

What do you mean by internet? Write about its evolution.

The internet is a globally connected network (Network of network) that uses TCP/IP to transmit data by various types of Medias (guided, wireless and fiber-optic technologies). Moreover, connecting a computer to any other computer anywhere in the world by routers and servers. When two computers are connected over the Internet, they can transmit and receive all kinds of information such as text, graphics, voice, video, and computer programs.

The origins of the Internet started, with the U.S. military's funding of a research network "Arpanet" in 1969. Arpanet was renamed the Internet in 1984. The number of computers connected to the Internet has grown rapidly beginning from when it connected four computers at university research lab. During the 1960s, researchers began to investigate the technologies that would form the basis for computer networking. Early networking research researched on packet switching, a technique of breaking up a conversation into small, independent units, each of which carries the address of its destination and is routed through the network independently.

In 1973, Robert Kahn and Vinton Cerf began to consider ways to interconnect these networks, which had quite different bandwidth, delay, and error properties than did the telephone lines of the ARPANET. TCP/IP was designed to interconnect multiple networks to form an Internet. 1975, the ARPANET had grown from its original four nodes to nearly 100 nodes. Around this time, two phenomena—the development of local area networks (LANs) and the integration of networking into operating systems—contributed to a rapid increase in the size of the network. By the late 1970s, the Unix operating system, originally developed at Bell Labs, had become the system of choice for researchers, because it ran on DEC's inexpensive (relative to other systems) VAX line of computers. By the early 1990s, the Internet was international in scope, and its operation had largely been transferred from the NSF to commercial providers. Public access to the Internet expanded rapidly thanks to the ubiquitous nature of the analog telephone network and the availability of modems for connecting computers to this network. Digital transmission became possible throughout the telephone network with the deployment of optical fiber, and the telephone companies leased their broadband digital facilities for connecting routers and regional networks to the developers of the computer network.

The Internet's Domain Name System was created in 1984 to match complex IP addresses with easy-to-remember names ending in extensions such as .com, .org, .edu, .gov, .mil and country codes today, the Internet links more than 440 million computers directly. In 1990, Tim Berners-Lee invented the World Wide Web as a method of publishing information in a hypertext format on the Internet. The Web began to take off in 1993, after computer science student Marc Andreessen created the first popular Web browser, known as Mosaic. Since then the number of Web sites and Web pages has exploded.

2. Distinguish Between Internet and Intranet.

The internet is the global computer network that provides information and communication facilities that can be unlimited data's and resources. However, Intranets are like mini internets for business, where they can store relevant information, news and data online, but make it accessible only to those employed by the organization. The main difference between an intranet and the internet is that the former is a closed network, and the latter is a public network. In short, the internet is for all; an intranet is for a select group of people.

The internet: This worldwide system of computer networks. This allows the access and exchange of other computers' information, enabling an array of services that cover communication, entertainment, and news.

1. Internet is wide network of computers and is open for all.
2. Internet itself contains a large number of intranets.
3. The number of users who use internet is Unlimited.
4. The Visitors traffic is unlimited.
5. Internet contains different source of information and is available for all.

An intranet: An intranet, on the other hand, has a reduced set of functions which are primarily aligned with helping employees within a business. While similar to the internet in that it is a computer network that shares information – an intranet operates strictly within a closed network. This is beneficial for organizations who want to submit and exchange company information privately. Intranets typically use a local-only network, which restricts access. Only users directly wired to the system can log on. Despite this, remote workers can gain access from home, and employees on the road can access it via mobile.

Intranets are a closed network: Within the internet, intranets are like islands where businesses can congregate.

Intranets are designed to solve a specific set of problems: The whole purpose of an intranet is to remedy existing issues in a business, namely data storage, knowledge sharing, and the distribution of information.

Intranets are smaller and more secure: Like a mini internet, intranets are solely for the use of a business and act as a secure way to help organizations function.

3. Explain different layers of OSI model.

The OSI (Open System Interconnection) Reference Model is the comprehensive set of standards and rules for hardware manufacturers and software developers. By following these standards, they can build the networking components and software applications which work in dissimilar environments. In 1984, the ISO (International Organization for Standardization) published this Model. The OSI model not only provides a framework for creating and implementing networking standards, devices, and internetworking schemes but also explains the networking from a modular perspective, making it easier to understand and troubleshoot.

The Physical Layer

The Physical Layer is the first layer of OSI model. This layer specifies the standards for devices, media and technologies which are used in moving the data across the network such as:-

- Type of cable used in connecting the devices
- Patterns of pin used in both sides of cable
- Type of interface card used in networking device
- Type of connector used to connect the cable with network interface

On sending computer, it converts digital signals received from the Data Link layer, in analog signals and loads them in physical media. On receiving computer, it picks analog signals from media and converts them in digital signals and transfers them to the Data Link layer for further processing.

The Data Link Layer

The Data Link Layer is the second layer of OSI model. This layer defines how networking components access the media and what transmission methods they use. This layer has two sub-layers; MAC and LLC.

MAC (Media Access Control)

This sub layer defines how the data packets are placed in media. It also provides physical addressing. Physical address is known as MAC address. Unlike logical addresses which need to be configured, physical addresses are pre-configured in NIC. MAC address is used to uniquely identify a host in local network.

LLC (Logical Link Control)

This sub layer identifies the network layer protocol. On sending computer, it encapsulates the information of the Network Layer protocol in LLC header from which the Data Link layer receives the data packet. On receiving computer, it checks the LLC header to get the information about the network layer protocol. This way a data packet is always delivered to the same network layer protocol from which it was sent.

The Network Layer

The third layer of OSI model is the Network Layer. This layer takes data segment from transport layer and adds logical address to it. A logical address has two components; network partition and host partition. Network partition is used to group networking components together while host partition is used to uniquely identify a system on a network. Logical address is known as IP address. Once logical address and other related information are added in segment, it becomes packet.

This layer decides whether the packet is intended for local system or remote system. It also specifies the standards and protocols which are used to move the data packets across the networks. To move data packet between two different networks, a device known as router is used. Router uses logical address to take routing decision. Routing is a process of forwarding data packet to its destination.

The Transport Layer

The transport layer is the fourth layer of OSI model. It provides following functionality: -

Segmentation

On sending computer, it breaks data stream into smaller pieces before transmission. Each piece is known as segment and the process of breaking data into smaller pieces is known as segmentation. On receiving computer, it joins all segments back in data stream. So the upper layers receive data in the format in which it was sent.

Data transportation

This layer establishes a logical connection between sending system and receiving system and uses that connection to provide end-to-end data transportation. For data transportation, it mainly uses two protocols; TCP and UDP.

Main difference between a connection-less and connection-oriented protocol is that a connection-oriented protocol provides reliable data delivery. For reliable data delivery, it uses several mechanisms such as, three way handshake process, acknowledgments, sequencing and flow control.

Multiplexing

Through the use of port numbers, this layer also provides connection multiplexing. Connection multiplexing allows multiple applications to send and receive data simultaneously.

The Session Layer

The session layer is the fifth layer of OSI model. It is responsible for setting up, managing, and dismantling sessions between presentation layer entities and providing dialogs between computers.

When an application makes a network request, this layer checks whether the requested resource is available in local system or in remote system. If requested resource is available in remote system, it tests whether a network connection to access that resource is available or not. If network connection is not available, it sends an error message back to the application informing that connection is not available. If network connection is available, it establishes a session with remote system. For each individual request, it uses a separate session. This allows multiple applications to send or receive data simultaneously. When data transmission is completed, it terminates the session.

The Presentation Layer

The sixth layer of OSI model is the Presentation layer. Applications running in local system may or may not understand the format that is used to transmit the data across the network. The presentation layer works as the translator in OSI model. When receiving data from application layer, it converts that data in such a format that can be sent over the network. When receiving data from session layer, it reconverts that data in such a format that the application which will use the incoming data can understand.

The Application Layer

This is the last and the topmost layer of the OSI model. This layer provides an interface between application programs running in system and network. If any application needs to access any resource that is available in remote system, it interacts with this layer. Then this layer encompasses the protocols and services that the application will employ to access that resources.

There are two types of application programs; network-aware and network-unaware. An application program is considered as network-aware when it can make any sort of network request. If an application program can't make any kind of network request, it is considered as network-unaware program.

4. Differentiate Between Relative and Absolute URL.

Absolute URL requires you to place the entire address on the page that you link to. An example of an absolute URL would look like this:

```
<a href = http://www.example.com/xyz.html>
```

Where,

- **Http** is the protocol.
- **Example.com** is the server name.
- **Xyz.html** is the file name.

Absolute URLs contain more information than relative urls, as they also include the protocol (e.g Http://) and the domain name.

The Relative URL, on the other hand, does not use the full address. It assumes that the page you type in is on the same site. An example of a relative URL would look like this:

```
<a href = "/xyz.html">
```

Relative URLs are used for internal links i.e. to create links to file that are part of same website as the Web Pages on which you are placing the link.

5. Define client server architecture. Write down its pros and cons.

A client-server network is a central computer, also known as a server, which hosts data and other forms of resources. Clients such as laptops and desktop computers contact the server and request to use data or share its other resources with it.

A client-server network is designed for end-users, called clients, to access resources such as files, songs, video collections, or some other service from a central computer called a server. A server's sole purpose is to do what its name implies - serve its clients

Advantages of Client-Server Architecture:

Organizations often seek opportunities to maintain services and quality competition to sustain its market position with the help of technologies. Deployment of client-server computing in an organization will effectively increase its productivity through the usage of cost-effective user interface, enhanced data storage, vast connectivity and reliable application services.

- Improved Data Sharing:

Data is retained by usual business processes and manipulated on a server is available for designated users (clients) over an authorized access.

- Integration of Services:

Every client is given the opportunity to access corporate information via desktop interface eliminating the necessity to log into a terminal mode or processor.

- Shared Resources Amongst Different Platforms:

Application used for client-server model is built regardless of the hardware platform or technical background of the entitled software (operating system software) providing an open computing environment, enforcing users to obtain the services of clients and servers (database, application and communication services)

- Data Processing Capability Despite the Location: Client-server users can directly log into a system despite of the location or technology of the processors.
- Easy Maintenance:

Client-server architecture is distributed model representing dispersed responsibilities among independent computers integrated across a network. Therefore, it's easy to replace, repair, upgrade and relocate a server while client remains unaffected. This unaware change is called as Encapsulation.

Disadvantages of Client-Server Architecture:

- Overloaded Servers:

When there are frequent simultaneous client requests, server severely gets overloaded, forming traffic congestion.

- Impact of Centralized Architecture:

Since it is centralized, if a critical server failed, client requests are not accomplished. Therefore, client-server lacks the robustness of a good network.

6. Explain Relation between IP address and DNS. Explain the working of DNS.

The DNS is an Internet service that translates domain names/hostnames to IP addresses (forward DNS) and IP addresses to their associated domain names/hostnames (Reverse DNS) with the help of a DNS server. Well, a domain name is nothing but a textual version of the IP address; this is the number which points to a specific website. You can also visit a website by entering the IP address in a specific sequence and you would get a brief idea about a domain name. For humans, it is suitable to remember the name (domain name) of a website than remembering a multiple-digit IP address.

1. The user logs onto their Internet Service Provider (ISP) to use the Internet.
2. The user opens up a web browser (Firefox, Chrome, Internet Explorer, etc.) and types a URL into the address bar. For example, perhaps the user types in `https://www.wordpress.com`.
3. The computer then asks for the ISP's DNS servers for the specific IP address for `www.wordpress.com`.
4. Once the DNS server that holds this specific IP address for `www.wordpress.com` is found, the DNS server responds with the appropriate IP address and the user's computer then gives this address to the user's browser.
5. The browser opens a connection to the server using the IP address provided and retrieves the page from the site requested, in this case for `www.wordpress.com`
6. The browser displays the requested page on the computer screen.

From a technical standpoint, the Domain Name System (DNS) is an organized naming system for computers, services or any other resource that is connected to the Internet or private network. To put it a bit more simply, the DNS translates easily memorized domain names, like `www.wordpress.com`. Into numbers, like `209.206.84.150`.

