Fundamentals of Computer   Unit - 2
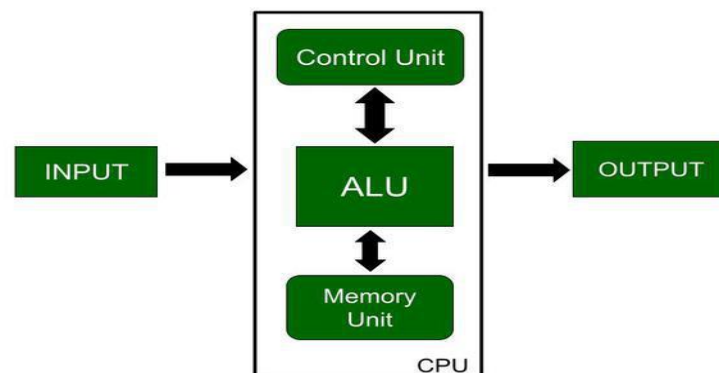
What is the Processor in a Computer?

The processor or CPU is the brain of your computer. It performs program tasks, calculates data from input, and manages and coordinates other parts like memory, devices connected to the computer, and what shows up on the screen.

Components of CPU

- Memory or Storage Unit
- Control Unit
- ALU (Arithmetic Logic Unit)

CPU Operations

- **Fetch:** The processor usually gets instructions from RAM.
- **Decode:** A decoder translates an instruction into signals that the computer's other parts can use.
- **Execute:** Each component receives the now-decoded instructions.
- **Store:** After the execute step the instructions are ready to store in the memory.

**Types of Processors:

1. Single Core Processors: The oldest type of computer CPUs is single core CPU. These CPUs were used in the 1970s. these CPUs only have a single core that preform different operations. This means that the single core CPU can only process one operation at a single time. single core CPU is not suitable for multitasking.

2. Dual-Core Processors: Dual-Core CPUs contain a single Integrated Circuit with two cores. Each core has its cache and controller. These controllers and cache are work as a single unit. dual core CPUs can work faster than the single-core processors.

3. Quad-Core Processors: Quad-Core CPUs contain two dual-core processors present within a single integrated circuit (IC) or chip. A quad-core processor contains a chip with four independent cores. These cores read and execute various instructions provided by the CPU. Quad Core CPU increases the overall speed for programs. Without even boosting the overall clock speed it results in higher performance.

RISC & CISC:

RISC and CISC are two different types of computer architectures that are used to design the microprocessors that are found in computers. The fundamental difference between RISC and CISC is that RISC (Reduced Instruction Set Computer) includes simple instructions and takes one cycle, while the CISC (Complex Instruction Set Computer) includes complex instructions and takes multiple cycles. Read this tutorial to find out more about RISC and CISC and how these two architectures are different from each other.

What is RISC?

In the RISC architecture, the instruction set of the computer system is simplified to reduce the execution time. RISC architecture has a small set of instructions that generally includes register-to-register operations.

The RISC architecture uses comparatively a simple instruction format that is easy to decode. The instruction length can be fixed and aligned to word boundaries. RISC processors can execute only one instruction per clock cycle.

The following are some important characteristics of a RISC Processor −

- A RISC processor has a few instructions.
- RISC processor has a few addressing modes.
- In the RISC processor, all operations are performed within the registers of the CPU.
- RISC processor can be of fixed-length.
- RISC can be hardwired rather than micro-programmed control.
- RISC is used for single-cycle instruction execution.
- RISC processor has easily decodable instruction format.

RISC architectures are characterized by a small, simple instruction set and a highly efficient execution pipeline. This allows RISC processors to execute instructions quickly, but it also means that they can only perform a limited number of tasks.

What is CISC?

The CISC architecture comprises a complex instruction set. A CISC processor has a variable-length instruction format. In this processor architecture, the instructions that require register operands can take only two bytes.

In a CISC processor architecture, the instructions which require two memory addresses can take five bytes to comprise the complete instruction code. Therefore, in a CISC processor, the execution of instructions may take a varying number of clock cycles. The CISC processor also provides direct manipulation of operands that are stored in the memory.

The primary objective of the CISC processor architecture is to support a single machine instruction for each statement that is written in a high-level programming language.

The following are the important characteristics of a CISC processor architecture −

- CISC can have variable-length instruction formats.
- It supports a set of a large number of instructions, typically from 100 to 250 instructions.
- It has a large variety of addressing modes, typically from 5 to 20 different modes.
- CISC has some instructions which perform specialized tasks and are used infrequently.

CISC architectures have a large, complex instruction set and a less efficient execution pipeline. This allows CISC processors to perform a wider range of tasks, but they are not as fast as RISC processors when executing instructions.

Difference between RISC and CISC

The following table highlights all the important differences between RISC and CISC architectures –

Sr.No.	RISC	CISC
1.	It stands for Reduced Instruction Set Computer.	It stands for Complex Instruction Set Computer.
2.	It is a microprocessor architecture that uses small instruction set of uniform length.	This offers hundreds of instructions of different sizes to the users.
3.	These simple instructions are executed in one clock cycle.	This architecture has a set of special purpose circuits which help execute the instructions at a high speed.
4.	These chips are relatively simple to design.	These chips are complex to design.
5.	They are inexpensive.	They are relatively expensive.

6.	Examples of RISC chips include SPARC, POWER PC.	Examples of CISC include Intel architecture, AMD.
7.	It has a smaller number of instructions.	It has a greater number of instructions.
8.	It has fixed-length encodings for instructions.	It has variable-length encodings of instructions.
9.	Simple addressing formats are supported.	The instructions interact with memory using complex addressing modes.
10.	It doesn't support arrays.	It has a large number of instructions. It supports arrays.
11.	It doesn't use condition codes.	Condition codes are used.
12.	Registers are used for procedure arguments and return addresses.	The stack is used for procedure arguments and return addresses.

Internet and World wide web:

Internet Basics:

Internet is a system that interconnects the different computer systems across the world. It uses the Internet protocol suite to link devices located in different corners of the world.

The Internet system carries an extensive range of information resources and services including World Wide Web (WWW), telephony, electronic mail, etc. It uses standard internet protocols, such as TCP/IP and HTTP, etc.

An internal web comprises of all Hypertext Transfer Protocol (HTTP) nodes on a private network; for example, an organization's LAN or WAN.

Features of Internet

Let us now discuss the features of Internet. The features are described below −

Accessibility

An Internet is a global service and accessible to all. Today, people located in a remote part of an island or interior of Africa can also use Internet.

Easy to Use

The software, which is used to access the Internet (web browser), is designed very simple; therefore, it can be easily learned and used. It is easy to develop.

Interaction with Other Media

Internet service has a high degree of interaction with other media. For example, News and other magazine, publishing houses have extended their business with the help of Internet services.

Low Cost

The development and maintenance cost of Internet service are comparatively low.

Extension of Existing IT Technology

This facilitates the sharing of IT technology by multiple users in organizations and even facilitates other trading partners to use.

Flexibility of Communication

Communication through Internet is flexible enough. It facilitates communication through text, voice, and video too. These services can be availed at both organizational and individual levels.

Security

Last but not the least, Internet facility has to a certain extent helped the security system both at the individual and national level with components such as CCTV camera, etc.

Internet Software

Internet Software comprises of all the tools needed for networking through computer. Following are a few important components of the Internet Software −

- Transmission Control Protocol/ Internet Protocol (TCP/IP)
- Dialer Software
- Interment Browser

Internet Applications

Internet applications are server-based applications. Following is a few Internet Applications −

- World Wide Web (WWW)
- Electronic mail (e-mail)
- File Transfer Protocol (FTP)
- Telnet (i.e., log-in to the computer located remotely)
- Internet Relay Chat (IRC) (Real time video chatting)

Types of Internet Protocols:

Internet protocols are a set of rules that allow computers and other devices to communicate over the Internet. These protocols ensure that data is sent, received, and understood correctly between different systems. There are many types of internet protocols, each serving a specific purpose, such as transferring files, sending emails, or securing data. Understanding these protocols is important for making the internet work efficiently and securely. In this article we will see different types of internet protocol in detail.

What is Internet Protocol?

As we discuss **Internet Protocol (IP)** is a set of rules that allows devices to communicate with each other over the Internet. It is like the address system used for sending data. Every device connected to the internet has a unique **IP address** that helps data know where to go and where it is coming from.

Need for Internet Protocols

The sender and receiver of data are parts of different networks, located in different parts of the world having different data transfer rates. So, we need protocols to manage the flow control of data and access control of the link being shared in the communication channel. Suppose there is a sender X who has a data transmission rate of 10 Mbps. And, there is a receiver Y who has a data receiving rate of 5Mbps. Since the rate of receiving the data is slow so some data will be lost during transmission. In order to avoid this, receiver Y needs to inform sender X about the speed mismatch so that sender X can adjust its transmission rate. Similarly, the access control decides the node which will access the link shared in the communication channel at a particular instant in time. If not the transmitted data will collide if many computers send data simultaneously through the same link resulting in the corruption or loss of data.

**1. TCP/IP(Transmission Control Protocol/ Internet Protocol)**

In TCP/IP, the IP protocol ensures that each computer that is connected to the Internet is having a specific serial number called the IP address. TCP specifies how data is exchanged over the internet and how it should be broken into IP packets. It also makes sure that the packets have information about the source of the message data, the destination of the message data, the sequence in which the message data should be re-assembled, and checks if the message has been sent correctly to the specific destination. The TCP is also known as a connection-oriented protocol.
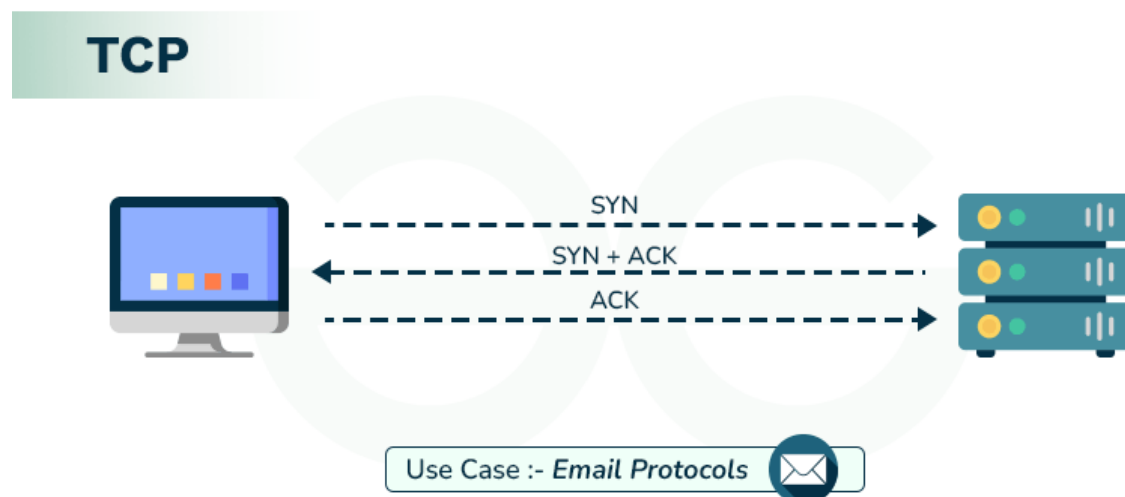
TCP/IP
FTP (File Transfer Protocol)
This protocol is used for transferring files from one system to the other. This works on a client-server model. When a machine requests for file transfer from another machine, the FTO sets up a connection between the two and authenticates each other using their ID and Password. And, the desired file transfer takes place between the machines.
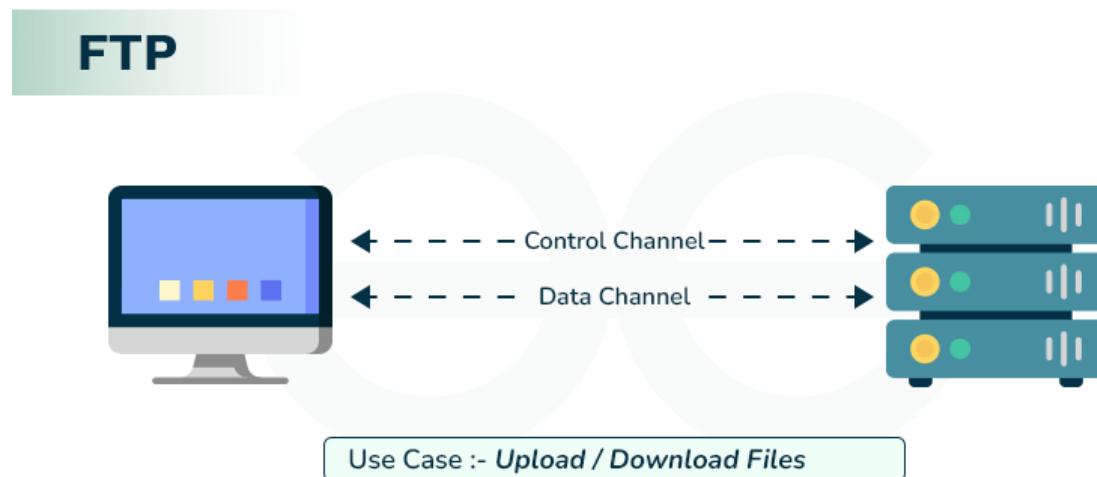
FTP

HTTP (Hyper Text Transfer Protocol)
HTTP protocol is used to transfer hypertexts over the internet and it is defined by the www (world wide web) for information transfer. This protocol defines how the information needs to be formatted and transmitted. And, it also defines the various actions the web browsers should take in response to the calls made to access a particular web page. Whenever a user opens their web browser, the user will indirectly use HTTP as this is the protocol that is being used to share text, images, and other multimedia files on the World Wide Web.
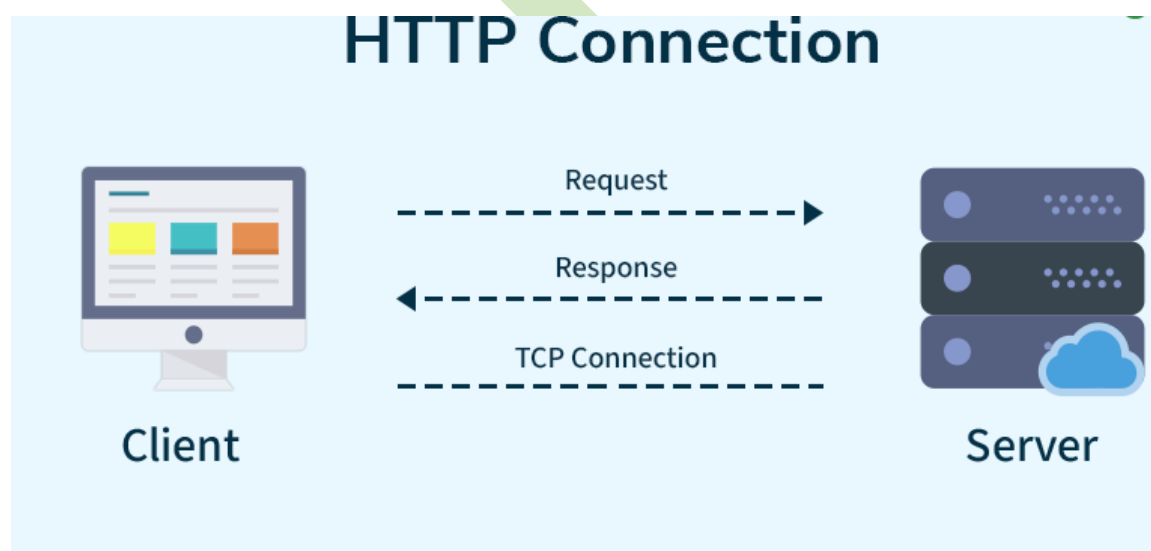
HTTP

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 cannot 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?

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.

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.

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, Water fox, and so on. The choice of a web browser depends on the user's preference and requirements.