Internet and Web Services

What are Web Services?

The Internet is the worldwide connectivity of hundreds of thousands of computers of various types that belong to multiple networks. On the World Wide Web, a web service is a standardized method for propagating messages between client and server applications. A web service is a software module that is intended to carry out a specific set of functions. Web services in cloud computing can be found and invoked over the network.
The web service would be able to deliver functionality to the client that invoked the web service.

A web service is a set of open protocols and standards that allow data to be exchanged between different applications or systems. Web services can be used by software programs written in a variety of programming languages and running on a variety of platforms to exchange data via computer networks such as the Internet in a similar way to inter-process communication on a single computer.

Any software, application, or cloud technology that uses standardized web protocols (HTTP or HTTPS) to connect, interoperate, and exchange data messages – commonly XML (Extensible Markup Language) – across the internet is considered a web service.
Web services have the advantage of allowing programs developed in different languages to connect with one another by exchanging data over a web service between clients and servers. A client invokes a web service by submitting an XML request, which the service responds with an XML response**.**

Functions of Web Services

- It's possible to access it via the internet or intranet networks.
- XML messaging protocol that is standardized.
- Operating system or programming language independent.
- Using the XML standard, it is self-describing.
- A simple location approach can be used to locate it.

Components of Web Service

XML and HTTP is the most fundamental web services platform. The following components are used by all typical web services:

SOAP (Simple Object Access Protocol)

SOAP stands for “Simple Object Access Protocol.” It is a transport-independent messaging protocol. SOAP is built on sending XML data in the form of SOAP Messages. A document known as an XML document is attached to each message. Only the structure of the XML document, not the content, follows a pattern. The best thing about Web services and SOAP is that everything is sent through HTTP, the standard web protocol.

A root element known as the element is required in every SOAP document. In an XML document, the root element is the first element. The “envelope” is separated into two halves. The header comes first, followed by the body. The routing data, or information that directs the XML document to which client it should be sent to, is contained in the header. The real message will be in the body.

UDDI (Universal Description, Discovery, and Integration)

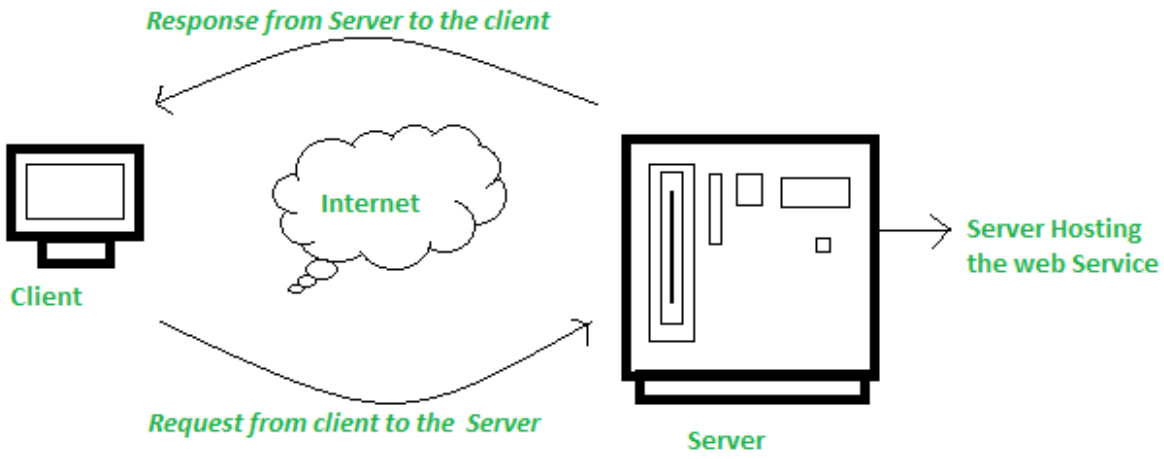
UDDI is a standard for specifying, publishing and discovering a service provider’s online services. It provides a specification that aids in the hosting of data via web services. UDDI provides a repository where WSDL files can be hosted so that a client application can discover a WSDL file to learn about the various actions that a web service offers. As a result, the client application will have full access to the UDDI, which serves as a database for all WSDL files. The UDDI registry will hold the required information for the online service, just like a telephone directory has the name, address, and phone number of a certain individual. So that a client application may figure out where it is.

WSDL (Web Services Description Language)

If a web service can’t be found, it can’t be used. The client invoking the web service should be aware of the location of the web service. Second, the client application must understand what the web service does in order to invoke the correct web service. The WSDL, or Web services description language, is used to accomplish this. The WSDL file is another XML-based file that explains what the web service does to the client application. The client application will be able to understand where the web service is located and how to use it by using the WSDL document.

How Does Web Service Work?

The diagram depicts a very simplified version of how a web service would function. The client would use requests to send a sequence of web service calls to a server that would host the actual web service.



Remote procedure calls are what are used to make these requests. Calls to methods hosted by the relevant web service are known as Remote Procedure Calls (RPC). Example: Flipkart offers a web service that displays prices for items offered on Flipkart.com. The front end or presentation layer can be written in .Net or Java, but the web service can be communicated using either programming language.

The data that is exchanged between the client and the server, which is XML, is the most important part of a web service design. XML (Extensible markup language) is a simple intermediate language that is understood by various programming languages. It is a counterpart to HTML. As a result, when programs communicate with one another, they do so using XML. This creates a common platform for applications written in different programming languages to communicate with one another.

For transmitting XML data between applications, web services employ SOAP (Simple Object Access Protocol). The data is sent using standard HTTP. A SOAP message is data that is sent from the web service to the application. An XML document is all that is contained in a SOAP message. The client application that calls the web service can be created in any programming language because the content is written in XML.

Features/Characteristics Of Web Service

Web services have the following features:

(a) XML Based: The information representation and record transportation layers of a web service employ XML. There is no need for networking, operating system, or platform binding when using XML. At the middle level, web offering-based applications are highly interoperable.

(b) Loosely Coupled: A customer of an internet service provider isn't necessarily directly linked to that service provider. The user interface for a web service provider can change over time

without impacting the user's ability to interact with the service provider. A strongly coupled system means that the patron's and server's decisions are inextricably linked, indicating that if one interface changes, the other should be updated as well.
A loosely connected architecture makes software systems more manageable and allows for easier integration between different structures.

(c) Capability to be Synchronous or Asynchronous: Synchronicity refers to the client's connection to the function's execution. The client is blocked and the client has to wait for the service to complete its operation, before continuing in synchronous invocations. Asynchronous operations allow a client to invoke a task and then continue with other tasks.
Asynchronous clients get their results later, but synchronous clients get their effect immediately when the service is completed. The ability to enable loosely linked systems requires asynchronous capabilities.

(d) Coarse-Grained: Object-oriented systems, such as Java, make their services available through individual methods. At the corporate level, a character technique is far too fine an operation to be useful. Building a Java application from the ground, necessitates the development of several fine-grained strategies, which are then combined into a rough-grained provider that is consumed by either a buyer or a service.
Corporations should be coarse-grained, as should the interfaces they expose. Web services generation is an easy approach to define coarse-grained services that have access to enough commercial enterprise logic.

(e) Supports Remote Procedural Call: Consumers can use an XML-based protocol to call procedures, functions, and methods on remote objects utilizing web services. A web service must support the input and output framework exposed by remote systems.
Enterprise-wide component development Over the last few years, JavaBeans (EJBs) and.NET Components have become more prevalent in architectural and enterprise deployments. A number of RPC techniques are used to allocate and access both technologies.
A web function can support RPC by offering its own services, similar to those of a traditional role, or by translating incoming invocations into an EJB or.NET component invocation.

(f) Supports Document Exchanges: One of XML's most appealing features is its simple approach to communicating with data and complex entities. These records can be as simple as talking to a current address or as complex as talking to an entire book or a Request for Quotation. Web administrations facilitate the simple exchange of archives, which aids incorporate reconciliation.
The web benefit design can be seen in two ways: **(i)** The first step is to examine each web benefit on-screen character in detail. **(ii)** The second is to take a look at the rapidly growing web benefit convention stack.

Advantages Of Web Service

Using web services has the following advantages:

(a) Business Functions can be exposed over the Internet: A web service is a controlled code component that delivers functionality to client applications or end-users. This capability can be accessed over the HTTP protocol, which means it can be accessed from anywhere on the internet. Because all apps are now accessible via the internet, Web services have become increasingly valuable. Because all apps are now accessible via the internet, Web services have become increasingly valuable. That is to say, the web service can be located anywhere on the internet and provide the required functionality.

(b) Interoperability: Web administrations allow diverse apps to communicate with one another and exchange information and services. Different apps can also make use of web services. A .NET application, for example, can communicate with Java web administrations and vice versa. To make the application stage and innovation self-contained, web administrations are used.

(c) Communication with Low Cost: Because web services employ the SOAP over HTTP protocol, you can use your existing low-cost internet connection to implement them. Web services can be developed using additional dependable transport protocols, such as FTP, in addition to SOAP over HTTP.

(d) A Standard Protocol that Everyone Understands: Web services communicate via a defined industry protocol. In the web services protocol stack, all four layers (Service Transport, XML Messaging, Service Description, and Service Discovery) use well-defined protocols.

(e) Reusability: A single web service can be used simultaneously by several client applications.

Sample Questions

Question 1. What exactly do you mean when you say you're going to upload a file on the internet? The name of the protocol that was utilized for it.

Answer:

> Uploading a file to a server is the process of transferring a file from your computer to a server through the Internet. FTP(File Transfer Protocol) is the protocol that is used for this. An FTP client application allows a user to communicate with an FTP server program in order to gain access to data and services on the server machine. Users must be able to connect to the Internet or communicate with an FTP client application in order to use the FTP server program.

Question 2. Why do we need a web service?

Answer:

> Web-based apps are developed using a range of programming platforms in today's corporate world. Some applications are written in Java, others in .Net, and still others in Angular JS, Node.js, and other frameworks. Most of the time, these diverse programs require some form of communication to work together. Because

they are written in separate programming languages, ensuring accurate communication between them becomes extremely difficult. Web services have a role in this. Web services provide a common platform for several applications written in different programming languages to connect with one another

Question 3. For web services, what kind of security is required?

Answer:

Web services should have a higher level of security than the Secure Socket Layer (SSL) (SSL). Entrust Secure Transaction Platform is the only way to attain this level of security. This level of security is required for web services in order to assure dependable transactions and secure confidential information.

Internet and its Services

The internet offers a range of services to its consumers. We can upload and download the files/ data via the internet as it is a pool of knowledge. We can access or obtain information as needed. It is quite popular because of the variety of senders available on the Internet. Web services have grown in popularity as a result of these offerings. To access/exchange a large amount of data such as software, audio clips, video clips, text files, other documents, etc., we require internet services. We must use an Internet service to connect to the Internet. Data can be sent from Internet servers to your machine via Internet service. Some of the internet services are FTP, Telnet, VoIP, etc. In this article, we will learn about different types of internet services.

How to connect your computer to the Internet?

Before moving further first of all we will understand how to connect our computer to the internet. So to establish the connection follow the following steps:

Step 1: Install the hardware, such as a modem and an Ethernet cable, as well as the important software like LAN driver, etc.

Step 2: Use an ethernet cable or a wireless link to establish a preliminary connection.

Step 3: Navigate to the router's default IP address.

Step 4: Use the login name and password provided by the ISP to connect to the internet.

Step 5: Save your preferences.

Internet services

To access/exchange a large amount of data such as software, audio clips, video clips, text files, other documents, etc., we need internet services. You must use an Internet service to connect to the Internet. Data can be sent from Internet servers to your machine via Internet service. Some of the commonly used internet services are :

- Communication Services
- Information Retrieval Services
- File Transfer
- World Wide Web Services
- Web Services
- Directory Services
- Automatic Network Address Configuration
- Network Management Services
- Time Services
- Usenet
- NewsGroup
- Ecommerce

Now let us discuss them one by one

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

- **IRC(Internet Relay Chat):** Subscribers can communicate in real-time by connecting numerous computers in public spaces called channels.
- **VoIP:** It stands for Voice over Internet Protocol, which describes how to make and receive phone calls over the internet. A larger number of people believe VoIP is a viable alternative to traditional landlines. VoIP (Voice over Internet Protocol) is a technique that helps us make voice calls via the Internet rather than over a traditional (or analog) phone line. Some VoIP services may let you call only other VoIP users, while others may let you call anyone with a phone number, including long-distance, mobile, and local/international lines. If you have an internet connection you can easily call anyone without using a local phone service because VoIP solutions are based on open standards, they can be used on any computer. More than just setting up calls is what VoIP service providers do. Outgoing and incoming calls are routed through existing telephone networks by them.
- **List Server (LISTSERV):** Delivers a group of email recipients' content-specific emails.
- **E-Mail:** Used to send electronic mail via the internet. It is a paperless method for sending text, images, documents, videos, etc from one person to another via the internet.
- **User Network (USENET):** It hosts newsgroups and message boards on certain topics, and it is mostly run by volunteers.
- **Telnet:** It's used to connect to a remote computer that's connected to the internet.
- **Video Conferencing:** Video conferencing systems allow two or more people who are generally in different locations to connect live and visually. Live video conferencing

services are necessary for simulating face-to-face talks over the internet. The system can vary from very simple to complex, depending on the live video conferencing vendors. A live video-based conference involves two or more individuals in separate locations utilizing video-enabled devices and streaming voice, video, text, and presentations in real-time via the internet. It allows numerous people to connect and collaborate face to face over large distances. Tools available for this purpose are Zoom, FreeConference, Google Hangouts, Skype, etc.

2. Information Retrieval Services: 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. Some sites are:

- **www.geeksforgeeks.org:** Free tutorials, millions of articles, live, online, and classroom courses, frequent coding competitions, industry expert webinars, internships, and job possibilities are all available. A computer-based system for searching and locating data in a file, database, or another source.
- **www.crayola.com:** It includes advice for students, parents, and educators on how to be more creative.

3. File Transfer: The exchange of data files across computer systems is referred to as file transfer. Using the network or internet connection to transfer or shift a file from one computer to another is known as file transfer. To share, transfer, or send a file or logical data item across several users and/or machines, both locally and remotely, we use file transfer. Data files include – documents, multimedia, pictures, text, and PDFs and they can be shared by uploading or downloading them. To retrieve information from the internet, there are various services available such as:

- **Gopher:** A file retrieval application based on hierarchical, distributed menus that is simple to use.
- **FTP (File Transfer Protocol):** To share, transfer, or send a file or logical data item across several users and/or machines, both locally and remotely.
- **Archie:** A file and directory information retrieval system that may be linked to FTP

4. Web services: Web services are software that uses defined messaging protocols and are made accessible for usage by a client or other web-based programs through an application service provider's web server. Web services allow information to be exchanged across web-based applications. Using Utility Computing, web services can be provided.

5. World Wide Web: The internet is a vast network of interconnected computers. Using this network, you can connect to the world wide web (abbreviated as 'www' or 'web') is a collection of web pages. The web browser lets you access the web via the internet.

6. Directory Services: A directory service is a set of software that keeps track of information about your company, customers, or both. Network resource names are mapped to network addresses by directory services. A directory service provides users and administrators with full transparent access to printers, servers, and other network devices. The directory services are :

- **DNS (Domain Number System):** This server provides DNS. The mappings of computer hostnames and other types of domain names to IP addresses are stored on a DNS server.
- **LDAP (Lightweight Directory Access Protocol):** It is a set of open protocols that are used for obtaining network access to stored data centrally. It is a cross-platform authentication protocol for directory services and also allows users to interact with other directory services servers.

7. Automatic Network Address Configuration: Automatic Network Addressing assigns a unique IP address to every system in a network. A DHCP Server is a network server that is used to assign IP addresses, gateways, and other network information to client devices. It uses Dynamic Host Configuration Protocol as a common protocol to reply to broadcast inquiries from clients.

8. Network Management Services: Network management services are another essential internet service that is beneficial to network administrators. Network management services aid in the prevention, analysis, diagnosis, and resolution of connection problems. The two commands related to this are:

- **ping**: The ping command is a Command Prompt command that is used to see if a source can communicate with a specific destination & get all the possible paths between them.
- **traceroute**: To find the path between two connections, use the traceroute command.

9. Time Services: Using facilities included in the operating system, you may set your computer clock via the Internet. Some services are :

- **Network Time Protocol (NTP):** It is a widely used internet time service that allows you to accurately synchronize and adjust your computer clock.
- **The Simple Network Time Protocol (SNTP):** It is a time-keeping protocol that is used to synchronize network hardware. When a full implementation of NTP is not required, then this simplified form of NTP is typically utilized.

10. Usenet: The ‘User’s Network’ is also known as Usenet. It is a network of online discussion groups. It’s one of the first networks where users may upload files to news servers and others can view them.

11. News Group: It is a lively Online Discussion Forum that is easily accessible via Usenet. Each newsgroup contains conversations on a certain topic, as indicated by the newsgroup name. Users can use newsreader software to browse and follow the newsgroup as well as comment on the posts. A newsgroup is a debate about a certain topic made up of notes posted

to a central Internet site and distributed over Usenet, a global network of news discussion groups. It uses Network News Transfer Protocol (NNTP).

12. E-commerce: Electronic commerce, also known as e-commerce or e-Commerce, is a business concept that allows businesses and individuals to buy and sell goods through the internet. Example: Amazon, Flipkart, etc. websites/apps.

Sample problem

Question 1: Describe the search engine's objective.

Solution:

> The primary goal of a search engine is to assist individuals in finding additional information on any topic they are interested in.

Question 2: What do you mean when you say you're going to upload a file on the internet? The name of the protocol required to do so.

Solution:

> Uploading a file over the Internet is the process of transferring a file from your computer to a server. FTP(File Transfer Protocol) is the protocol required to do so.

Question 3: What exactly do you mean when you say "remote login"?

Solution:

> The ability to log into a computer or network from another computer via internet/ network is known as Remote access / Remote login.

Question 4: What are the benefits of video conferencing for teachers?

Solution:

> Teachers can use video conferencing to speak with other educators and pupils from different schools to discuss various topics or join online workshops.

Question 5: What is FTP and how does it work?

Solution:

> The protocol/ rules that allows users to move data between computers connected to the Internet. It allows users to upload/ download the files from/to their computer to/from a website. FTP (File Send Protocol) is the means of transferring the files between computers using the Internet and TCP/IP (Transmission Control Protocol/Internet Protocol) services.

FTP is based on the client/server concept. A FTP client application allows a user to communicate with an FTP server program in order to gain access to data and services on the server machine. In order to use FTP server program users needs to connect to the Internet or communicate with an FTP client application.

Objectives of FTP :

- It allows users to share files.
- The data transfer is more secure and efficient.
- It facilitates people to use distant computers.

Advantages of FTP :

- It employs robust control commands and is a connection-oriented protocol.
- The data is sent over a separate TCP connection than the control commands. This allows for quick data transport.
- It is easy to set up and utilize.
- Because of its uniformity, it has a universal application and so is popular to use.
- Using the FTP, users of all operating systems (Windows, Linux etc.) can connect to the server without difficulty.

Disadvantages of FTP :

- It necessitates a greater amount of memory and programming work.
- There are many TCP/IP connections in use. The utilization of such connections is hampered by a firewall.
- When a firewall is in place, filtering active mode FTP traffic on the client side is difficult.
- Due to its connection-oriented design, it has a significant latency.
- the transfer of date/timestamp attributes is not supported.

Question 6: How to find people on the internet

Solution:

You can find people on the internet on various websites and via various search engines. The internet makes it really simple to locate someone who is willing to help you for no cost. Some of the numerous sites and methods for finding anyone online are listed below:

- **Facebook:** It allows people to stay in touch with friends and family, find communities, and expand their companies.
- **PeekYou:** PeekYou is a People search engine that puts people in the spotlight on the Internet. It allows you to learn about the individuals who are most significant and meaningful in your life.

- **LinkedIn:** LinkedIn is an excellent tool for locating people. There's a decent possibility you'll meet folks you can't find anyplace else on this career-focused alternative to Facebook.