Services of Internet

FTP- File Transfer Protocol

The File Transfer Protocol (**FTP**) is a standard network protocol used to transfer computer files between a client and server on a computer network. This simple protocol is used to download and upload data from and to other computers, these computers may be at the same site or at different sites thousands of miles apart.

FTP is built on a client-server model architecture and uses separate **control** and **data connections** between the client and the server. When you log on to the FTP server, a connection called command link is opened up between your computer and the server. The link is used for sending commands to the server and sending messages and information back from the server to your computer.

FTP may run in *active* or *passive* mode, which determines how the data connection is established. In both cases, the client creates a TCP control connection from a random, usually an unprivileged, port N to the FTP server command **port 21**.

- In **active mode**, the client starts listening for incoming data connections from the server on port M. It sends the FTP command PORT M to inform the server on which port it is listening. The server then initiates a data channel to the client from its **port 20** (the FTP server data port).
- In situations where the client is behind a firewall and unable to accept incoming TCP connections, **passive mode** may be used. In this mode, the client uses the control connection to send a PASV command to the server and then receives a server IP address and server port number from the server, which the client then uses to open a data connection from an arbitrary client port to the server IP address and server port number received.

E-Commerce

E-commerce refers to the use of electronic means and technologies to conduct commerce (sale, purchase, transfer, or exchange of products, services, and/or information), including within business, business-to-business, and business-to-consumer interactions. Delivery of product or service may occur over or outside of the Internet.

In a narrow sense, e-commerce refers to various online commercial activities focusing on commodity exchanges by electronic methods, computer network in particular, by companies, factories, enterprises, industrial undertaking and consumers. In a broad sense, electronic business (EB) refers to the electronicization of all business among all industries (including

governments, enterprises and institutional units), such as electronic government, electronic command, electronic education, electronic public business, electronic household etc.
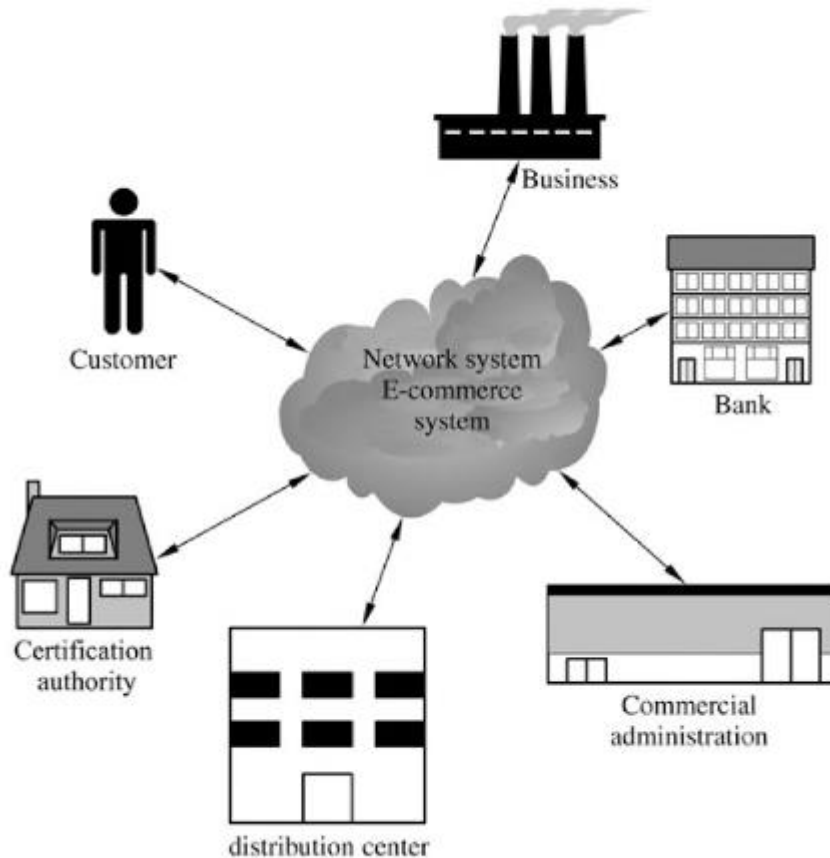
Components of e-commerce are illustrated in Figure:

Figure 1.2 Components of e-commerce

Some of the characteristics of **E-commerce** are:

- Provides higher payoff in the form of more efficient processes.
- Lower costs and provide potentially greater profits.
- Utilize a technology infrastructure of databases, application servers, security tools, management and legacy systems.
- Involve the creation of new value chains between a company and its customers and suppliers, as well as within the company itself.
- Involve major and potentially disruptive organizational change.

Video Conferencing

A video conference is a live, visual connection between two or more people residing in separate locations for the purpose of communication. At its simplest, video conferencing provides transmission of static images and text between two locations. At its most

sophisticated, it provides transmission of full-motion video images and high-quality audio between multiple locations. Videoconference is the conduct of a conference by a set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions. Videoconferencing uses audio and video telecommunications to bring people at different sites together. This can be as simple as a conversation between people in private offices (point-to-point) or involve several (multipoint) sites in large rooms at multiple locations. Besides the audio and visual transmission of meeting activities, allied videoconferencing technologies can be used to share documents and display information on whiteboards.

The core technology used in a videoconferencing system is digital compression of audio and video streams in real time. The hardware or software that performs compression is called a codec (coder/decoder). Compression rates of up to 1:500 can be achieved. The resulting digital stream of 1s and 0s is subdivided into labeled packets, which are then transmitted through a digital network of some kind (usually ISDN or IP).

E-business

Electronic business, or e-business, is the application of information and communication technologies (ICT) in support of all the activities of business. This would include the buying and selling of goods and services, along with providing technical or customer support through the Internet. e-Business is a term often used in conjunction with e-commerce, but includes services in addition to the sale of goods. E-business includes e-commerce but also covers internal processes such as production, inventory management, product development, risk management, finance, knowledge management and human resources. E business strategy is more complex, more focused on internal processes, and aimed at cost savings and improvements in efficiency and productivity.
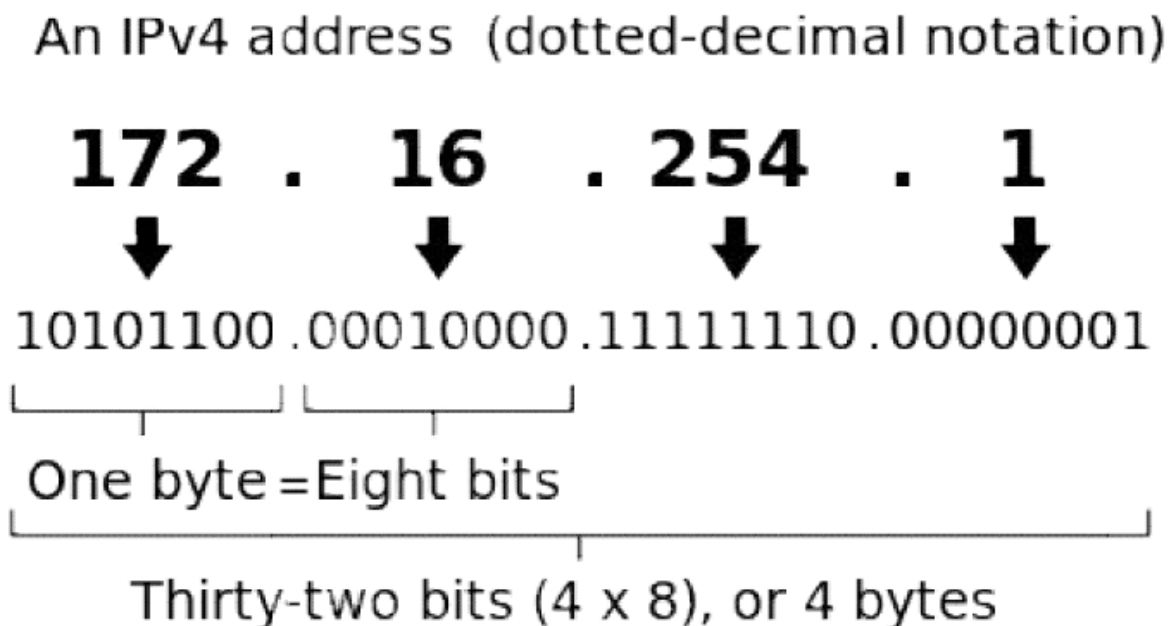
Internet service providers

An Internet service provider also known as ISP is a business or organization that provides consumers or businesses access to the Internet and related services. In the past, most ISPs were run by the phone companies. Now, ISPs can be started by just about any individual or group with sufficient money and expertise. ISPs employ a range of technologies to enable consumers to connect to their network. For "home users", the most popular options include dial-up, DSL (typically ADSL), Broadband wireless access, Cable modem, and ISDN. For customers who have more demanding requirements, such as medium-to-large businesses, or other ISPs, DSL, Ethernet, Metro Ethernet, Gigabit Ethernet, Frame Relay, ISDN, ATM, Satellite Internet access and SONET are more likely.

Internet Address

An Internet Protocol address (IP address) is a mechanism that gives a unique number to every device that is connected to network. Every device has different IP address so that we can easily differentiate various devices attached to a network.

The designers of the internet protocol defined an IP address as a 32-bit number and this system, known as Internet Protocol Version 4 (IPV4), is still in use today. However, because of the growth of the internet and the predicted depletion of available addresses, a new version of IP (IPV6), using 128 bits for the address, was developed in 1995.

In IPv4 an address consists of 32 bits which limits the address space to 4294967296 (2^{32}) possible unique address. It is normally expressed as four decimal numbers, each representing eight bits, separated by periods. This is sometimes known as the **dot address** or **dotted quad notation**. It consists of four decimal numbers, each ranging from 0 to 255, separated by dots, e.g., 172.16.254.1. Each part represents a group of 8 bits (octet) of the address.

An IPv4 address (dotted-decimal notation)

$$172 \,.\, 16 \,.\, 254 \,.\, 1$$

10101100 . 00010000 . 11111110 . 00000001

One byte =Eight bits

Thirty-two bits (4 x 8), or 4 bytes

There are two parts of an IP address:

- Network ID
- Host ID
1. **The Network ID**, also known as network address, identifies a single network segment within a larger TCP/IP network. All the systems that attach and share access to the same network have a common network ID within their full IP address. This ID is also used to uniquely identify each network within the larger networks.

2. **The Host ID,** also known as a host address, identifies a TCP/IP node (a workstation, server, router, or other TCP/IP device) within each network. The host ID for each device identifies a single system uniquely within its own network.
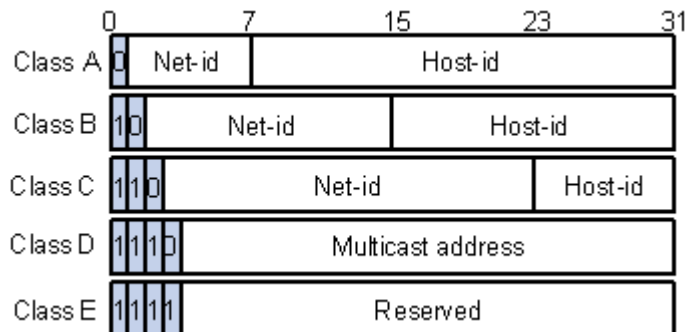
Domain Name System (DNS)

The Domain Name System (DNS) is a central part of the Internet, providing a way to match names (a website you're seeking) to numbers (the address for the website). Anything connected to the Internet - laptops, tablets, mobile phones, and websites - has an Internet Protocol (IP) address made up of numbers. The main objective of DNS is to translate a user oriented name to an IP address which is 32 bit long or in other words we can say that DNS is used to translate hostnames to IP addresses. Your favorite website might have an IP address like 64.202.189.170, but this is obviously not easy to remember. However a domain name such as facebook.com is something people can recognize and remember. DNS syncs up domain names with IP addresses enabling humans to use memorable domain names while computers on the Internet can use IP addresses.

Working on DNS
When you type a web address like www.google.com into your browser, your browser sends a query over the Internet to find the website for www.google.com. A query is a question seeking to match the domain name with its corresponding IP address.

Recursive Resolver
 The first server your query interacts with is the **recursive resolver**, which can be operated by your Internet Service Provider (ISP). The recursive resolver knows which other DNS server it needs to ask to answer your original query i.e. "What is the IP address of google.com?"
The Root Servers
The first type of DNS server the recursive resolver talks to is called a Root Server. The Root Servers are running all over the world and each one knows DNS information about Top Level

Domains such as .**com**. To begin answering your query, the recursive resolver asks a root server for DNS information about .com.

There are thousands of servers supporting the root, located strategically according to where the most Internet activity occurs. The DNS ensures your query will be sent to a server that isn't too far away.

The TLD Name Server

Each Top Level Domain (TLD) DNS name server stores the address information for second level domains (google.com) within the Top Level Domain (.com). When your query reaches the TLD server, the TLD server answers with the IP address of the domain's name server, which will provide the next piece of the puzzle.

The Domain's Name Server

Next the recursive resolver sends the query to the domain's name server. This DNS server knows the IP address for the full domain, google.com, and that answer is returned to the recursive resolver.

Now that the recursive resolver knows the IP address for the domain name in your query, the recursive resolver tells the browser what the IP address is. Finally, your browser can send a request to the website to retrieve the website's content, using the IP address it just learned.
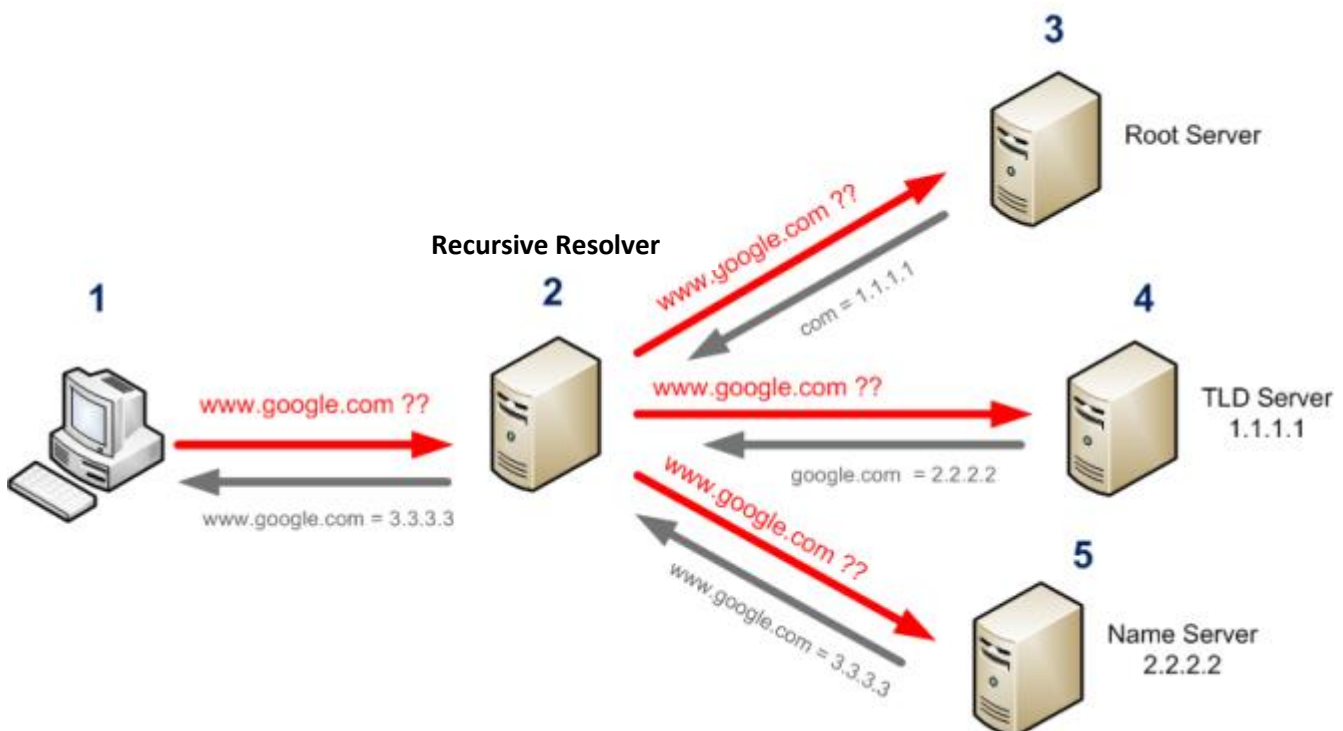
World Wide Web (WWW)

The **World Wide Web** (abbreviated **WWW** or the Web) is an information space where documents and other web resources are identified by Uniform Resource Locators (URLs), interlinked by hypertext links, and can be accessed via the Internet. The world wide web consists of billions of pages linked to each other that contain text, graphics, multimedia files, and other interactive software that are accessed using a browser. It is a distributed system that runs on top of the Internet.

Up until the early 1990s, the Internet was largely populated by academic, government, and industrial researchers. One new application, the **WWW** (World Wide Web) changed all that and brought millions of new, nonacademic users to the net. This application, invented by CERN physicist Tim Berners-Lee, did not change any of the underlying facilities but made them easier to use. Together with the Mosaic browser, written by Marc Andreessen at the National Center for Supercomputer Applications in Urbana, Illinois, the WWW made it possible for a site to set up a number of pages of information containing text, pictures, sound, and even video, with embedded links to other pages. By clicking on a link, the user is suddenly transported to the page pointed to by that link. For example, many companies have a home page with entries pointing to other pages for product information, price lists, sales, technical support, communication with employees, stockholder information, and more.

Numerous other kinds of pages have come into existence in a very short time, including maps, stock market tables, library card catalogs, recorded radio programs, and even a page pointing to the complete text of many books whose copyrights have expired (Mark Twain, Charles Dickens, etc.). Many people also have personal pages (home pages).

Much of this growth during the 1990s was fueled by companies called **ISPs** (Internet Service Providers). These are companies that offer individual users at home the ability to call up one of their machines and connect to the Internet, thus gaining access to e-mail, the WWW, and other Internet services. These companies signed up tens of millions of new users a year during the late 1990s, completely changing the character of the network from an academic and military playground to a public utility, much like the telephone system. The number of Internet users now is unknown, but is certainly hundreds of millions worldwide and will probably hit 1 billion fairly soon.

Uniform Resource Locator (URL)

URL is an acronym for Uniform Resource Locator and is a reference (an address) to a resource on the Internet. Each page is assigned a **URL** (**Uniform Resource Locator**) that effectively serves as the page's worldwide name. URLs have three parts: **the protocol** (also known as the **scheme**), the **DNS name** of the machine on which the page is located, and a **local name**

uniquely indicating the specific page (usually just a file name on the machine where it resides). As an example, the URL for the video page is

http://www.cs.vu.nl/video/index-en.html

This URL consists of three parts: the protocol (*http*), the DNS name of the host (*www.cs.vu.nl*), and the file name (*video/index-en.html*), with certain punctuation separating the pieces. The file name is a path relative to the default Web directory at *cs.vu.nl*.

Many sites have built-in shortcuts for file names. At many sites, a null file name defaults to the organization's main home page. Typically, when the file named is a directory, this implies a file named *index.html*. Finally, *~user/* might be mapped onto *user*'s WWW directory, and then onto the file *index.html* in that directory. Thus, the home page can be reached at

http://www.cs.vu.nl/~ast/

Even though the actual file name is *index.html* in a certain default directory.

HTTP Protocol

HTTP stands for **HyperText Transfer Protocol**. It is widely-used application protocol, which is the basis for the World Wide Web. The *http* protocol is the Web's native language, the one spoken by Web servers. When a browser wants a Web page, it sends the name of the page it wants to the server using HTTP. The server then sends the page back. Although HTTP was designed for use in the Web, it has been intentionally made more general than necessary with an eye to future object-oriented applications. For this reason, operations, called **methods**, other than just requesting a Web page are supported.

The built-in HTTP request methods.

| Method	Description
GET	Request to read a Web page
HEAD	Request to read a Web page's header
PUT	Request to store a Web page
POST	Append to a named resource (e.g., a Web page)
DELETE	Remove the Web page
TRACE	Echo the incoming request
CONNECT	Reserved for future use
OPTIONS	Query certain options

Web Browser

A web browser is an application software which enables a user to display and interact with text, images, videos, music, games and other information typically located on a Web page at a website on the World Wide Web or a local area network (LAN). When a web browser connects to a web server, the web server sends the requested document, if it exists, back to the web browser for display. In short, you type URLs into your browser or click a link, and the browser requests and displays those pages for you. Web browser can show text, audio, video, animation and more. It is the responsibility of a web browser to interpret text and commands contained in the web page. The various browser used mostly are Google chrome, Firefox, Opera. Each web browser besides providing the basic function displaying the web page also has various features like history, password maintaining, favorites, bookmarks etc.

Search Engine

Search Engine is a software program that searches for and identifies items in a database that correspond to keywords or characters specified by the user, used especially for finding particular sites on the World Wide Web. The search results are generally presented in a line of results often referred to as search engine results pages (**SERPs**). The information may be a mix of web pages, images, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a **web crawler**.
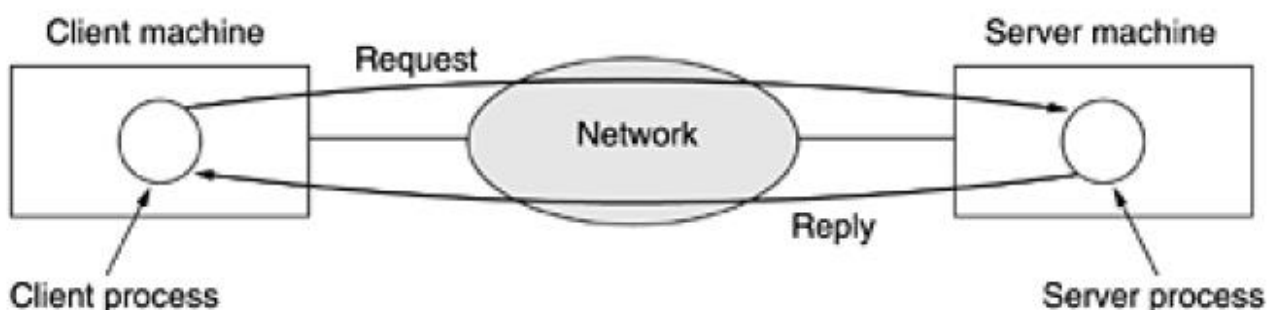
Web Server

A web server is a computer system that processes requests via HTTP, the basic network protocol used to distribute information on the World Wide Web. The term can refer to the entire system, or specifically to the software that accepts and supervises the HTTP requests. The primary function of a web server is to store, process and deliver web pages to clients. The communication between client and server takes place using the Hypertext Transfer Protocol (HTTP). Pages delivered are most frequently HTML documents, which may include images, style sheets and scripts in addition to text content.
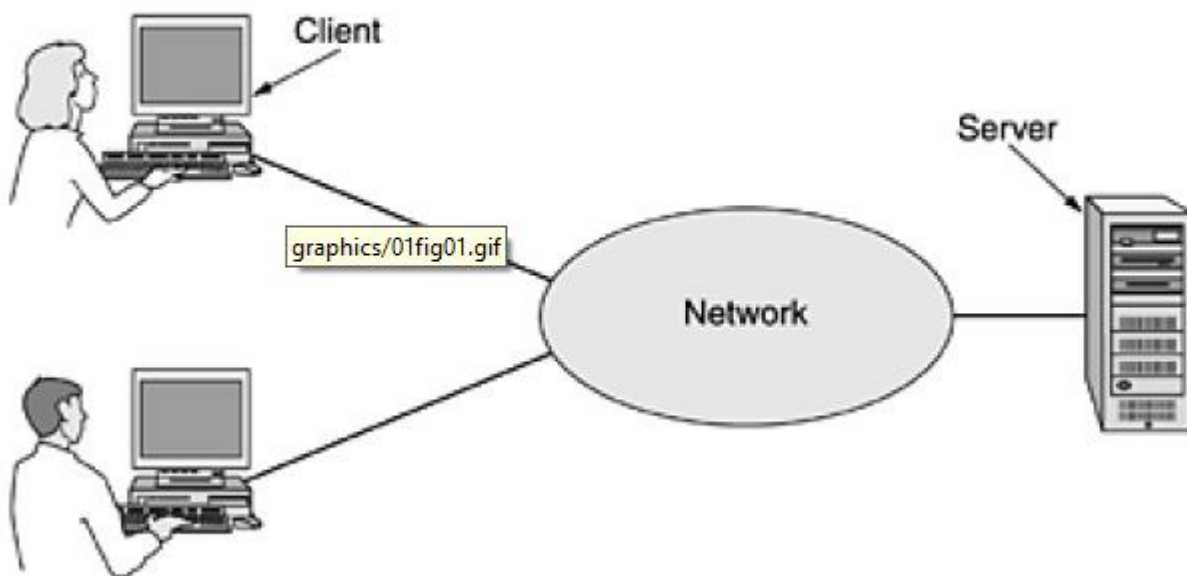
The client and server machines are connected by a network, as illustrated in figure.

This whole arrangement is called the **client-server model**. It is widely used and forms the basis of much network usage. If we look at the client-server model in detail, we see that two processes are involved, one on the client machine and one on the server machine. Communication takes the form of the client process sending a message over the network to the server process. The client process then waits for a reply message. When the server process gets the request, it performs the requested work or looks up the requested data and sends back a reply. These messages are shown in figure.

Apache Server

Apache is the most widely used web server software. Developed and maintained by Apache Software Foundation, Apache is an open source software available for free. It runs on 67% of all webservers in the world. It is fast, reliable, and secure. It can be highly customized to meet the needs of many different environments by using extensions and modules. Most commonly used on a Unix-like system (usually Linux), the software is available for a variety of operating systems besides Unix, including Microsoft Windows.

IIS Server

Internet Information Services (IIS, formerly Internet Information Server) is an extensible web server created by Microsoft for use with Windows NT family. IIS supports HTTP, HTTPS, FTP, FTPS, SMTP and NNTP. With IIS, Microsoft includes a set of programs for building and administering Web sites, a search engine, and support for writing Web-based applications that access databases. Microsoft points out that IIS is tightly integrated with the Windows NT and 2000 Servers in a number of ways, resulting in faster Web page serving.

Proxy Server

A proxy server is a server that acts as an intermediary for requests from clients seeking resources from other servers. A client connects to the proxy server, requesting some service, such as a file, connection, web page, or other resource available from a different server and the proxy server evaluates the request as a way to simplify and control its complexity. The proxy provides the resource either by connecting to the specified server or by serving it from a cache. In some cases, the proxy may alter the client's request or the server's response for various purposes.