# CA518 –
# PROGRAMMING THE INTERNET

## UNIT-1
## Basics in Web Design

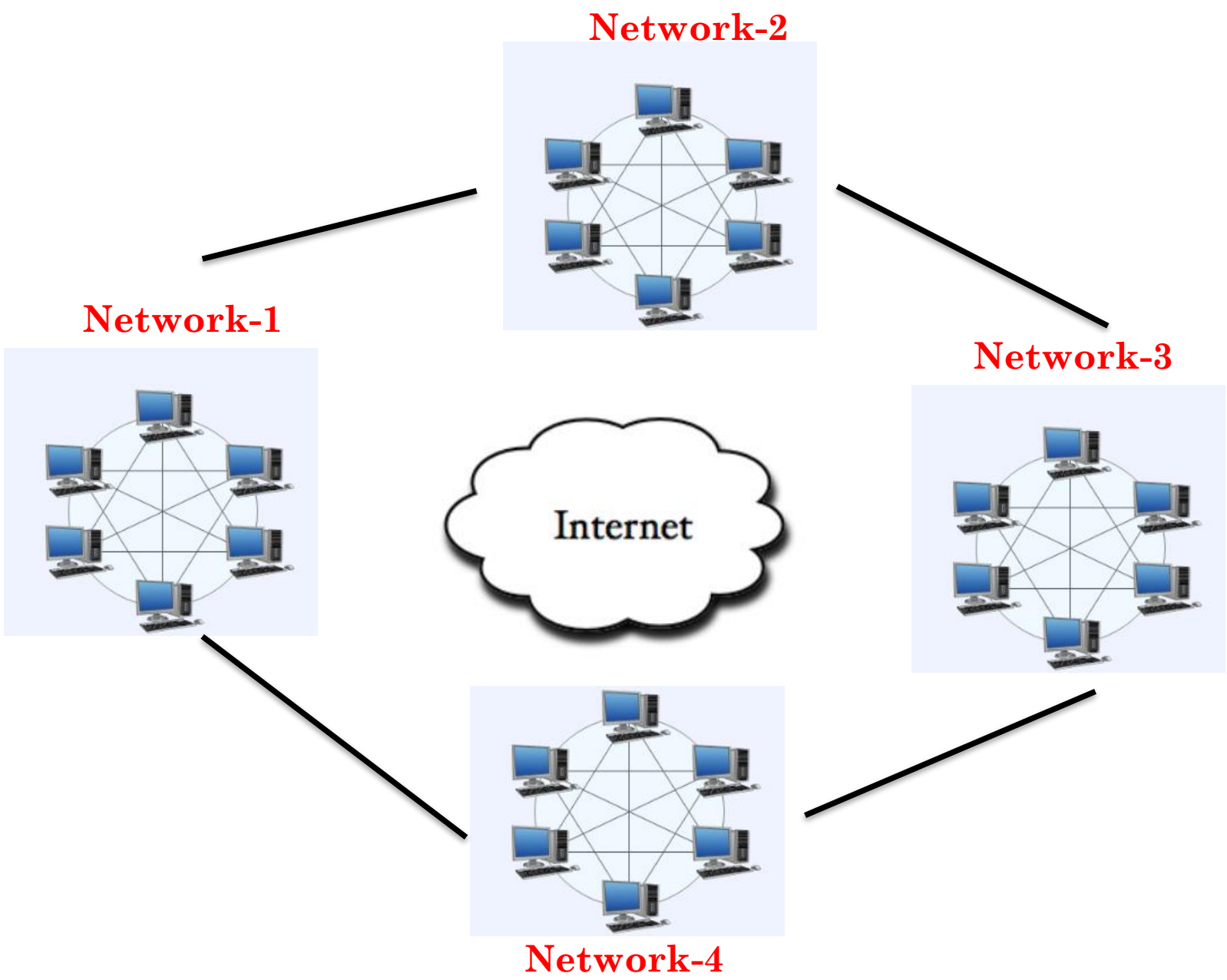
**Prepared By:**
**Konica Soni**

| Course Title | Teaching Scheme | | | | Examination Scheme | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Contact Hours | | | Credit | Theory | | | Practical | | | Total |
| | | | | | Internal | | External | Internal | | External | |
| | Theory | Practical | Total | | Case Study | Tests/ Criteria | | Term work | Tests | | |
| Programming The Internet | 3 | 3 | 6 | 6 | 10 | 20 | 70 | 15 | 15 | 70 | 200 |

# What is the most require thing in the world today?

# What is the basic requirement for this device?

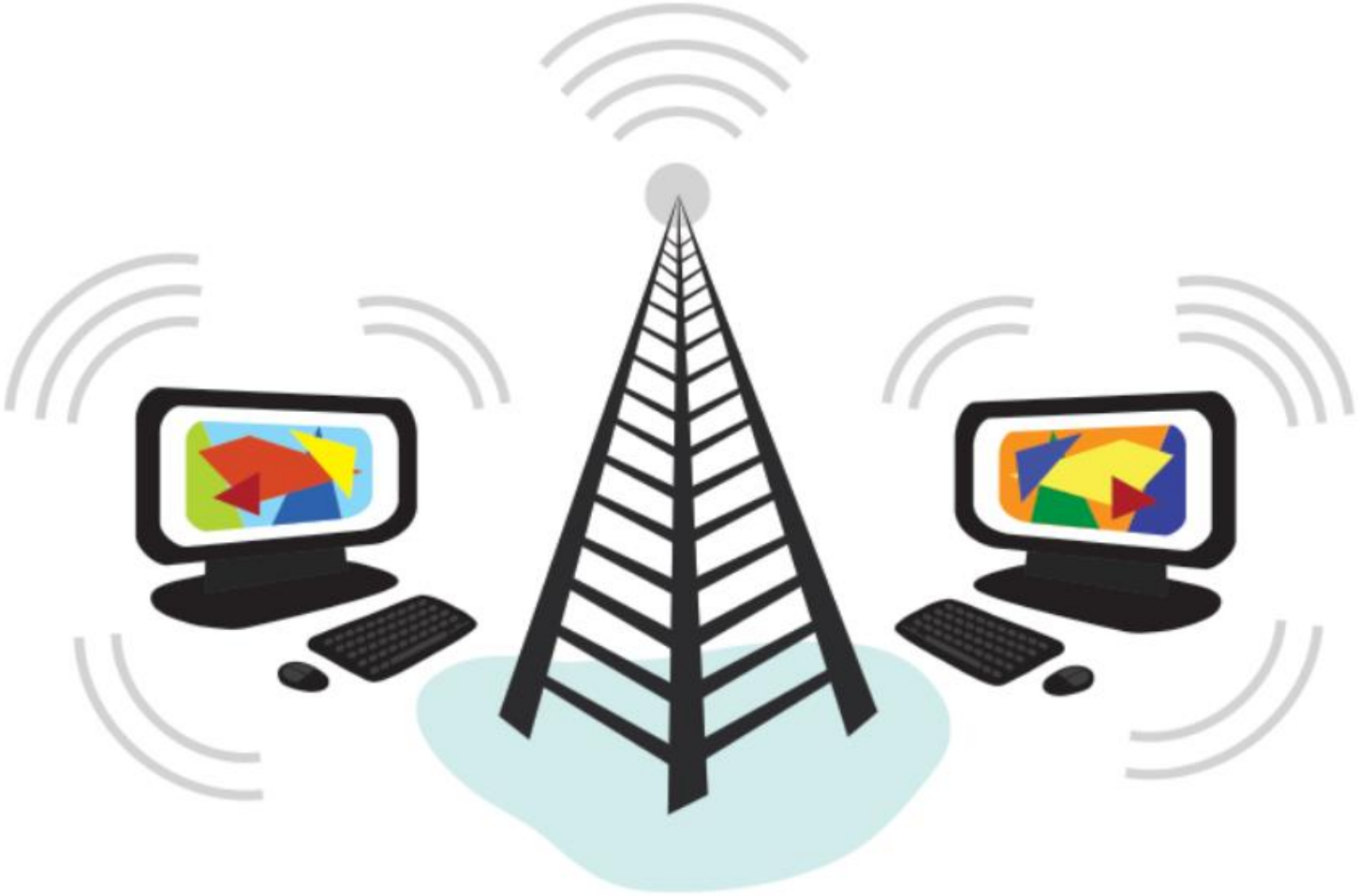
Internet




**Network** is a group of two or more computers or other electronic devices that are interconnected for the purpose of exchanging data.

# WHAT IS INTERNET?

- INTERNET stands for **Interconnected Network**



# WHAT IS INTERNET ?

- The Internet is a **global network(network of network)** of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.

- The Internet is a vast network that connects computers all over the world. Through the Internet, people can share information and communicate from anywhere with an Internet connection.

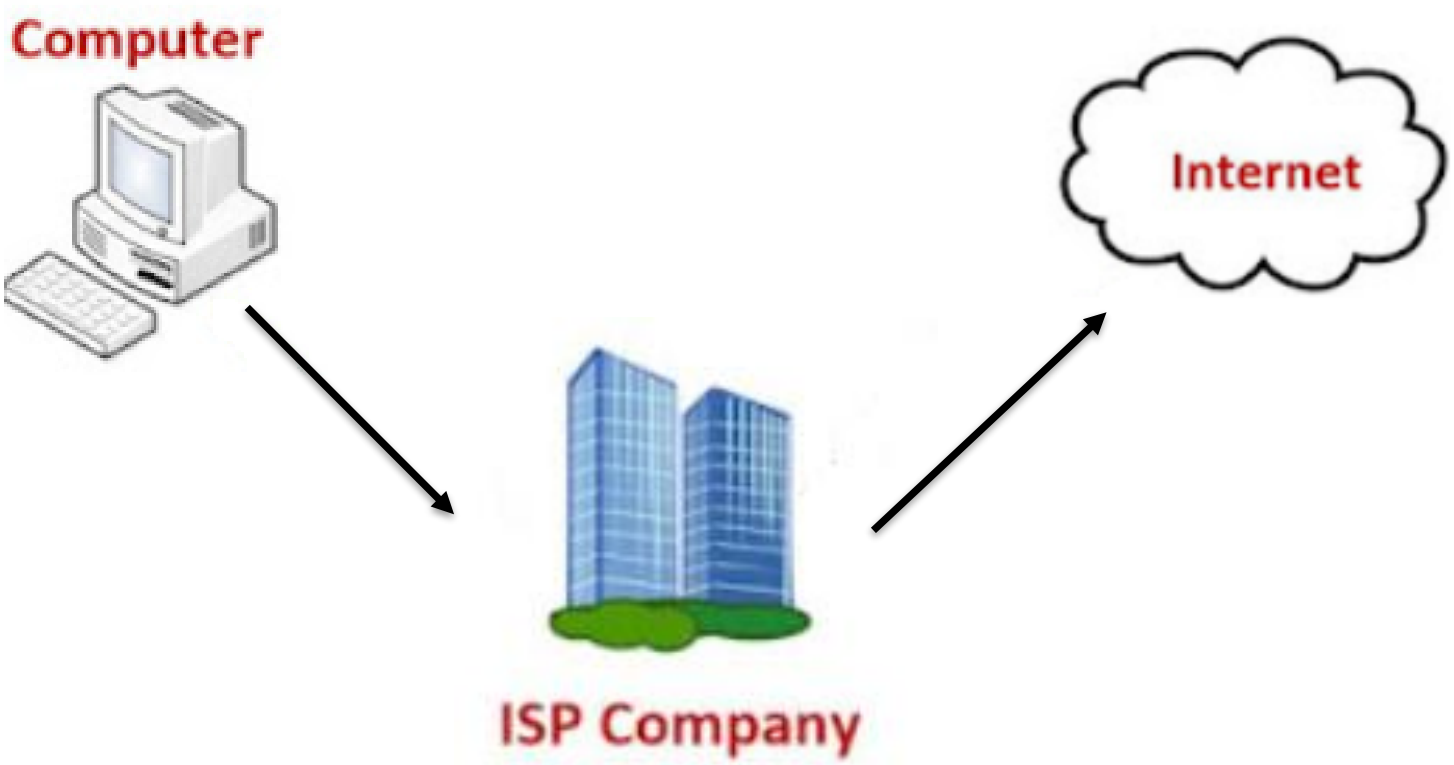
# INTERNET

- You can do all of this by connecting a computer to the Internet, which is also called **going online.**

- When someone says a computer is online, it's just another way of saying it's connected to the Internet.

# EVOLUTION

- The concept of Internet was originated in 1969 and has undergone several technological & Infrastructural changes as discussed below:
- The origin of Internet devised from the concept of **Advanced Research Project Agency Network (ARPANET).** ARPANET was developed by United States Department of Defense.
- Basic purpose of ARPANET was to provide communication among the various bodies of government. Initially, there were only four nodes, formally called Hosts.
- In 1972, the ARPANET spread over the globe with 23 nodes located at different countries and thus became known as Internet.
- By the time, with invention of new technologies such as TCP/IP protocols, DNS, WWW, browsers, scripting languages etc., Internet provided a medium to publish and access information over the web.


Computer
Internet
ISP Company

# What is ISP

- ISP stands for **Internet Service Provider.**
- ISP is a company that provides access to the internet
- ISPs can provide this access through multiple means, including dial-up, DSL, cable, wireless and fiber-optic connections.
- **Example of ISP are**
  - **Jio**
  - **BSNL**
  - **GTPL**
  - **Airtel**
  - **Vi**

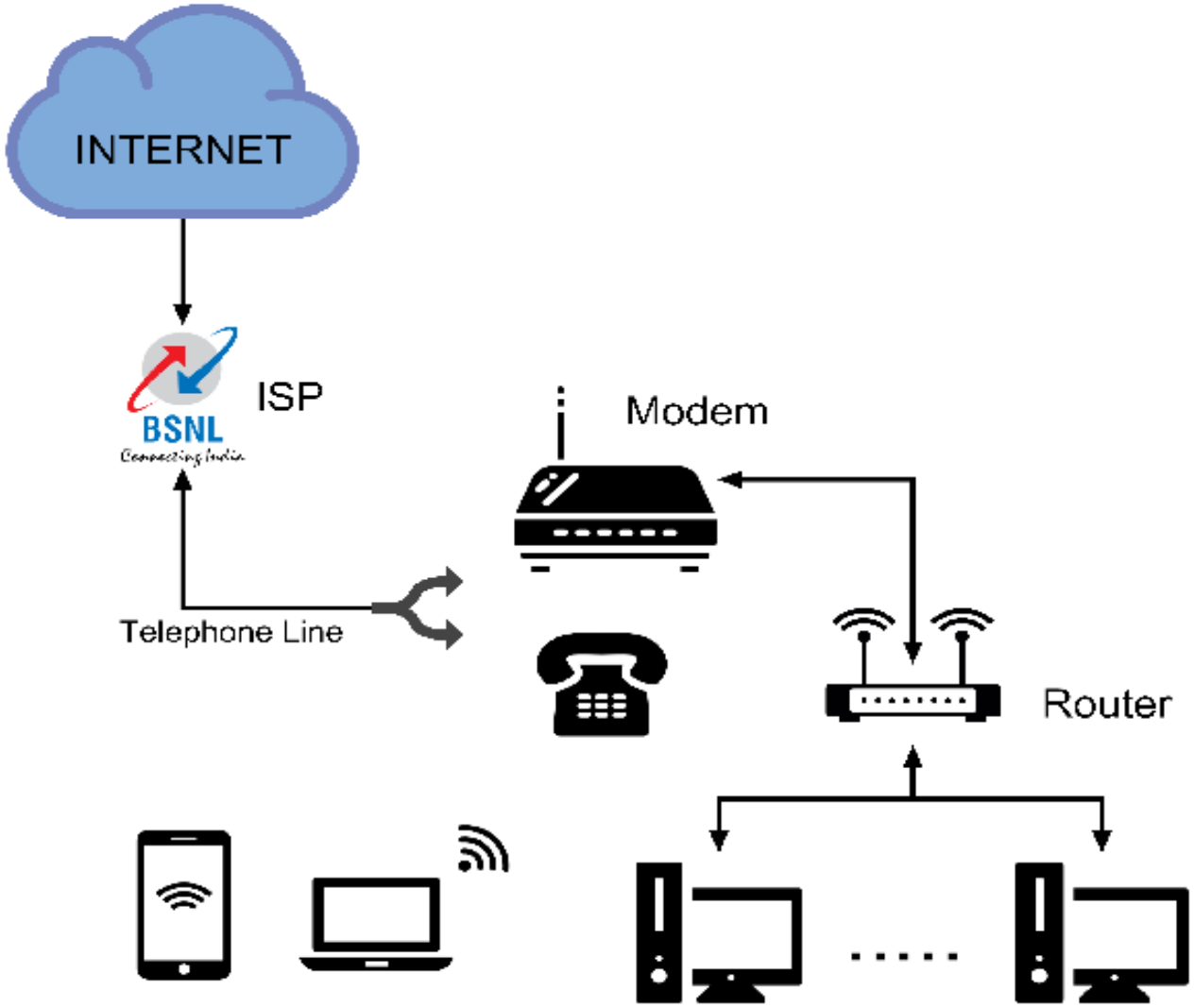
# How internet works?

- There are two main concepts that are fundamental to the way the Internet functions: *packets* and *protocols*.
- **Packets:**
  - In networking, a packet is a small segment of a larger message. Each packet contains both data and information about that data.
- **Protocols:**
  - 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.

# Types of Prototcols

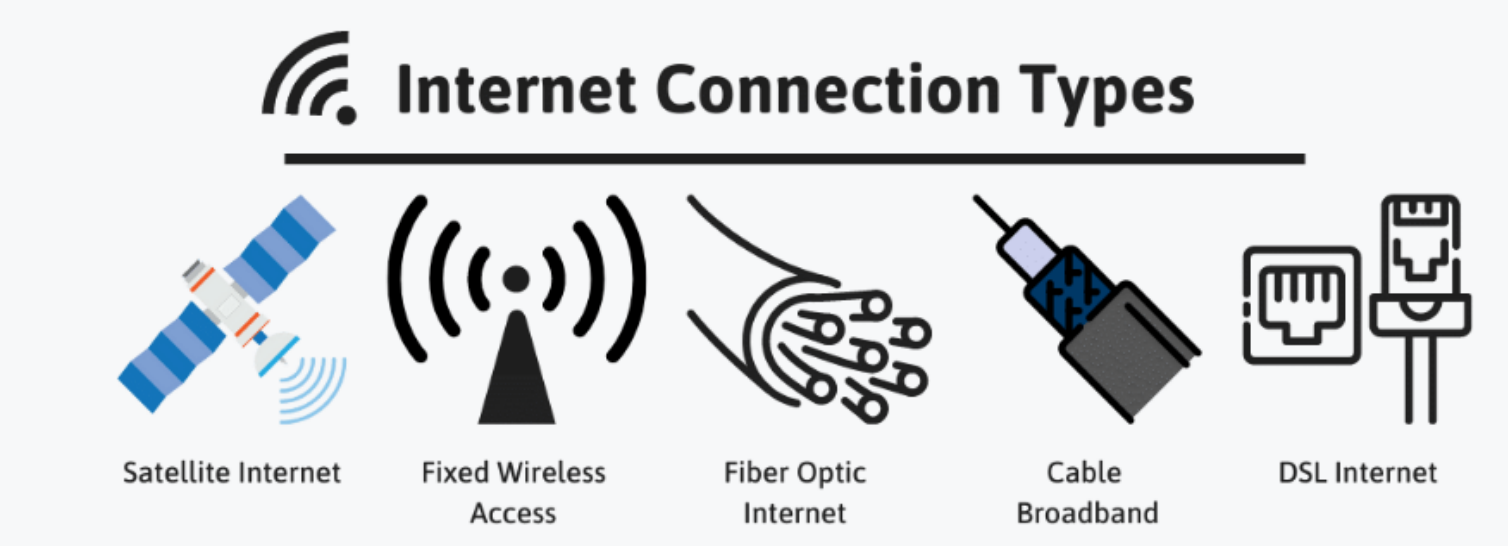
- **TCP/IP** (Transmission Control Protocol/Internet Protocol)
- **HTTP** (Hypertext Transfer Protocol)
- **FTP** (File Transfer Protocol)
- **SMTP** (Simple Mail Transfer Protocol)
- POP (Post Office Protocol)
- **IMAP** (Internet Message Access Protocol)

# How internet works?



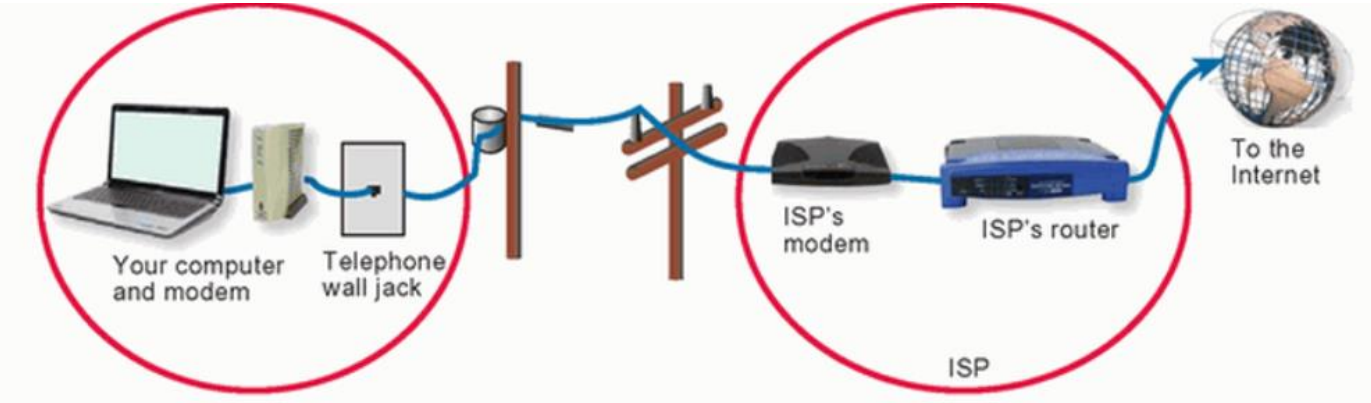
# Internet connection types

- The type of Internet service you choose will largely depend on which **Internet service providers** (ISPs) serve your area, along with the types of service they offer. Here are some common types of Internet service.



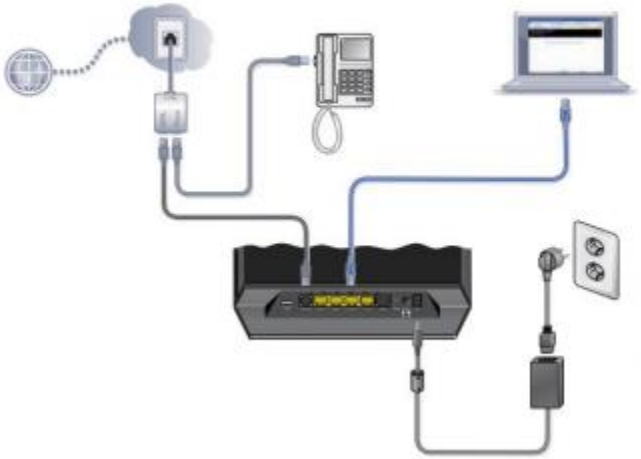
# INTERNET CONNECTION TYPES

- **1)Dial-up**: A dial-up connection is a fixed Internet connection that uses a voice band modem and telephone lines to transport data between your computer and your ISP.
- When you used dial-up connection, your computer's modem places a regular telephone call to your ISP.
- This is generally the slowest type of Internet connection.



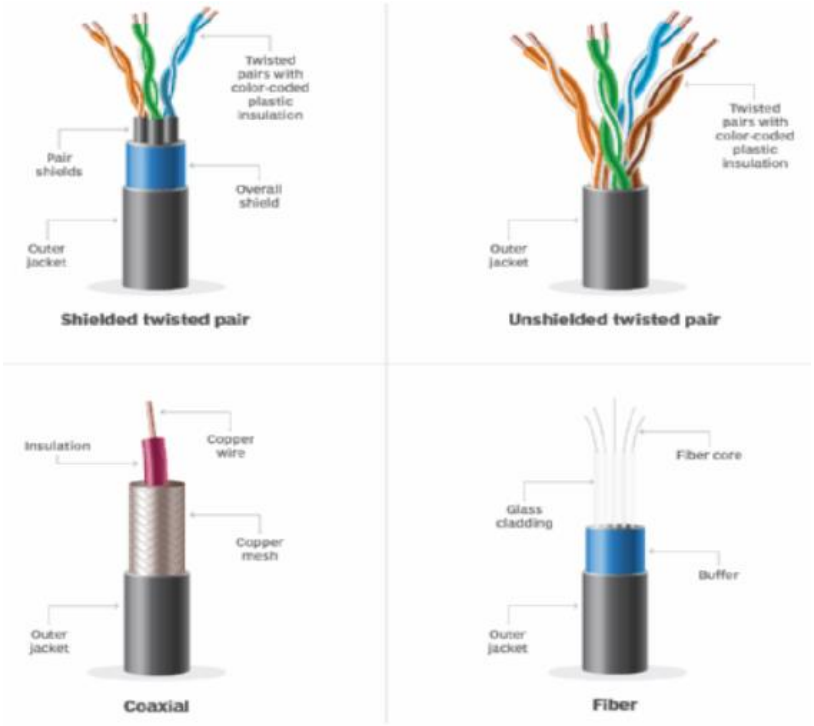
# INTERNET CONNECTION TYPES

**2)DSL** (**Digital Subscriber Line**) : DSL service uses a **broadband connection**, which makes it much faster than dial-up. DSL connects to the Internet **via a phone line** but does not require you to have a landline at home. And unlike dial-up, you'll be able to use the Internet and your phone line at the same time



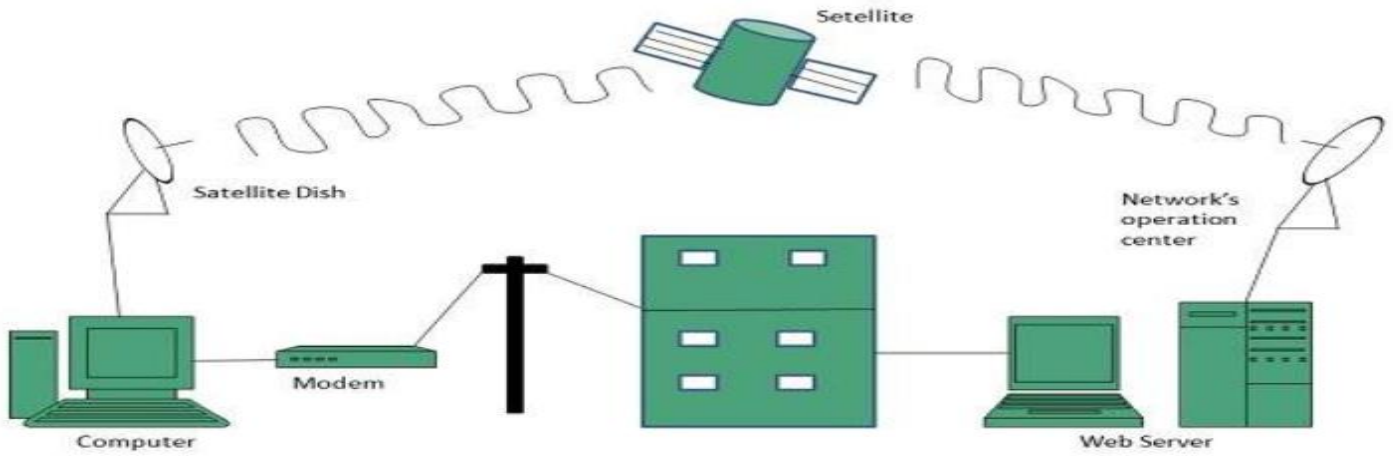
# Internet connection types

**3) Cable**: Cable service connects to the Internet **via cable TV**, although you do not necessarily need to have cable TV in order to get it. It uses a broadband connection and can be faster than both dial-up and DSL service; however, it is only available where cable TV is available.



# INTERNET CONNECTION TYPES

- **4) Satellite**: A satellite connection uses broadband but does not require cable or phone lines; it connects to the Internet **through satellites orbiting the Earth**. As a result, it can be used almost anywhere in the world, but the connection may be affected by weather patterns.
- Satellite connections are also usually slower than DSL or cable.



# INTERNET CONNECTION TYPES

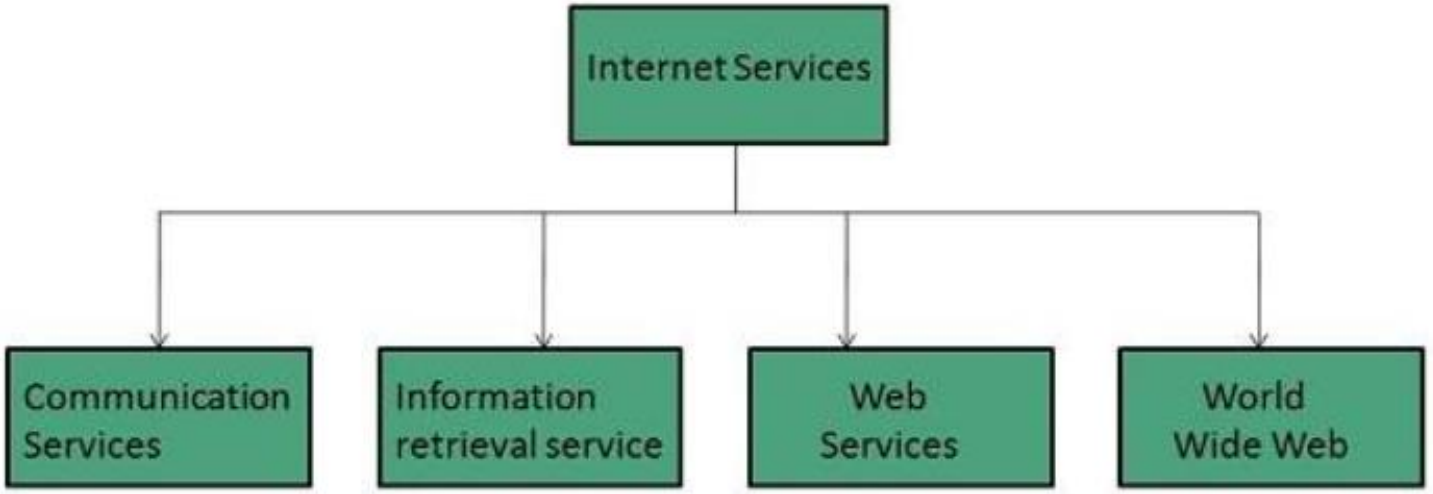
- **5) Wireless connection(3G and 4G)**:
- 3G and 4G service is most commonly used with mobile phones, and it connects **wirelessly** through your ISP's network. However, these types of connections aren't always as fast as DSL or cable.
- They will also **limit the amount of data** you can use each month, which isn't the case with most broadband plans.

***Note:***

Satellite signals go from **space to a satellite dish**, providing Internet. Meanwhile, fixed wireless(3G,4G) signals come from **radio towers**

# INTERNET SERVICES

- **Internet Services** allows us to access huge amount of information such as text, graphics, sound and software over the internet. Following diagram shows the four different categories of Internet Services.



# INTERNET SERVICES

## 1) Communication service

To exchange data/information among individuals or organizations, we need communication services. Following are some of the common communication services.

- **Electronic Mail**
  Used to send electronic message over the internet.
- **Telnet**
  Used to log on to a remote computer that is attached to internet. Telnet is a **client/server application protocol** that provides access to virtual terminals of remote systems on local area networks or the Internet. Telnet consists of two components: the protocol itself which specifies how two parties to communicate and the software application that provides the service
- **Newsgroup**
  Offers a forum for people to discuss topics of common interests.
- **Instant Messaging**
  Offers real time chat between individuals and group of people. Eg. Yahoo messenger, MSN messenger.

# INTERNET SERVICES

## 2) Information Retrieval service

- It is the procedure for gaining access to information/data stored on the Internet. Net surfing or browsing is the process of discovering and obtaining information from the Internet.
- When your computer is linked to the Internet, you may begin retrieving data.
- To get data, we need a piece of software called a Web browser. A print or computer-based information retrieval system searches for and locates data in a file, database, or other collection of data

- The following table gives a brief introduction to these services:

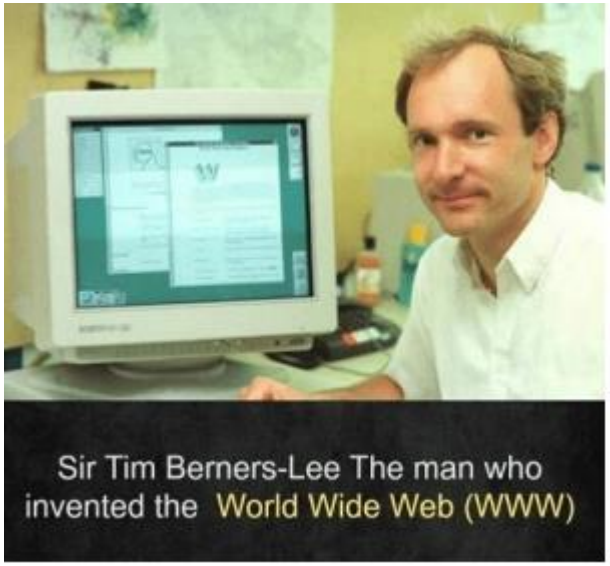
  - **File Transfer Protocol (FTP)**
    Enable the users to transfer files.
  - **Archie**
    It's updated database of public FTP sites and their content. It helps to search a file by its name. You can use an Archie client to search the database for specific files.

# INTERNET SERVICES

## 3) Web services

- A web service is a **software system** that supports interoperable machine-to-machine interaction over a network.
- A web service is either: a **service offered by an electronic device to another electronic device**, communicating with each other via the Internet, or a server running on a computer device, listening for requests at a particular port over a network, serving web documents.
- Simply the web services are the set of technologies and rules that enable two or more components on the web to talk to each other.

# INTERNET SERVICES




## 4) World wide Web

- WWW stands for world wide web.
- WWW is also known as W3 or web.
- It offers a way to access documents

spread over the several servers over the internet.

- These documents may contain texts, graphics, audio, video, hyperlinks.
- Simply www refers to all the public websites or pages that users can access on their local computers and other devices through the internet. These pages and documents are interconnected by means of hyperlinks that users click on for information.
- It is used before any website to search for the website on the internet Or web.

# What is www ?

- In simple terms, The World Wide Web is a way of exchanging information between computers on the Internet, tying them together into a vast collection of interactive multimedia resources.
- **Internet** and **Web** is not the same thing: Web uses internet to pass over the information.
- So, the **World Wide Web** is a collection of different **websites** you can access through the Internet.

# What is web server ?

- A web server is software and hardware that uses HTTP (Hypertext Transfer Protocol) and other protocols to respond to client requests made over the World Wide Web.
- The main job of a web server is to display website content through storing, processing and delivering webpages to users.

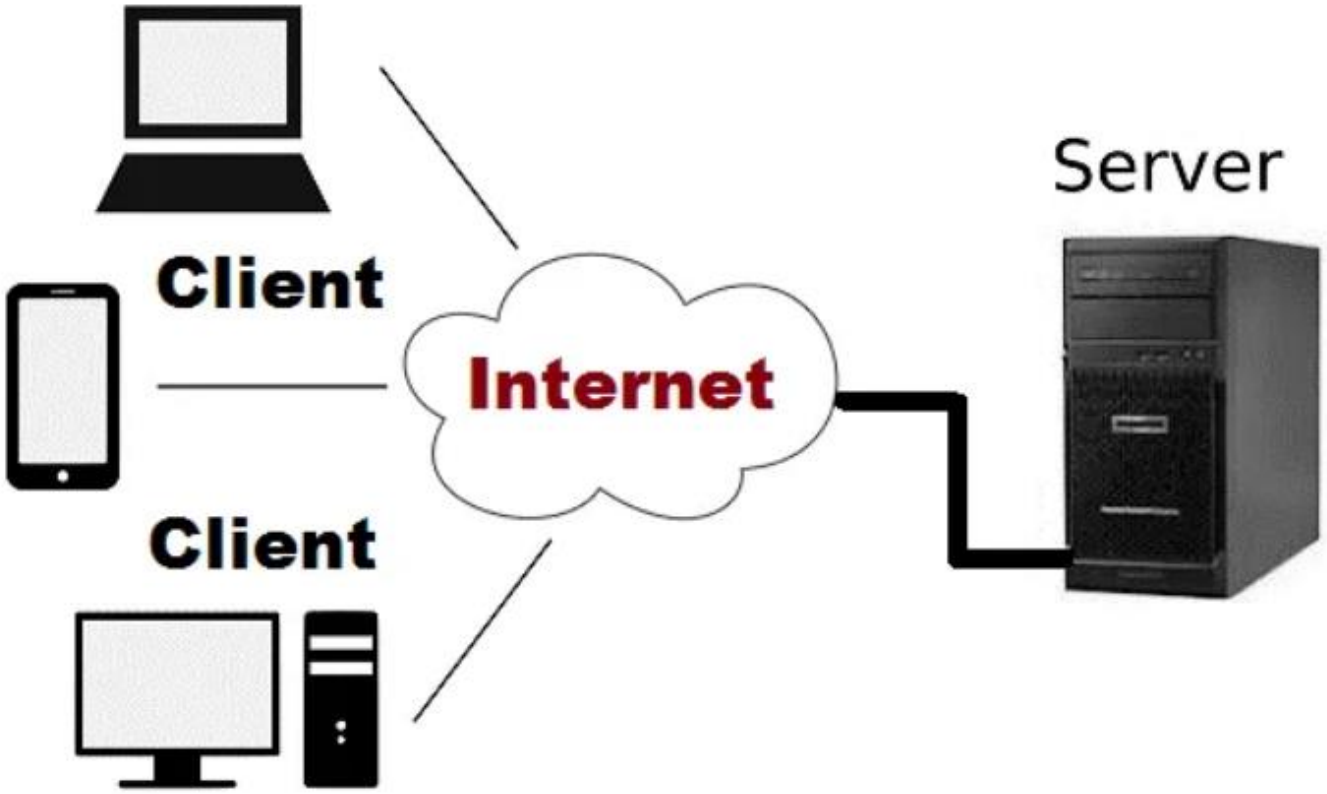
# Where is web server located?

- Web servers are typically located in data centers, which are large facilities that house many computers and other related equipment.
- Data centers are typically located in secure locations and are designed to provide a reliable and secure environment for web servers.

# What is web client ?

- A web client is a computer program that is used to access and view web pages.
- It is usually a web browser such as Google Chrome, Mozilla Firefox, or Microsoft Edge.

# How it works?



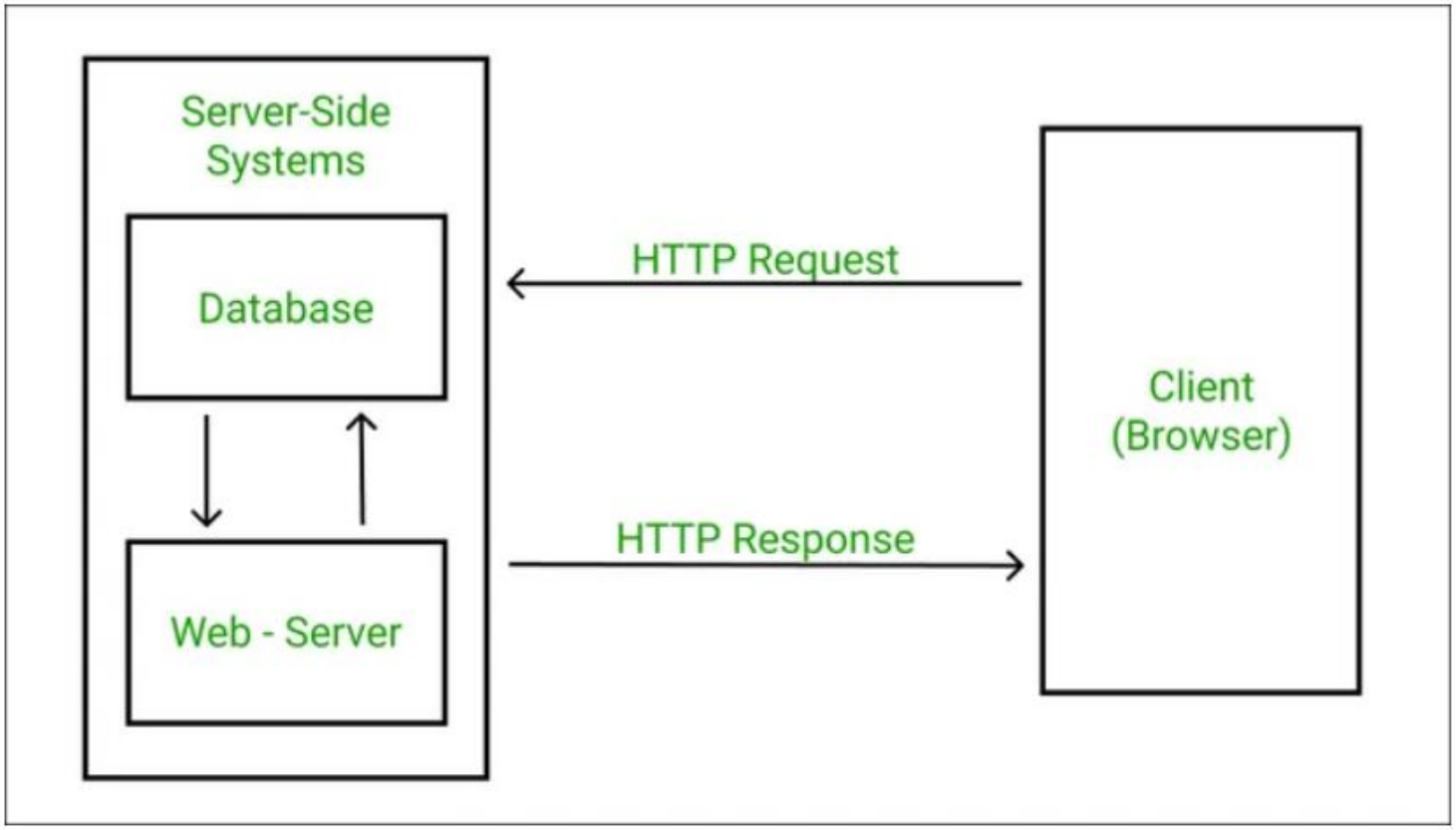
# What is HTTP ?

- **HTTP** is a communication protocol.
  - It defines mechanism for communication between browser and the web server.
  - It is also called request and response protocol because the communication between browser and server takes place in request and response pairs.

- **HTTPS: (Hyper text transfer protocol secure)**
  - It is **a secure way to send data** between a web server and a web browser.
  - It uses **encryption for secure communication** over a computer network, and is widely used on the Internet. In HTTPS, the communication protocol is encrypted

# How it works?

# How it works?




**1. Client requests for website from the web server.**

**2. Web server does processing using a dynamic language (PHP/ Python/ Node Js) and returns the response to client in the form of html, css and JS.**

# What is client side scripting language

- Client-Side Scripting refers to the output which is requested to the server by the end-users.
- The majority of this page is written in HTML. With client-side scripting, JavaScript is the primary language used.
- It is the most widely used language in this area, and it works with all programs.

# What is server side scripting language

- **Server side scripting** is a process in which server data formats into an HTML response before it is sent back to the web browser.
- In other words, a process in which the script code is executed by the web server on the server side after the page is requested is called server side scripting.

# Difference between client and server side scripting language

| Server side | Client side |
| --- | --- |
| It helps work with the back end. | It helps work with the front end. |
| It doesn't depend on the client. | It is visible to the users. |
| It runs on the web server. | The scripts are run on the client browser. |
| Server side scripting requires languages such as PHP, ASP.net, ColdFusion, Python. | Client side scripting involves languages such as HTML, CSS, JavaScript. |
| Source code is not visible to user | Source code is visible to user |
| The server-side scripting has complete access to all the files present in any web server. | The client-side scripting has no access to the files that exist in a web server. |
| | |

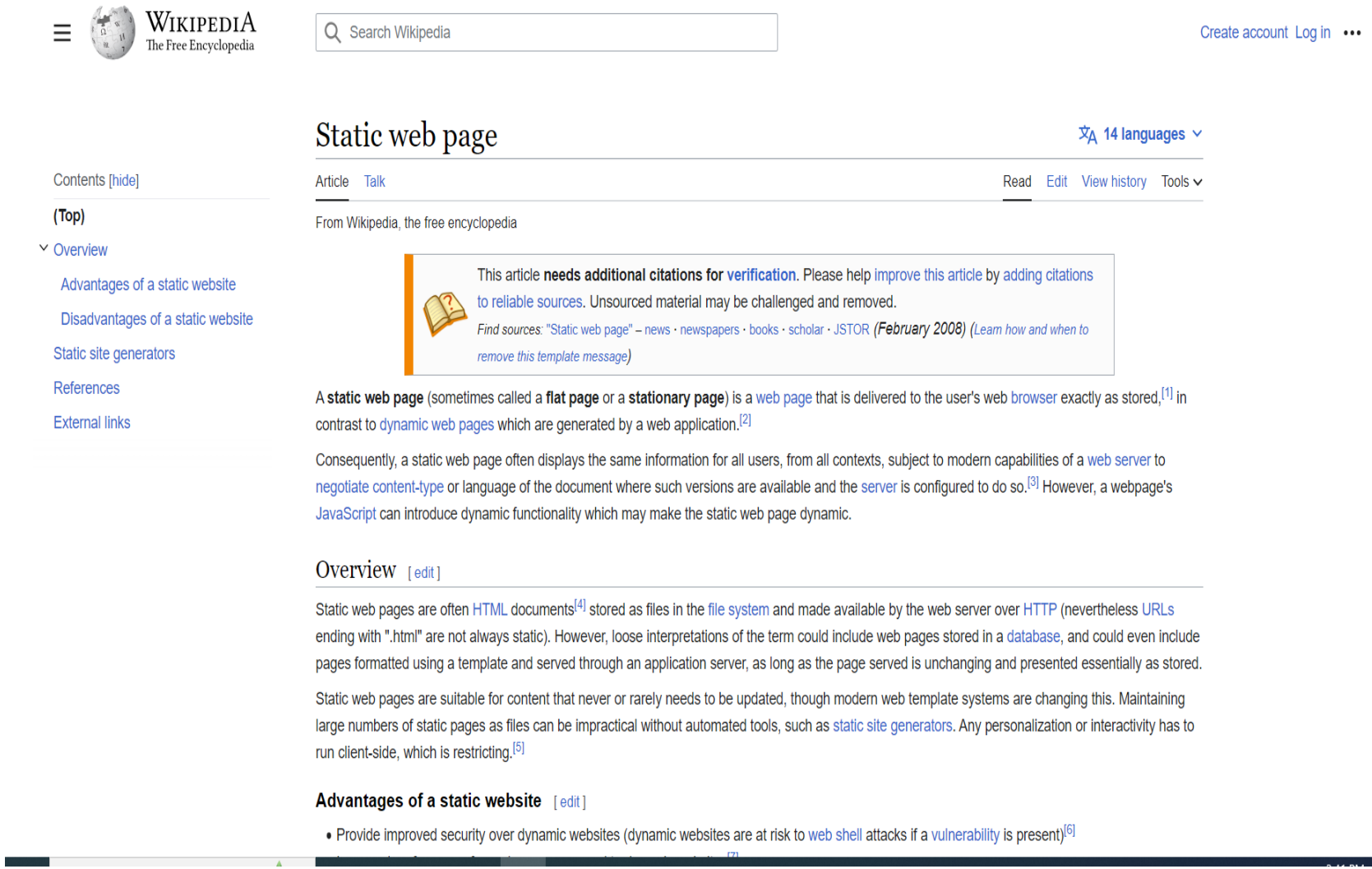
# Types of websites

- There are two types of websites.
  - Static
  - Dynamic

# Types of websites

- **Static Website** :A static web page is a web page that is delivered to the user's web browser exactly as stored.
- Static web pages are made of “fixed code,” and unless the site developer makes changes, nothing will change on the page
- **Dynamic Website** : A dynamic website contains information and content that changes, depending on factors such as the viewer of the site, the time of the day, the time zone, or the native language of the country the viewer).

# STATIC WEBSITE EXAMPLE



Wikipedia
The Free Encyclopedia

Search Wikipedia

Create account Log in

## Static web page

14 languages

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External links

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Read Edit View history Tools

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A **static web page** (sometimes called a **flat page** or a **stationary page**) is a web page that is delivered to the user's web browser exactly as stored,[1] in contrast to dynamic web pages which are generated by a web application.[2]

Consequently, a static web page often displays the same information for all users, from all contexts, subject to modern capabilities of a web server to negotiate content-type or language of the document where such versions are available and the server is configured to do so.[3] However, a webpage's JavaScript can introduce dynamic functionality which may make the static web page dynamic.

### Overview [edit]

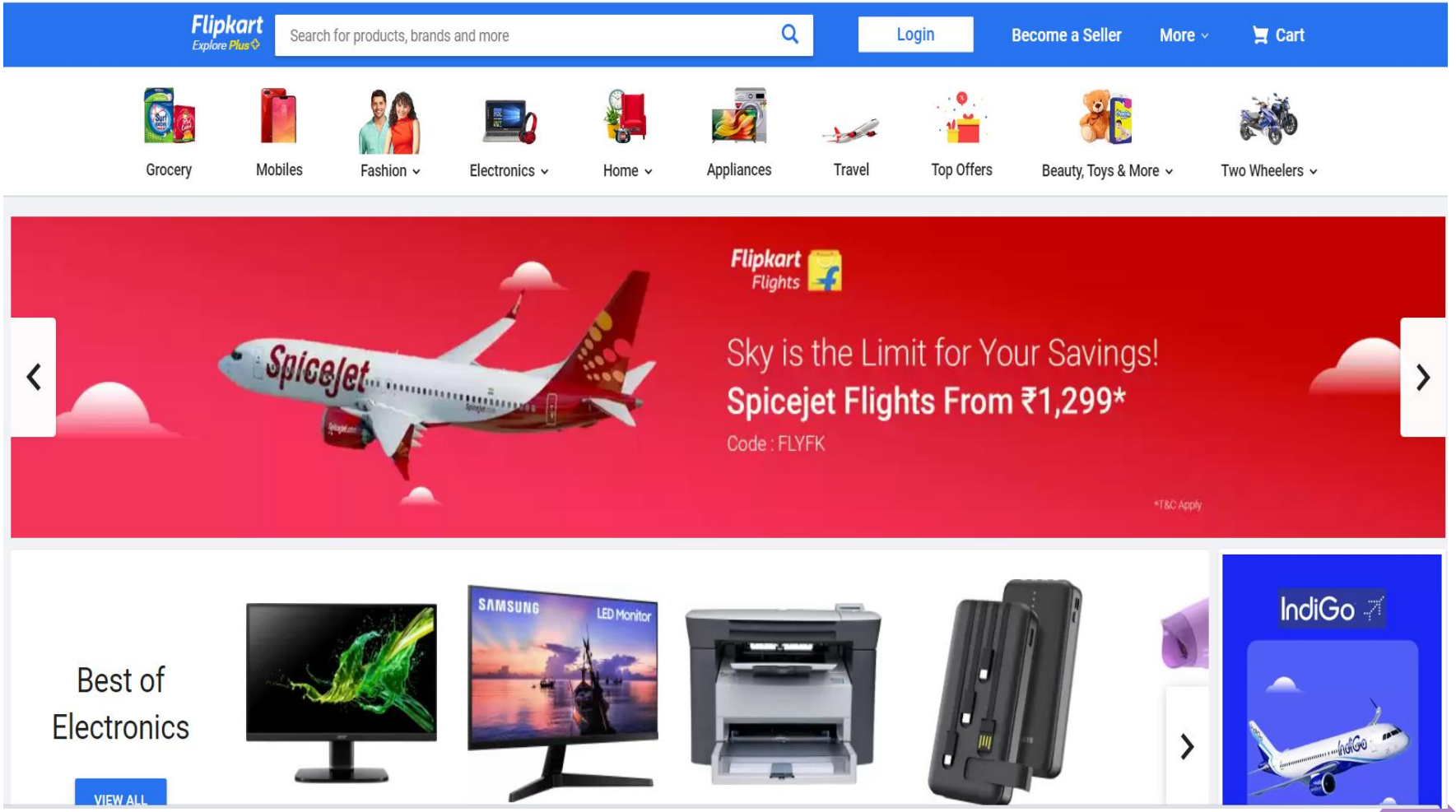
Static web pages are often HTML documents[4] stored as files in the file system and made available by the web server over HTTP (nevertheless URLs ending with ".html" are not always static). However, loose interpretations of the term could include web pages stored in a database, and could even include pages formatted using a template and served through an application server, as long as the page served is unchanging and presented essentially as stored.

Static web pages are suitable for content that never or rarely needs to be updated, though modern web template systems are changing this. Maintaining large numbers of static pages as files can be impractical without automated tools, such as static site generators. Any personalization or interactivity has to run client-side, which is restricting.[5]

### Advantages of a static website [edit]

- Provide improved security over dynamic websites (dynamic websites are at risk to web shell attacks if a vulnerability is present)[6]

# Dynamic website example



# DIFFERENCE

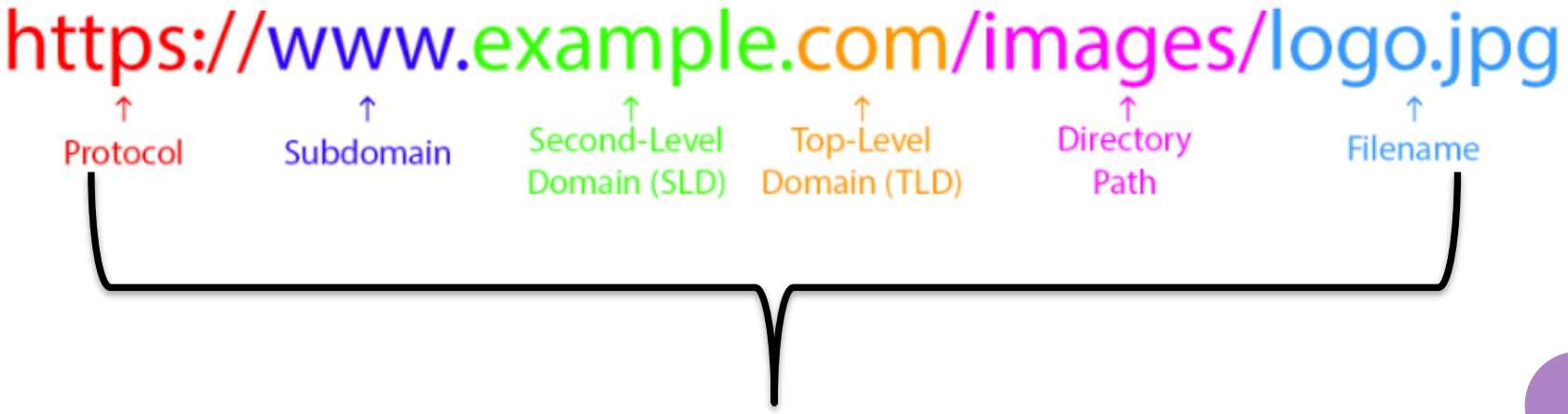
| Static Website | Dynamic Website |
| --- | --- |
| Content of Web pages can not be change at runtime. | Content of Web pages can be changed. |
| No interaction with database possible. | Interaction with database is possible |
| It is faster to load as compared to dynamic website. | It is slower than static website. |
| Cheaper Development costs. | More Development costs. |
| HTML, CSS, JavaScript is used for developing the website. | Server side languages such as PHP, Node.js are used. |
| Same content is delivered every time the page is loaded. | Content may change every time the page is loaded. |

# Web Development

- Web development refers to the **process of creating, building, and maintaining websites and web applications**.
- It involves various aspects such as web design, front-end development, back-end development, and web server configuration.
- Web developers use **programming languages**, **frameworks**, and **tools** to bring websites and web applications to life.

# What is URL ?

- A URL, or **Uniform Resource Locator**, is the address of a website or web page on the internet.
- It's a unique web address that will lead you to a specific webpage. Every page on the internet has its own URL, just like the one you are on now.
- A URL is the web address that you type into your web browser to visit a webpage.
- It refers to the entire address, including the scheme ("https://"), the domain name and any additional paths, parameters or anchors.



# What is URL ?

**1) Protocol**

**http:// or https://**

- The http is a protocol that stands for Hypertext Transfer Protocol. It tells the browser to which protocol will be preferred to use for accessing the information that is specified in the domain.
- The https (Hypertext Transfer Protocol Secure) is an enhanced protocol as compared to http as it concerned with security. It provides the surety that the information, which is transmitted over HTTP is secure and encrypted.
- The colon (:) and two forward slashes (//) are used to separate the protocol from the rest of the part of the URL.

# What is URL ?

**2) subdomain**

**www**

- The www is used to recognize the content, which stands for World Wide Web. This portion of the URL can be left out many times, as it is not required. For instance, if you type "http://google.com," you will still get the google website.

# What is URL ?

**3) SLD & TLD**

**Example.com**

- The example.com is the domain name for the website, and the .com is called TLD or suffix. It helps to identify the location or type of the website.
- Example of TLD:
  - .com : commercial
  - .gov : Government
  - .net : Network
  - .edu : Educational
  - .ac : academia
  - .org : Organization
  - .in : India
  - .au : Australia
  - .uk : United Kingdom
  - .us : United State

# What is URL ?

**4) Path / Directory**

**Images**

- Some URLs have page extensions, like .html. For example, URLs of files and images. An image URL ends with an image extension, like .logo.jpg.

# What is URL ?

**5) File name**

**Home.html / logo.jpg**

- The home.html is the name of the web page, and the .html is the file extension of the web page, which describes the file is an HTML file.
- There are many other file extensions available on the internet such as .php, .html, .xml, .jpg, .gif, .asp, .cgi, etc.

# What is internet Addressing ?

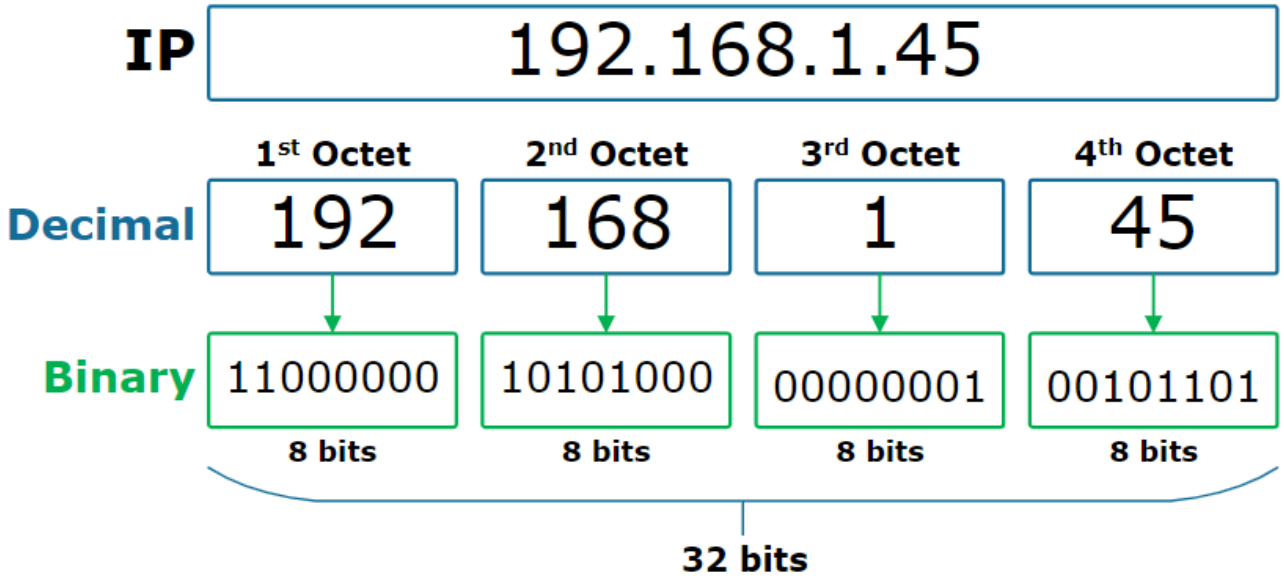
- IP address is a short form of "Internet Protocol Address."
- It is a unique number provided to every device connected to the internet network, such as Android phone, laptop, Mac, etc.
- An IP address is represented in an integer number separated by a dot (.), for example, 192.167.12.46.

An IP address is categorized into two different types based on the number of IP address it contains. These are:

- IPv4 (Internet Protocol version 4)
- IPv6 (Internet Protocol version 6)

# What is internet Addressing ?

- **IPv4 (Internet Protocol version 4)**
  - IPv4 is version 4 of IP. It is a current version and the most commonly used IP address. It is a **32-bit address** written in **four numbers** separated by a dot (.)
  - This address is unique for each device. For example, 126.12.25.15



# What is internet Addressing ?

- **IPv6 (Internet Protocol version 4)**
  - IPv6 is the next generation of IP addresses. The main difference between IPv4 and IPv6 is the address size of IP addresses. It is a **128-bit address.**

# What is internet Addressing ?

| IPV4 | IPV6 |
|---|---|
| Length : 32-bits | Length : 128-bits |
| Octet 4 | Octet 8 |
| 0 to 255 | 0 to FFFF (65535) |
| 4 billion ($2^{32}$) | 340 trillion($2^{128}$) |
| 192.168.0.1 | 2001:db8:3333:4444:5555:6666:7777:8888 |

Originally IP addresses were divided into five different categories called **classes**. These divided IP classes are class A, class B, class C, class D, and class E. Out of these, classes A, B, and C are most important.

# Classes of IP

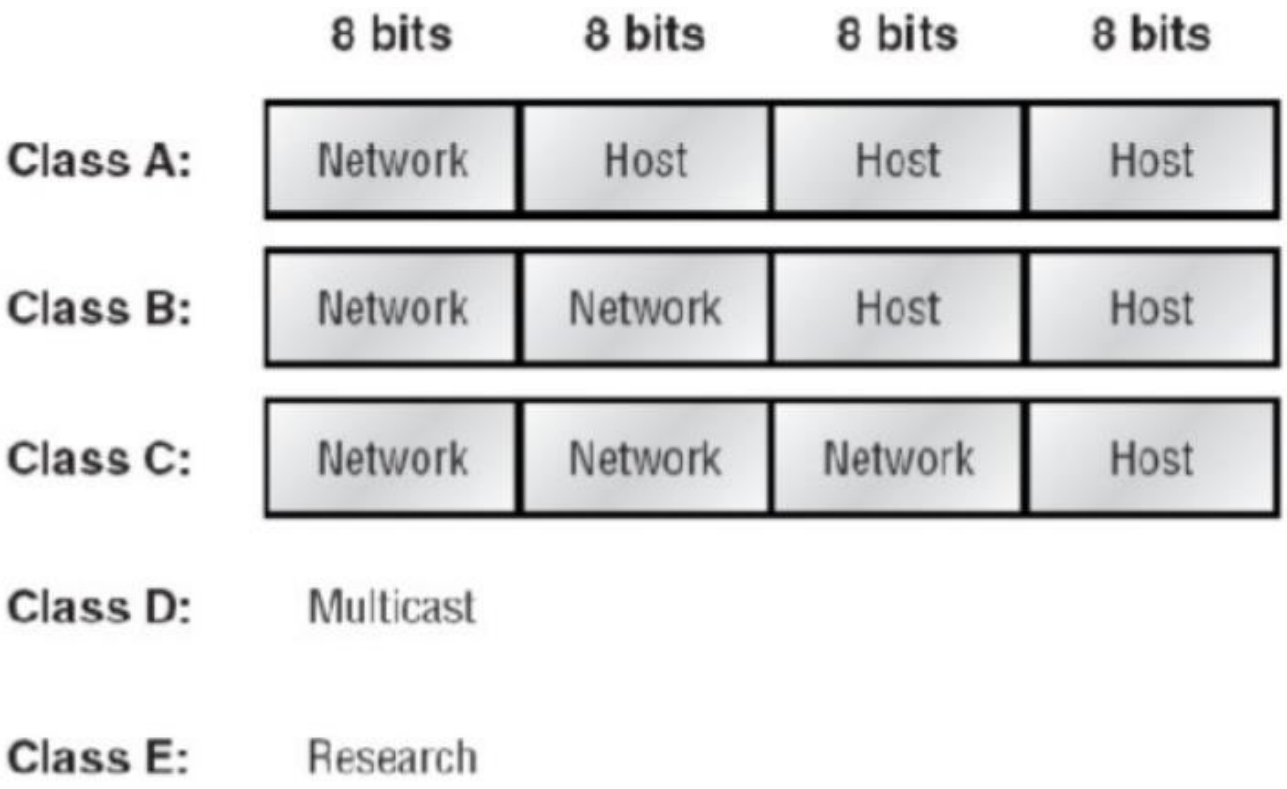
| Class | Range |
|---|---|
| Class A | 0 to 126 (12.16.20.152) |
| Class B | 128 to 191 (128.16.15.20) |
| Class C | 192 to 223 (192.16.14.20) |
| Class D | 224 to 239 (used for multicasting) |
| Class E | 240 to 255 (used for research) |

Note : 127.0.0.1 is allocated for local server.

# Classes of IP

IP Address separated in two parts

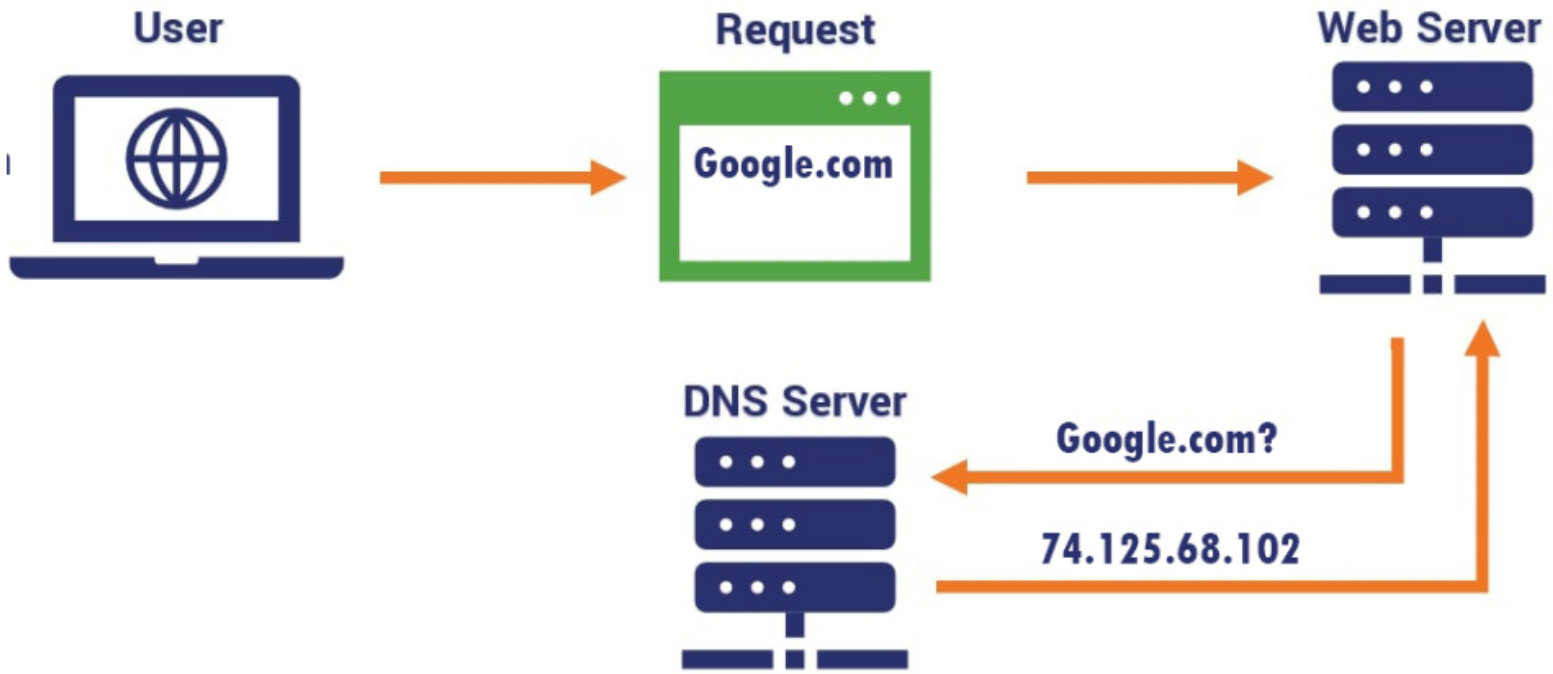
1) Network IP
2) Host IP



# What is DNS ?

- DNS stands for domain name server/System.
- The DNS is a global network of servers responsible for matching domain names to IP addresses, and it contains many types of machines. One of these machines is called a server.
- The Domain Name System (DNS) turns domain names into IP addresses, which browsers use to load internet pages.
- DNS acts like a phonebook for the internet. Whenever people type domain names, like gmail.com, into the address bar of web browsers, the DNS finds the right IP address.

# What is DNS ?




When a computer or mobile user types a domain name in the address bar of the browser then the browser sends a request to the DNS server. The DNS server finds the IP address and then connect it with the hosting and then the web page is displayed on the browser.

# Basic elements of the Internet

- The main elements of the Internet are the
  - cloud
  - Connection
  - user
  - browser
  - website
  - social networks

# Basic elements of the Internet

## 1) cloud

- A cloud is a collection of computers connected to a specific network protocol.
- This protocol allows you to transmit data, which can be websites, e-mail, audio or video.

## 2) Connection

- It refers to a link that connects the cloud to a specific user's device. There are several types of connections.
- For example, there is a cable connection directly connected to a PC or laptop; but the most used is a wireless connection, such as Wi-Fi. Both installed internally and via a USB port, a Wi-Fi connection allows the computer to connect to radio frequencies to the device in a relatively short range. This device, in turn, connects to the Internet. Another form of wireless communication is Bluetooth, a technology similar to Wi-Fi, but which requires the interaction of two devices. The range is even shorter.
- Finally, there is the Internet connection via the mobile cellular network.

# Basic elements of the Internet

## 3) user

- Internet users are all those who use this network, no matter where they are.
- The user accesses the Internet through a computer, mobile phone with Internet connection, digital TV, games, computers and tablets, among others ..
- It is estimated that the number of Internet users worldwide is over three thousand eight hundred million people.
- China has the largest number of Internet users, followed by India and the United States.

# Basic elements of the Internet

## 4) Social Networks

- These are communities that are hosted on the Internet and allow users to interact with each other on the Internet.
- The most popular social networks are Facebook, Twitter, Instagram, LinkedIn and Pinterest.

# If you want any information from internet then where do you search?

Google

Search Google or type a URL

# What will be your first step to reach google?





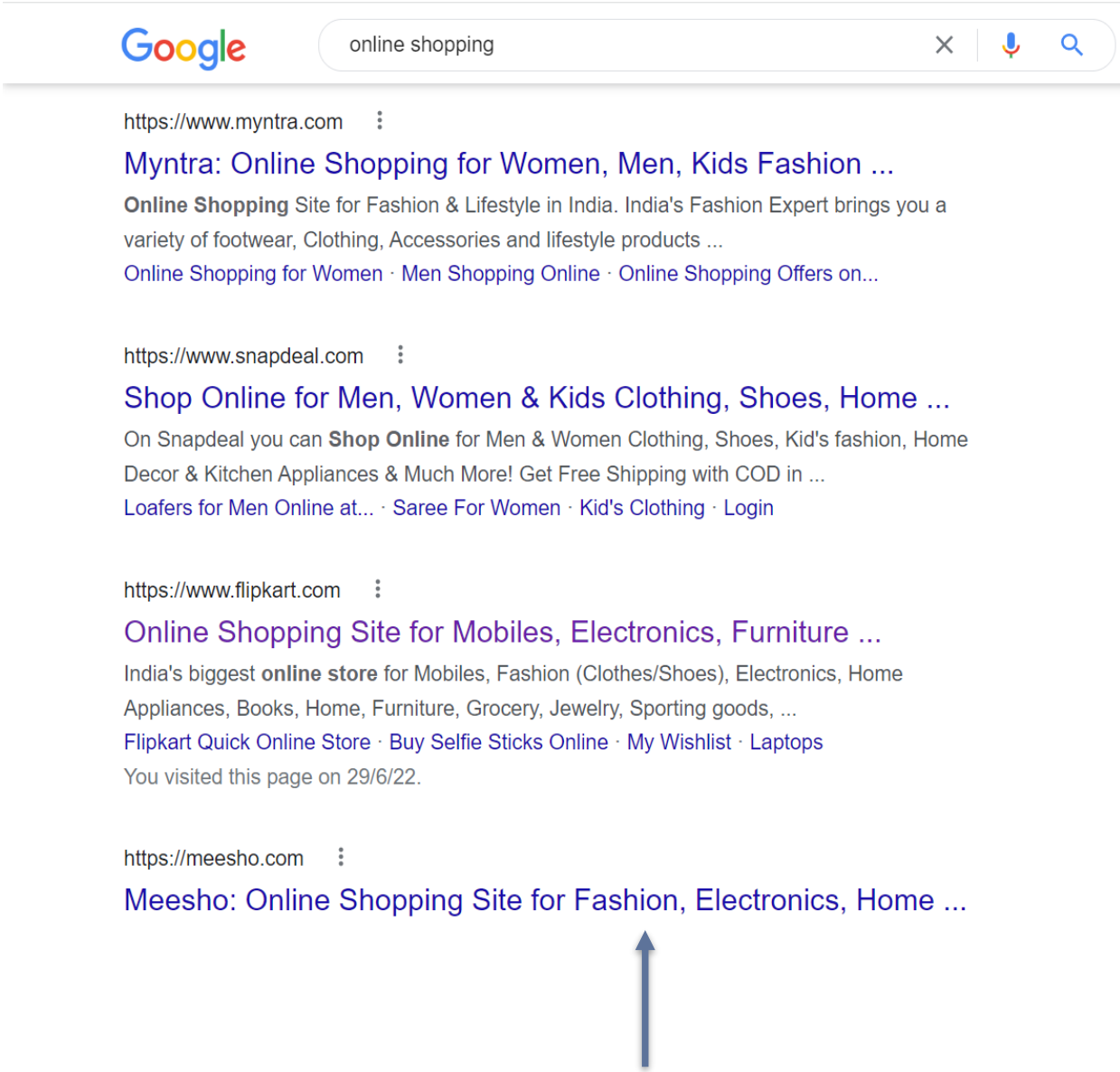
**Chrome** **Firefox** **Internet Explorer** **Opera** **Safari**

Web Browser

**5) Web Browser** is a computer program that helps user to find the information on the internet.

When we search for any information, we get a list related to it.

Example :




When we search for any information, we get a list of **websites** related to it.

**6) Website :** A group of interlinked and well structure webpages that are exist on same domain is called **website.**

**A webpage** is a collection of **Text, Images, Audio, Video, Animation, Link** etc.

**Web design** refers to the design of websites that are displayed on internet.

**Web** is a **huge collection of pages** of information linked to each other around one globe.

It can be designed with **HTML, CSS & Java Script.**

**HTML : Structure / Layout**
**CSS : Style / Decoration**
**Java Script : Logic**