger's complete URL is
https://www.hostinger.com/

and entering it in a browser's address bar directs users to our website. The same rule applies to

https://www.microsoft.com/

and

https://www.linux.org/

. https://uti.stu.edu.iq/

https://uomustansiriyah.edu.iq/

https://www.asiacell.com/

That said, URLs can get more specific.
For example, the
/tutorials/

URL leads users to our **Tutorials** page, and

/tutorials/how-to-make-a-website

is a full URL for our **How to Make a Website** article on **Hostinger Tutorials**.

URLs can also send users to a particular section on a web page.
`/tutorials/how-to-make-a-website#6_Optimize_Your_Website_for_SEO_and_Conversions`
The above URL, for example, sends users to the tip number 6 in the **How to Make a Website** article.
Lastly, every uploaded image has its own URL, enabling users to access it directly. The following URL leads to the featured image of our **How to Make a Website** article
`/tutorials/wp-content/uploads/sites/2/2021/08/how-to-make-a-website-1.png.`

What Is a URL: Examples, Structure, and More

What Is the Structure of a URL

As you can see from the image, uniform resource locator (URL) contains multiple parts. To help you better understand, let's dive deeper into the structure of a URL.

HTTP or HTTPS

HTTP (Hypertext Transfer Protocol) and HTTPS (Hypertext Transfer Protocol Secure) are protocols for network communication between web servers and browsers. They transmit messages, retrieve information through the domain name system (DNS), and return it to the browser.
The difference between HTTP and HTTPS is that the latter encrypts the data transmission process. This security protocol protects a website better and is an essential factor in improving ranking on search results.
Another difference is that HTTPS uses the Transmission Control Protocol/Internet Protocol (TCP/IP) port number 443 encrypted by Transport Layer Security (TLS). Meanwhile, an HTTP URL uses TCP/IP port number 80.

Important! Web browsers can also process other protocols, including FTP and mailto. The former allows file sharing between different web hosts, either local or remote. The latter directs users to a specific email address.

www (Subdomain)

A **subdomain** consists of any words or phrases that come before a URL's first dot. Referring to the world wide web, **www** is the most common type. It indicates that a website is accessible through the internet and uses HTTP to communicate.
Furthermore, site owners can use any word as a subdomain for website organization purposes as it points to a specific directory from the primary domain. Some of the most popular options are "blog" and "news."

For example, while
hostinger.com

uses www, the subdomain for our **Knowledge Base** page is "support." Hence, the

support.hostinger.com

URL.

Domain Name

A **domain name is** what users type into their browser's address bar to reach a website. It consists of a site name and an extension, for example,
hostinger.com.

Every name is unique, and they represent their corresponding **IP addresses**. This unique IP address points to the website's server. In other words, it helps users access websites easily.

Domain Extension

Also called a **top-level domain (TLD)**, is the bit following a website name. Used for around **53%** of all websites, **.com** is the most popular extension.
Here are types of TLD extensions to consider using:

- **Generic TLD (gTLD)**. This category includes most of the popular extensions, including **.com**, **.org**, **.net**.
- **Country Code TLD (ccTLD)**. As the name suggests, this TLD indicates a country, a territory, or a geographical area. ccTLD consists of two letters based on the international country codes, such as **.mx**, **.in**, or **.at**.
- **Sponsored TLD (sTLD)**. This type of extension is sponsored and used for specific organizations. For example, Tralliance Registry Management Company, LLC sponsors **.travel**, and DotAsia Organization Ltd. sponsors **.asia domain extension**.
- **New gTLD (nTLD)**. It's a **new generation of domain extensions**. Basically, any TLD launched after 12 January 2012 are new gTLD, including **.online**, **.store**, and **.tech**.

Path to the Resource

A path to the resource is the part to the right of the TLD. It's often referred to as the folder structure of the website.
A path to the resource gives extra information to a web server, enabling it to lead users to a specific location. A series of paths to resources may point to a specific page, post, or file.
A URL can have more than one path to resources. When that happens, the forward-slash sign (/) will separate each of them. The more paths to resources a URL contains, the more specific the location is.

Parameters

Parameters are query strings or URL variables. They're the portion of a URL following a question mark. Parameters contain keys and values separated by the equal sign (=). Furthermore, a URL can have multiple variables. In that case, the ampersand symbol (&) will separate each.
In terms of parameter use cases, here are some of the most common ones:

- **Translating.** Having a country code in the query string translates a web page to the associated country's language.
- **Searching.** The searching parameter provides search results from a website's internal search engine.
- **Filtering.** To separate distinct fields, such as topic, color, price range, and region, site owners can use the filtering parameter.
- **Paginating.** This parameter is especially useful for eCommerce websites, enabling site owners to sort content.
- **Tracking.** Usually contains the **Urchin Tracking Module** codes to track traffic from ads and marketing campaigns.

Suggested Reading

To better understand the web structure, check out our guide on **what a website is**.

What Is a URL Syntax

Syntax refers to a set of rules. In the case of a URL syntax, it sets which component and symbol are allowed in a URL. Here's what a URL's general syntax looks like:
http://subdomain.domain-name.domain-extension/path-to-resource?parameters

Furthermore, uniform resource locators can only contain numbers, letters, and the following characters ()!$-'_*+.
To use other characters, site owners should translate them into programming code. For example, as URLs can't contain spaces, site owners often utilize the plus sign, hyphens, or %20 to replace them.
URLs can contain an **anchor link**, also called page jump or fragment identifier. The element is represented with the number sign (#), which bookmarks a specific part inside a resource.

With an HTML file containing a page jump, a web browser will go directly to the selected section. For a video or audio document, a modern web browser will find the timestamp on which the anchor represents and play accordingly.

What Are the Different Types of URLs

In general, the most popular types of URLs are absolute and relative.
An absolute URL contains complete information, from the protocol to the path to resources or parameters. In comparison, a relative URL only includes the path to resources.
Based on the function, here are some other types of uniform resource locators:

- **Canonical URLs.** Site owners can use them in case they have duplicate content. Setting one URL as canonical is a way to let search engines know which internet address to crawl and index.
- **Callback URLs.** They refer to a home destination when users complete a process on an external system.
- **Vanity URLs.** Also known as custom short URLs, they are easy-to-remember web addresses. Typically, a vanity URL is a redirect of a longer URL. Site owners can use a website URL shortener tool, like **Bitly**, **Short.io**, and **TinyURL**, to create a vanity URL.

Where Is a URL Located

A URL can usually be found in the address bar at the top of the web browser's window. On laptops and desktop computers, a website URL will always be visible in the address bar as users scroll through the web page.
In the case of mobile devices, the default browser behavior causes a URL to disappear as soon as users start scrolling down. However, it will reappear when users scroll up.

How to Open a URL

If you know the complete website URL, typing it on the address bar is one of the easiest ways to open a URL. If not, here are several other ways to do it:

- **Clicking a hyperlink.** It can be a text, an icon, or an image that links to another HTML file on the internet. Users can identify a hyperlink by hovering their mouse over the linked text or graphic. Then, a URL link will appear at the bottom of the window, telling users where the link will take them.
- **Scanning a QR code.** Short for quick response code, it's a black and white barcode readable for digital devices. It stores numerous data types, including web links, account information, and encryption details.
- **Copying and pasting.** If you come across a website URL with no links or QR code, copying and pasting it to the address bar will open it.

How to Create a URL

To create a unique URL, like
hostinger.com

,

microsoft.com

, or

linux.org

, find a credible registrar to register a domain name on your behalf.

A registrar is an **ICANN-accredited company** for managing domain reservations and renewals. **Google Domains**, **CloudFlare,** and **Domain.com** are some of the most popular registrars. People can also obtain a custom name from a hosting company offering **registration services**.

Here is a general step-by-step guide on **how to buy a domain**:

1. **Ensure the name's availability.** For this, you can run a search using a checker. Type in your desired name and extension -> click **Search**. It will then provide you with a list of available names.
2. **Proceed to check out.** In this step, you will choose the registration period. Typically, a registrar requires a minimum period of one year. That said, some registrars offer up to a ten-year registration period.
3. **Complete the registration process.** Once the payment is authorized, the registrar will need you to fill out a setup form, which may include your name, email, address, and contact information. Be sure to input all the details correctly.
4. **Verify name ownership.** A verification link should appear on the email you use for registration a few minutes after completing the registration process. If it doesn't arrive, you can send a request from the control panel.

As the registration isn't a one-time purchase, every owner should keep track of their domain expiry dates.

Conclusion

A uniform resource locator (URL) is a complete web address pointing to a specific file on the internet. For example, a URL can lead users to a website, a web page, or an image.
Structure-wise, a URL consists of several elements:

- **HTTP or HTTPS.** It's a network communication protocol connecting web servers and web browsers. The latter is more secure than the former.
- **www.** Also called a subdomain, it's the part before a URL's first dot. Site owners can also use any words or phrases for their website organization purposes.
- **Domain name.** Also known as a site address, it is what users type on their browsers to reach a website.
- **Domain extension.** It's the part following a domain name, for example, **.com** and **.org**.
- **Path to the resource.** Separated by the forward-slash sign (/), this element gives extra information to a website address.
- **Parameters.** They're often called query strings or URL variables. A question mark (?) indicates a parameter.

To create and modify a site's URL, users will need to register a domain through a credible registrar. Alternatively, you can go with a reliable hosting provider offering this registration services.

What is a Web Address?

The web address contains information about the location of the webpage.

It is also known as the URL (uniform resource locator).

Like the address for your home, a web address organizes information about a webpage's location in a predictable way.

This is how to break down the information using the following URL as an example:

www.supremecourt.gov/opinions/12pdf/11-697_d1o2.pdf

Network:

This is a set of connected webpages. The address for the network is typically the same as the homepage of a website. Under that website will be a variety of webpages. The last part of the network address is the top level domain name.

From the example, **www.supremecourt.gov** is the network section of the URL, and the top level domain is **.gov**.

Top Level Domain:

This indicates the type of network, and can give you clues about the purpose/owners of a website. Websites based outside of the United States will often include a country code as part of the domain (e.g. .uk, .ca, .ng, etc.)

Common domain names:

- .com (business)
- .org (organization)
- .edu (education)
- .gov (government)

> **Note:** there are few restrictions about what domain name a website must use. A business can choose either .com or .org. Only a government site can use .gov, but you may find some government sites under other domains (e.g. some public schools use .org).

Folders & subfolders:

Just like on your personal computer, a website may have a variety of folders and subfolders to organize all of the content on the website.

> The example above has a folder called opinions that contains a subfolder of PDF documents from 2012 called **12pdf**.

File name:

The last part of a web address gives the name of the individual file that displays when you go to that address. Web address often end with the file name *.htm* or *.html*, which indicates that you are looking at a regular webpage.

> The example address above has the file name **11-697_d1o2.pdf**. Because the file name ends with *.pdf*, it will display a PDF document.

Webpages in the Walden Library

Because the Walden Library is on the Internet, it can sometimes be difficult to know when you are in the Library or on a different website.

Walden Library webpages have web addresses that start with:

> **https://academicguides.waldenu.edu/library...**

Walden University Quick Answers have web addresses that start with:

> **https://academicanswers.waldenu.edu/...**

Walden Library Database pages will include the following somewhere in the web address:

> **...ezp.waldenulibrary.org/...**

Accessing Databases through the Walden Library:

The Library subscribes to databases from database vendors. This means that most of the web address is for the website of the vendor, but in order to access the database the vendor has to know that you are affiliated with Walden. You do this by accessing the database's website via the Walden Library. Once you log in, that little bit of web address (ezp.waldenulibrary.org) is added to the web address of every page you visit.

NOTE: you can sometimes access a database without being in the Walden Library. If that happens, you may be able to search, but you won't have access to full text. How do you know if you're in the Library's version? Look for **ezp.waldenulibrary.org/** in the web address.

Database web address via the Library (full text access): https://www-sciencedirect-com.**ezp.waldenulibrary.org**/science/search

Database web address on the Open Internet (no full text): https://www.sciencedirect.com/search/advanced

Linking to individual articles

Unlike most webpages on the Internet, the web addresses of individual articles may not be stable. This means that you may not be able to bookmark an individual article. Instead, look for a persistent link.

Persistent link: a web address that is stable over time. Also known as *permalink*.
Use the persistent link to reopen an individual article.

Each database has a different way of providing a persistent link to an article. Here are some of the most common examples:

- On the article record, click **permalink** in the right column and then copy the address that appears (EBSCOhost databases)
- On the article record, look for the **Document ID** at the bottom of the page (ProQuest databases)
- Open the full text and copy the URL in the address bar (ScienceDirect, SAGE)
- On the article record, choose the e-mail option (OVID)

Tip: the persistent link must have **ezp.waldenulibrary.org** to work.

URL

URL	
	Uniform resource locator
Abbreviation	URL
Status	Published
First published	1994; 30 years ago
Latest version	Living Standard 2023
Organization	Internet Engineering Task Force (IETF)
Committee	Web Hypertext Application Technology Working Group (WHATWG)
Series	Request for Comments (RFC)
Editors	Anne van Kesteren
Authors	Tim Berners-Lee
Base standards	RFC 1738. – Uniform Resource Locators (URL). RFC 3986. – Uniform Resource Identifier (URI): Generic Syntax. RFC 4248. – The telnet URI Scheme. RFC 4266. – The gopher URI Scheme. RFC 6068. – The 'mailto' URI Scheme. RFC 6196. – Moving mailserver: URI Scheme to Historic. RFC 6270. – The 'tn3270' URI Scheme.
Related standards	URI, URN
Domain	World Wide Web
License	CC BY 4.0
Website	url.spec.whatwg.org

A **uniform resource locator** (**URL**), colloquially known as an **address** on the Web,[1] is a reference to a resource that specifies its location on a computer network and a mechanism for retrieving it. A URL is a specific type of Uniform Resource Identifier (URI),[2][3] although many people use the two terms interchangeably.[4][a] URLs occur most commonly to reference web pages (HTTP/HTTPS) but are also used for file transfer (FTP), email (mailto), database access (JDBC), and many other applications.

Most web browsers display the URL of a web page above the page in an address bar. A typical URL could have the form `http://www.example.com/index.html`, which indicates a protocol (`http`), a hostname (`www.example.com`), and a file name (`index.html`).

History

Uniform Resource Locators were defined in RFC 1738 in 1994 by Tim Berners-Lee, the inventor of the World Wide Web, and the URI working group of the Internet Engineering Task Force (IETF),[7] as an outcome of collaboration started at the IETF Living Documents birds of a feather session in 1992.[7][8]

The format combines the pre-existing system of domain names (created in 1985) with file path syntax, where slashes are used to separate directory and filenames. Conventions already existed where server names could be prefixed to complete file paths, preceded by a double slash (`//`).[9]

Berners-Lee later expressed regret at the use of dots to separate the parts of the domain name within URIs, wishing he had used slashes throughout,[9] and also said that, given the colon following the first component of a URI, the two slashes before the domain name were unnecessary.[10]

Early WorldWideWeb collaborators including Berners-Lee originally proposed the use of UDIs: Universal Document Identifiers. An early (1993) draft of the HTML Specification[11] referred to "Universal" Resource Locators. This was dropped some time between June 1994 (RFC 1630) and October 1994 (draft-ietf-uri-url-08.txt).[12] In his book *Weaving the Web*, Berners-Lee emphasizes his preference for the original inclusion of "universal" in the expansion rather than the word "uniform", to which it was later changed, and he gives a brief account of the contention that led to the change.

Syntax

Main article: Uniform Resource Identifier § Syntax

Every HTTP URL conforms to the syntax of a generic URI. The URI generic syntax consists of five *components* organized hierarchically in order of decreasing significance from left to right:[13]:§3

```
URI = scheme ":" ["//" authority] path ["?" query] ["#" fragment]
```

A component is *undefined* if it has an associated delimiter and the delimiter does not appear in the URI; the scheme and path components are always defined.[13]:§5.2.1 A component is *empty* if it has no characters; the scheme component is always non-empty.[13]:§3

The authority component consists of *subcomponents*:

```
authority = [userinfo "@"] host [":" port]
```

This is represented in a syntax diagram as:

The URI comprises:

- A non-empty **scheme** component followed by a colon (`:`), consisting of a sequence of characters beginning with a letter and followed by any combination of letters, digits, plus (`+`), period (`.`), or hyphen (`-`). Although schemes are case-insensitive, the canonical form is lowercase and documents that specify schemes must do so with lowercase letters. Examples of popular schemes include `http`, `https`, `ftp`, `mailto`, `file`, `data` and `irc`. URI schemes should be registered with the Internet Assigned Numbers Authority (IANA), although non-registered schemes are used in practice.[b]
- An optional **authority** component preceded by two slashes (`//`), comprising:
  - An optional **userinfo** subcomponent followed by an at symbol (`@`), that may consist of a user name and an optional password preceded by a colon (`:`). Use of the format `username:password` in the userinfo subcomponent is deprecated for security reasons. Applications should not render as clear text any data after the first colon (`:`) found within a userinfo subcomponent unless the data after the colon is the empty string (indicating no password).
  - A **host** subcomponent, consisting of either a registered name (including but not limited to a hostname) or an IP address. IPv4 addresses must be in dot-decimal notation, and IPv6 addresses must be enclosed in brackets (`[]`).[13]:§3.2.2[c]
  - An optional **port** subcomponent preceded by a colon (`:`), consisting of decimal digits.
- A **path** component, consisting of a sequence of path segments separated by a slash (`/`). A path is always defined for a URI, though the defined path may be empty (zero length). A segment may also be empty, resulting in two consecutive slashes (`//`) in the path component. A path component may resemble or map exactly to a file system path but does not always imply a relation to one. If an authority component is defined, then the path component must either be empty or begin with a slash (`/`). If an authority component is undefined, then the path cannot begin with an empty segment—that is, with two slashes (`//`)—since the following characters would be interpreted as an authority component.[16]:§3.3

  By convention, in **http** and **https** URIs, the last part of a *path* is named **pathinfo** and it is optional. It is composed by zero or more path segments that do not refer to an existing physical resource name (e.g. a file, an internal module program or an executable program) but to a logical part (e.g. a command or a qualifier part) that has to be passed separately to the first part of the path that identifies an executable module or program managed by a web server; this is often used to select dynamic content (a document, etc.) or to tailor it as requested (see also: CGI and PATH_INFO, etc.).

  Example:

  URI: `"http://www.example.com/questions/3456/my-document"`
  where: `"/questions"` is the first part of the *path* (an executable module or program) and `"/3456/my-document"` is the second part of the *path* named *pathinfo*, which is passed to the executable module or program named `"/questions"` to select the requested document.
  An **http** or **https** URI containing a *pathinfo* part without a query part may also be referred to as a 'clean URL,' whose last part may be a 'slug.'

Query delimiter	Example
Ampersand (`&`)	`key1=value1&key2=value2`
Semicolon (`;`)[d]	`key1=value1;key2=value2`

  - An optional **query** component preceded by a question mark (`?`), consisting of a query string of non-hierarchical data. Its syntax is not well defined, but by convention is most often a sequence of attribute–value pairs separated by a delimiter.

- An optional **fragment** component preceded by a hash (#). The fragment contains a fragment identifier providing direction to a secondary resource, such as a section heading in an article identified by the remainder of the URI. When the primary resource is an HTML document, the fragment is often an `id` attribute of a specific element, and web browsers will scroll this element into view.

A web browser will usually dereference a URL by performing an HTTP request to the specified host, by default on port number 80. URLs using the `https` scheme require that requests and responses be made over a secure connection to the website.

Internationalized URL

Internet users are distributed throughout the world using a wide variety of languages and alphabets, and expect to be able to create URLs in their own local alphabets. An Internationalized Resource Identifier (IRI) is a form of URL that includes Unicode characters. All modern browsers support IRIs. The parts of the URL requiring special treatment for different alphabets are the domain name and path.[18][19]

The domain name in the IRI is known as an Internationalized Domain Name (IDN). Web and Internet software automatically convert the domain name into punycode usable by the Domain Name System; for example, the Chinese URL `http://例子.卷筒纸` becomes `http://xn--fsqu00a.xn--3lr804guic/`. The `xn--` indicates that the character was not originally ASCII.[20]

The URL path name can also be specified by the user in the local writing system. If not already encoded, it is converted to UTF-8, and any characters not part of the basic URL character set are escaped as hexadecimal using percent-encoding; for example, the Japanese URL `http://example.com/引き割り.html` becomes `http://example.com/%E5%BC%95%E3%81%8D%E5%89%B2%E3%82%8A.html`. The target computer decodes the address and displays the page.[18]

Protocol-relative URLs

Protocol-relative links (PRL), also known as protocol-relative URLs (PRURL), are URLs that have no protocol specified. For example, `//example.com` will use the protocol of the current page, typically HTTP or HTTPS.[21][22]

Web Browser

When we need any kind of information most of the time we get help from the Internet, and we get information. The Internet provides us with useful information easily. We use mobile phones, computers, and tablets. We search for a lot of things in our daily lives, so we get information about all over the world, but we can not get information by just only getting connected to the Internet. We need a platform where we can search for our questions. The platform that provides such kinds of services is called a web browser, without a web browser internet will not be able to provide information.

What is a Web Browser?

The web browser is an application software to explore www (World Wide Web). It provides an interface between the server and the client and it requests to the server for web documents and services. It works as a compiler to render HTML which is used to design a webpage. Whenever we search for anything on the internet, the browser loads a web page written in HTML, including text, links, images, and other items such as style sheets and JavaScript functions. Google Chrome, Microsoft Edge, Mozilla Firefox, and Safari are examples of web browsers.

Web Browser Definition: A software application used to access information on the World Wide Web is called a Web Browser. When a user requests some information, the web browser fetches the data from a web server and then displays the webpage on the user's screen.

History of the Web Browsers

The first web browser World Wide Web was invented in the year of 1990 by Tim Berners-Lee. Later, it becomes Nexus. In the year of 1993, a new browser Mosaic was invented by Mark Andreessen and their team. It was the first browser to display text and images at a time on the device screen. He also invents another browser Netscape in 1994. Next year Microsoft launched a web browser Internet Explorer which was already installed in the Windows operating system. After this many browsers were invented with various features like Mozilla Firefox, Google Chrome, Safari, Opera, etc. For more detail refer this article: History of Web Browsers

History of Web Browser

Today web browsers are easily accessible and can be used on devices like computer, laptops, mobile phones, etc. but this evolution of making browsers available for easy use took many years.

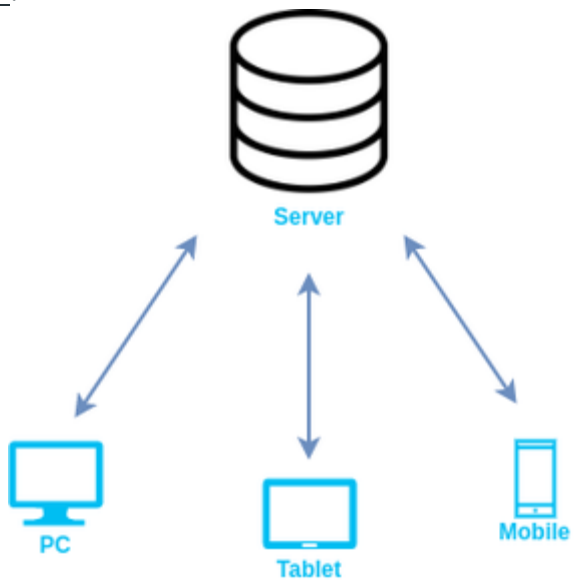
Given below are some salient points which one must know with regard to the history of web browsers:

- **"WorldWideWeb"** was the first web browser created by Tim Berners Lee in 1990. This is completely different from the World Wide Web we use today
- In 1993, the **"Mosaic"** web browser was released. It had the feature of adding images and an innovative graphical interface. It was the "the world's first popular browser"
- After this, in 1994, Marc Andreessen (leader of Mosaic Team) started working on a new web browser, which was released and was named **"Netscape Navigator"**

- In 1995, **“Internet Explorer”** was launched by Microsoft. It soon overtook as the most popular web browser
- In 2002, **“Mozilla Firefox”** was introduced which was equally as competent as Internet Explorer
- Apple too launched a web browser in the year 2003 and named it **“Safari”**. This browser is commonly used in Apple devices only and not popular with other devices
- Finally, in the year 2008, Google released “Chrome” and within a time span of 3 years it took over all the other existing browsers and is one of the most commonly used web browsers across the world

How does a Web Browser Work?

A web browser helps us find information anywhere on the internet. It is installed on the client computer and requests information from the web server such a type of working model is called a client-server model.



Client-server model

The browser receives information through HTTP protocol. In which transmission of data is defined. When the browser received data from the server, it is rendered in HTML to user-readable form and, information is displayed on the device screen.

Website Cookies

When we visited any website over the internet our web browser stores information about us in small files called cookies. Cookies are designed to remember stateful information about our browsing history. Some more cookies are used to remember about us like our interests, our browsing patterns, etc. Websites show us ads based on our interests using cookies.

Some Popular Web Browsers

Here is a list of 7 popular web browsers:

1. Google Chrome:

Developed by Google, Chrome is one of the most widely-used web browsers in the world, known for its speed and simplicity.

2. Mozilla Firefox:

Developed by the Mozilla Foundation, Firefox is an open-source browser that is known for its privacy features and customization options.

3. Apple Safari:

Developed by Apple, Safari is the default browser on Mac and iOS devices and is known for its speed and integration with other Apple products.

4. Microsoft Edge:
Developed by Microsoft, Edge is the default browser on Windows 10 and is known for its integration with other Microsoft products and services.
5. Tor Browser:
Developed by The Tor Project, Tor Browser is a web browser that is designed for anonymous web browsing and is based on Mozilla Firefox.
6. Opera:
Developed by Opera Software, Opera is a web browser that is known for its speed and built-in VPN feature.
7. Brave:
Developed by Brave Software, Brave is a web browser that is focused on privacy and security and blocks third-party ads and trackers by default.
These are some of the most popular web browsers, there are other browsers available such as Vivaldi, Waterfox, and so on. The choice of a web browser depends on the user's preference and requirements.

Functions of Web Browser

Our dependency on the Internet has massively increased. Stated below are functions of web browsers and how are they useful:

- The main function is to retrieve information from the World Wide Web and making it available for users
- Visiting any website can be done using a web browser. When a URL is entered in a browser, the web server takes us to that website
- To run Java applets and flash content, plugins are available on the web browser
- It makes Internet surfing easy as once we reach a website we can easily check the hyperlinks and get more and more useful data online
- Browsers user internal cache which gets stored and the user can open the same webpage time and again without losing extra data
- Multiple webpages can be opened at the same time on a web browser
- Options like back, forward, reload, stop reload, home, etc. are available on these web browsers, which make using them easy and convenient

Which web browser should you use?

Your browser choice depends on your needs. Do you prioritize privacy, speed, or browser features that improve your web browsing experience? Consider web browsers based on the following priorities.

1. Privacy

If privacy is your main priority, consider:

- The Tor browser

- Brave
- Mozilla Firefox
- Safari

2. Speed

If speed is your main concern, you should try:

- Google Chrome
- Brave
- Safari

3. Features

If the number of features and customization is your main target, you should consider:

- Vivaldi
- Mozilla Firefox
- Google Chrome

PRO TIP: *If you are not sure which browser to choose, try using multiple browsers to see which one is best for you. You might discover that different browsers are best suited for different tasks and keep several of them in rotation.*

Common Web browser features

Most Web browsers share standard features such as:

- A home button- which, when selected, will bring a user to a pre-defined homepage.
- A Web address bar, which allows users to input a Web address and visit a website.
- Back and forward buttons- which will take the user to the previous or the next page they were on.
- Refresh- a button which can be used to reload a Web page.

- Stop- a button which makes a Web cease communication with a Web server, stopping a page from loading.
- Tabs- which allow users to open multiple websites in a single window.
- Bookmarks- which allow a user to select specific, predefined-by-the-user websites.

Many browsers also offer plug-ins, which extend the capabilities of the browser. These plug-ins can allow users to, for example, make use of tasks such as adding security features.

Types of Web Browser

The functions of all web browsers are the same. Thus, more than the different types there are different web browsers which have been used over the years.

Discussed below are different web browser examples and their specific features:

1. WorldWideWeb

- The first web browser ever
- Launched in 1990
- It was later named “Nexus” to avoid any confusion with the World Wide Web
- Had the very basic features and less interactive in terms of graphical interface
- Did not have the feature of bookmark

2. Mosaic

- It was launched in 1993
- The second web browser which was launched
- Had a better graphical interface. Images, text and graphics could all be integrated
- It was developed at the National Center for Supercomputing Applications
- The team which was responsible for creating Mosaic was lead by Marc Andreessen
- It was named “the world’s first popular browser”

3. Netscape Navigator

- It was released in 1994
- In the 1990s, it was the dominant browser in terms of usage share
- More versions of this browser were launched by Netscape
- It had an advanced licensing scheme and allowed free usage for non-commercial purposes

4. Internet Explorer

- It was launched in 1995 by Microsoft
- By 2003, it has attained almost 95% of usage share and had become the most popular browsers of all
- Close to 10 versions of Internet Explorer were released by Microsoft and were updated gradually
- It was included in the Microsoft Windows operating system
- In 2015, it was replaced with “Microsoft Edge”, as it became the default browser on Windows 10

5. Firefox

- It was introduced in 2002 and was developed by Mozilla Foundation
- Firefox overtook the usage share from Internet Explorer and became the dominant browser during 2003-04
- Location-aware browsing was made available with Firefox
- This browser was also made available for mobile phones, tablets, etc.

6. Google Chrome

- It was launched in 2008 by Google
- It is a cross-platform web browser
- Multiple features from old browsers were amalgamated to form better and newer features
- To save computers from malware, Google developed the ad-blocking feature to keep the user data safe and secure
- Incognito mode is provided where private searching is available where no cookies or history is saved
- Till date, it has the best user interface

Apart from these, Opera Mini web browser was introduced in 2005 which was specially designed for mobile users. Before the mobile version, the computer version “Opera” was also released in 1995. It supported a decent user interface and was developed by Opera Software.

A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web. This includes Web pages, videos and images. The word "browser" originated prior to the Web as a generic term for user interfaces that let you browse (navigate through and read) text files online. Many people will use web browsers today for access to the internet and is seen almost as a necessity in how many navigate their daily life.

A Web browser is a client program that uses HTTP (Hypertext Transfer Protocol) to make requests of Web servers throughout the Internet on behalf of the browser user. Most browsers support e-mail and the File Transfer Protocol (FTP), but a Web browser is not required for those Internet protocols and more specialized client programs are more popular.

Web browser history

The first Web browser, called WorldWideWeb, was created in 1990. That browser's name was changed to Nexus to avoid confusion with the developing information space known as the World Wide Web. The first Web browser with a graphical user interface was Mosaic, which appeared in 1993. Many of the user interface features in Mosaic went into Netscape Navigator. Microsoft followed with its Internet Explorer (IE).

How a Web browser works

Web browsers work as part of a client/server model. The client is the browser which runs on the user’s device and makes requests to the Web server, while the server-side is the Web server which sends information back to the browser. The browser then interprets and displays the information on the user’s device.

Web browsers are normally made up of a number of interworking parts. This includes the user interface (UI), which is the level in which the user interacts with the browser. The browser engine is what queries the rendering engine, and the rendering engine is what renders the requested web page—interpreting the HTML or XML documents. Networking is what handles internet security and communication. A JavaScript interpreter is used to interpret and execute JavaScript code in a Website. The UI backend is used to make widgets such as

windows. Additionally, a persistence layer, called data persistence or storage, manages data such as bookmarks, caches and cookies.

Popular web browsers

Google Chrome is currently one of the most commonly used browsers. Other browsers include:

- Firefox- which was developed by Mozilla.
- Microsoft Edge- used a replacement for Internet Explorer, with Windows 10.
- Internet explorer- relegated to the past, Microsoft has mostly replaced Internet Explorer with Edge.
- Safari- a browser for Apple computers and mobile devices.
- Lynx- a text-only browser for UNIX shell and VMS users.
- Opera- a fast and stable browser that's compatible with most relatively operating systems.
- Flock- an open source browser based on Firefox and optimized for Web 2.0 features such as blogging and Social bookmarking.

What is a web browser?

A web browser is a software application that allows you to access and navigate web pages on the internet. It displays websites on your computer screen and helps you interact with them by clicking on links or entering text. The most popular web browsers are Google Chrome, Apple Safari, Mozilla Firefox, and Microsoft Edge.

A brief history of web browsers

The first browsers ever created are either no longer in use or have undergone major changes. Browser history begins in 1990, when Tim Berners-Lee created the first browser called the WorldWideWeb — it was the only browser and the only way to access the web.
Next came Lynx, the text-based browser that couldn't display any graphic content, followed by Mosaic, which already allowed images embedded in text. In 1994, Netscape Navigator was released, capitalizing on Mosaic's capabilities. Soon after, in 1995, Microsoft introduced its first web browser, Internet Explorer, making web surfing even easier. Two years later, the so-called browser wars began, with the newly released Opera going head-to-head with Internet Explorer and Navigator.
The year 2003 saw the release of Apple Safari, the default browser for macOS and iOS, followed by Mozilla Firefox in 2004. In 2008, Google launched Chrome, which took the browser market by storm. Seven years later, Microsoft replaced Internet Explorer with Edge to counter Google Chrome's popularity. However, Google Chrome is still the most popular browser worldwide — as of August 2023, it accounts for 63.56 percent of the global web browser market share, with Safari a distant second, and Edge and Firefox even further behind.

How do web browsers work?

A web browser works by retrieving resources from a web server and displaying them on your computer screen. These resources, mostly web pages, are identified by URLs and include text, images, videos, and other content. Web browsers use the Hypertext Transfer Protocol (HTTP) to request these web pages and display them to you.
Web browsers function by translating Hypertext markup language (HTML) and Extensible Markup Language (XML) code into a viewable web page. The browser fetches this code from a web server, interprets it, and creates a visible web page on the screen of your device.

What's the difference between a browser and a search engine?

Browsers and search engines serve different purposes. Web browsers (Google Chrome, Apple Safari, Microsoft Internet Explorer) allow you to view, locate, and access websites, while search engines (Google, Bing, Yahoo) are particular websites that provide you with search results that you can access via a web browser.

Think of a search engine as a map, and a web browser as a car. You use a car to reach a particular location, just like you use a web browser to navigate to a specific web page on the internet. You also need a map to find the specific location just like you need a search engine to help you reach the web page you want.

You can type in a specific domain name into the URL (address) bar, and the browser will take you to that website. However, modern web browsers have built-in search functionality, so you can simply type in a search query (a phrase) instead of a domain name. The browser sends the query to the search engine, which processes the query, conducts a search, and provides a list of results (web pages). The browser then displays these search results and, once you click on the one you've selected, takes you to the web page.

Types of web browsers

There are mainstream web browsers like Google Chrome, Mozilla Firefox, or Apple Safari, and privacy-focused ones like the Tor browser. There are also mobile browsers, such as Mobile Safari for iOS devices and Chrome for Android devices. If you are still wondering which type is best for you, check out the details about each of the most popular web browsers below:

Google Chrome

Google Chrome wins over most users with its user-friendly interface and high loading speed. It's a secure web browser, offering seamless integration with Google services.

Pros:

- Speed. Fast loading speed and good stability.
- Safety and security. The "safe browsing" feature flags websites without HTTPS encryption as "not secure." Comes with file download scanning and malware blocklist warnings.
- Availability. Available across all operating systems.
- User friendliness. A stylish design and intuitive interface.

- Customization. The biggest library of extensions for customized browsing.
- Integration with Google services. Allows signing in with your Google account and easy to synchronize across all devices. Some Google services are accessible from the browser.

Cons:

- Privacy concerns. Google can track and process your data.
- Resource-intensive. A relatively high CPU/RAM consumption.

Microsoft Edge

Microsoft Edge is the default web browser for the Windows operating system, so go for it if you need close integration with Windows 10 and 11 as well as Microsoft services. It's a fast browser that offers additional features for convenient browsing.

Pros:

- High connection and loading speed.
- Lots of built-in features. Web Note allows you to annotate web pages, Collections lets you organize and save web content, and Reading View strips away ads and other distractions. Offers an AI-powered Bing chatbot.
- Privacy settings are very clear. Security features help to protect from phishing and malware. Offers third-party tracking prevention features.
- Compatible with most Google Chrome extensions.

Cons:

- Collects browsing history and favorites.
- Limited extension library compared to Google Chrome and Mozilla Firefox.

Safari

Designed specifically for Apple devices, Safari offers seamless integration on Mac, iPhone, and iPad. It's also energy efficient.

Pros:

- Good performance and fast loading speed.
- Seamless integration with Apple devices.
- Built-in tools limit cross-site tracking and third-party cookies and protect users from hacks.
- Energy efficient.

Cons:

- Optimized for Apple's ecosystem.
- Limited customization features.
- Limited data synchronization options.
- Fewer add-ons and extensions available.

Mozilla Firefox

Mozilla Firefox might appeal to you if you're looking for strong privacy protection features and customization options.

Pros:

- Customization options thorough add-ons and extensions.
- Strong privacy protection features. Blocks many forms of cross-site tracking.
- Less inclined to track your browsing activities.
- Offers a good extension library.
- Goes easy on resource usage.
- Compatible across devices and syncs data seamlessly.

Cons:

- Slower compared to other top web browsers. Extensions may also slow it down.

Opera

The Opera browser is for you if you want unique privacy features and easy access to messaging apps.
Pros:

- Offers built-in privacy features.
- Fairly well customizable.
- Has a turbo mode and battery saver mode.

Cons:

- Interface might look cluttered.
- Not as fast as Chrome or Firefox.
- Offers less community support.

Brave

You can try Brave if you want your browser to improve your privacy and web browsing speed.
Pros:

- A minimalist interface.
- Automatically blocks ads from other networks, cross-site trackers, third-party cookies, fingerprinting, bounce tracking, some types of malware, and phishing attempts.
- Light on system resources.
- One of the few browsers that offer access to onion sites.

Cons:

- Runs its own ad network.
- Has a limited user base.

Tor

The Tor browser is probably the best browser for privacy, but it has a poor reputation due to its associations with the dark web.
Pros:

- Hides your IP address and browsing history. Encrypts your traffic for private browsing.

- One of the few browsers that offer access to onion sites.

Cons:

- Encrypts your traffic multiple times, so your connection may be slower than normal. Loading speed might also be slower.
- Some services block Tor or restrict Tor users' access to certain resources.

Vivaldi

You might like Vivaldi because of the high level of customization. But keep in mind that it requires a certain level of technical know-how.

Pros:

- Highly customizable interface and functionality.
- Feature rich, includes tab stacking, note-taking, web panels, and mouse gestures.
- Does not track users. Offers robust privacy settings and features.

Cons:

- Rather complex and better suited for technical users.
- Has a smaller user base.
- Might be resource intensive, especially with many tabs or customizations.

Maxthon

You might enjoy Maxthon with its cloud-based features if you want an alternative to a mainstream browser.

Pros:

- Cloud services allow you to sync your data across multiple devices to easily switch between them, including mobile devices.
- It's relatively light on system resources.
- It offers built-in features like resource sniffers, night mode, a screen capture tool, and a built-in blockchain wallet.

Cons:

- Not widely known or used.

- Some websites and apps might not be well-optimized for Maxthon.

Comparison of web browsers

Browser	Pros	Cons
Google Chrome	Widely used, fast, integrates with Google services	Resource intensive, privacy concerns
Mozilla Firefox	Privacy features, customizable	Slower, smaller extension library
Apple Safari	Optimized for Apple devices, energy efficient	Limited to Apple devices, less customizable
Microsoft Edge	Integrated with Microsoft Windows, resource efficient	Limited extensions
Opera	Innovative features	Compatibility issues
Brave	Privacy, rewards system	Limited user base

What is email?

Electronic mail, commonly shortened to “email,” is a communication method that uses electronic devices to deliver messages across computer networks. "Email" refers to both the delivery system and individual messages that are sent and received.

Email has existed in some form since the 1970s, when programmer Ray Tomlinson created a way to transmit messages between computer systems on the Advanced Research Projects Agency Network (ARPANET). Modern forms of email became available for widespread public use with the development of email client software (e.g. Outlook) and web browsers, the latter of which enables users to send and receive messages over the Internet using web-based email clients (e.g. Gmail).

Today, email is one of the most popular methods of digital communication. Its prevalence and security vulnerabilities also make it an appealing vehicle for cyber attacks like phishing, domain spoofing, and business email compromise (BEC).

How does email work?

Email messages are sent from software programs and web browsers, collectively referred to as email ‘clients.’ Individual messages are routed through multiple servers before they reach the recipient’s email server, similar to the way a traditional letter might travel through several post offices before it reaches its recipient’s mailbox.

Once an email message has been sent, it follows several steps to its final destination:

•The sender’s mail server, also called a Mail Transfer Agent (MTA), initiates a Simple Mail Transfer Protocol (SMTP) connection.

•The SMTP checks the email envelope data — the text that tells the server where to send a message — for the recipient’s email address, then uses the Domain Name System (DNS) to translate the domain name into an IP address.

•The SMTP looks for a mail exchange (MX)server associated with the recipient’s domain name. If one exists, the email is forwarded to the recipient’s mail server.

•The email is stored on the recipient’s mail server and may be accessed via the Post Office Protocol (POP)* or Internet Message Access Protocol (IMAP). These two protocols function slightly differently: POP downloads the email to the recipient’s device and deletes it from the mail server, while IMAP stores the email within the email client, allowing the recipient to access it from any connected device.

•To continue the postal system analogy, imagine Alice writes a thank-you note to Bob. She hands the letter to the mail carrier (MTA), who brings it to the post office to be sorted. At the post office, a processing clerk (SMTP) verifies the address written on the envelope. If the address appears to be written correctly and corresponds to a location that can receive mail (MX server), another mail carrier delivers the letter to Bob’s mailbox. After picking up the mail, Bob might keep the note in his desk drawer, where he can only access it at that location (POP) or put it in his pocket to read at any location (IMAP).

*The current version of the POP protocol is named POP3. REPORT 2023 Phishing Threats Report

What are the parts of an email?

An individual email is made up of three primary components: the SMTP envelope, the header, and the body.

SMTP envelope The SMTP “envelope” is the data communicated between servers during the email delivery process. It consists of the sender’s email address and the recipient’s email address. This envelope data tells the

mail server where to send the message, just as a mail carrier references the address on an envelope in order to deliver a letter to the correct location. During the email delivery process, this envelope is discarded and replaced every time the email is transferred to a different server.

Header

Like the SMTP envelope, the email header provides critical information about the sender and recipient. Most of the time, the header matches the information provided in the SMTP envelope, but this may not always be the case. For instance, a scammer may disguise the source of a message by using a legitimate email address in the header of an email. Because the recipient only sees the header and body of an email — not the envelope data — they may not know the message is malicious.

The header may also contain a number of optional fields that allow the recipient to reply to, forward, categorize, archive, or delete the email. Other header fields include the following:

•The 'Date' field contains the date the email is sent. This is a mandatory header field.

•The 'From' field contains the email address of the sender. If the email address is associated with a display name, that may be shown in this field as well. This is also a mandatory header field.

•The 'To' field contains the email address of the recipient. If the email address is associated with a display name, that may be shown in this field as well.

•The 'Subject' field contains any contextual information about the message the sender wants to include. It is displayed as a separate line above the body of an email.

•The 'Cc' (carbon copy) field allows the sender to send a copy of the email to additional recipients. The recipients marked in the 'To' field can see the email address(es) listed in the 'Cc' field.

•The 'Bcc' (blind carbon copy) field allows the sender to send a copy of the email to additional recipients. The recipients marked in the 'To' field cannot see the email address(es) listed in the 'Bcc' field.

•Body The body of an email contains any information the sender wishes to send: text, images, links, videos, and/or other file attachments, provided that they do not exceed the email client's size restrictions. Alternatively, an email can be sent without any information in the body field.

Depending on the options provided by the email client, the body of an email can be formatted in plain text or HTML. Plain text emails do not contain any special formatting (like non-black font colors) or multimedia (like images). They are compatible with all devices and email clients. HTML emails do allow formatting and multimedia within the body field, though some HTML elements may get flagged as spam by email filtering systems or may not display properly on incompatible devices or clients.

What is an email client?

An email client is a software program or web application* that enables users to send, receive, and store emails. Popular email clients include Outlook, Gmail, and Apple Mail. Software- and web-based email clients each have advantages and disadvantages. Desktop email clients often come with more robust security capabilities, streamline email management across multiple accounts, provide offline access, and allow users to back up emails to their computers. By contrast, web-based clients are usually cheaper and easier to access — since users can log in to their account from any web browser — but are reliant on an Internet connection and can be more susceptible to cyber attacks. *Originally, 'email' referred to desktop email clients and 'webmail' referred to web-based email clients. Today, the term 'email' encompasses both systems.

What is an email address?

An email address is a unique string of characters that identifies an email account, or 'mailbox,' where messages can be sent and received. Email addresses are formatted in three distinct parts: a local-part, an "@" symbol, and a domain. For example, in the email address employee@example.com, "employee" denotes the local-part and "example.com" denotes the domain. Imagine addressing a letter: the domain signifies the city where the recipient lives, while the local-part specifies the street and house number at which the letter can be received. Local-part The local-part tells the server the final location of an email message. It may include a combination of letters, numbers, and certain punctuation marks (like underscores).

The maximum number of characters for an email address (including both the local-part and domain) is 320, though the recommended length is capped at 254 characters. Domain The domain may be a domain name, like example.com, or an IP address, like 192.0.2.0. In the former case, the SMTP protocol uses DNS to translate a domain name into its IP address before delivering the message to the next server. Like the local-part, the domain also has to adhere to certain formatting requirements established by the Internet Engineering Task Force (IETF). Approved domain names may include a combination of uppercase and lowercase letters, numbers, and hyphens. An email address can also be formatted with an IP address in brackets instead of a domain name, although this is rare. The character limit for a domain name is 63.

Is email secure?

Although email is often used to exchange confidential information, it is not a secure system by design. This makes it an attractive target for attackers, who may intercept an unencrypted message, spread malware, or impersonate legitimate organizations. Other email security threats include social engineering, domain spoofing, ransomware, spam, and more. One of email's most significant vulnerabilities is its lack of built-in encryption, leaving the contents of an email visible to any unauthorized party that might intercept or otherwise gain access to the message. In an attempt to make email more secure, many email clients offer one of two basic encryption capabilities: Transport Layer Security encryption(or 'TLS encryption') and end-to-end encryption(or 'E2EE'). During TLS encryption, messages are encrypted during transit (from user to server or server to user), and the email service provider retains possession of the private key used to set up this encryption. The email service provider can therefore see the unencrypted contents of the email. During end-to-end encryption (from user to user), messages can only be decrypted by the sender and recipient of the email. For a complete rundown of email security best practices, see What is email security?

Popular Email Services

These are some popular email services:

Gmail

- This email service is extremely popular because you can easily share information across other Google platforms (e.g., Google Docs, Google Drive, and Google Photos).
- Easily accessible on desktops, phones, and tablets.
- Powerful search options.
- Secure.

Outlook

- Upgrades allow for the use of Microsoft Office tools. This is appealing in academic and business settings.

- Message recovery.
- Ease of use on desktops, phones, and tablets.

Yahoo! Mail

- Includes Yahoo News.
- Large storage.
- Secure.

Formal and informal are types of email.