Objective: At the end of this module, you must be able to:

1. *Establish a basic understanding of the Internet*
2. *Understand the Internet's evolution*

What is Internet?

Internet is a vast collection of different computers connected together to share information and resources, thus forming a communication network. It is also a world-wide system of networks, a network of networks. It is intended to carry data, which is similar to that of telephone which is intended to carry conversation between two parties.

But unlike other web and online services, which has a server and are centralized, the Internet is decentralized in design. Each Internet computer, called hosts, is independent. Its operators can choose which Internet services to use and which local services to make available to the global Internet community.

There are many ways to access the Internet. The most common is to gain access through a commercial **Internet Service Providers (ISP)** and your computer must include a special device called *modem* which converts analog signals to digital and vice versa, which makes it possible to gain information coming from the Internet.

History of Internet

The idea of Internet was formed when packet-switching networks came into operation in the 1960s. **Packet-switching networking** works with small packets of data being broken up to be sent to its destination, and then to be reassembled at the other side. This means that a single data signal can be routed to multiple users, and an interrupted packet may be re-sent without loss of transmission. These packets may be compressed and encrypted for speed and security.

During those days, computers are massive and primitive. The only type of network in operational are those that are connected to a mainframes. This is similar to the present-day client/server relationship except that computers are usually comparable in terms of power and so the Internet is known as a peer-to-peer system.

Early packet-switching networks were set up in Europe and the development of a similar system began in America in 1968 and went into operation the year after in the US Defense Department's Advanced Research Projects Agency (ARPA). Its network, called **ARPANET** uses the Network Control Protocol as its transmission protocol from 1969 to 1982 when NPC was replace with TCP/IP.

Eventually, a set of interconnected US military computers, which was considered the first large-scale Internet, was created. The idea of interconnecting these computers was if an attack was laid down on one part of the system, the rest of the system would still be

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operational enough to counter-attack. So, a network must not have a centralized system, or it would spell disaster. Thus, a need for a decentralized system was conceived.

Internet services such as the Email found their first usage through the ARPANET system and the benefits were lauded by all who participated. Usenet was developed between the 70s and 80s. During this stage, major universities in the US were connected to the network and used it for transmitting experimental data and educational resources. It was found to be an excellent method of sharing information. In 1973, the first international connection was made to the University College of London in England.

The introduction of personal computers in the late 1970s brought a large new number of users to the developing Internet. The Internet was growing rapidly. IRC (Internet Relay Chat) became available in 1988 and communities formed in chat rooms.

It was only in 1991 that what we now call the **World-Wide Web** was introduced, developed by <u>Mr. Tim Berners-Lee</u>. He saw the need for a standard linked information system accessible across the range of different computers in use. It must be simple to work with both command-based terminals and graphical X-Window platforms. Many researchers got interested and started designing web sites and browsers.

Today, the web is still growing at an amazing rate. Technology has improved considerably, and the web is regarded as an indispensable tool for education, business and entertainment.

Structure of the Internet

The Internet is a system of different machines in different networks with different users. The participants in the Internet are a wide variety of machines, organizations and individuals, all able to communicate and share information.

Each machine in the Internet is called **a host**. Hosts may be of many different types, as the following figure shows:
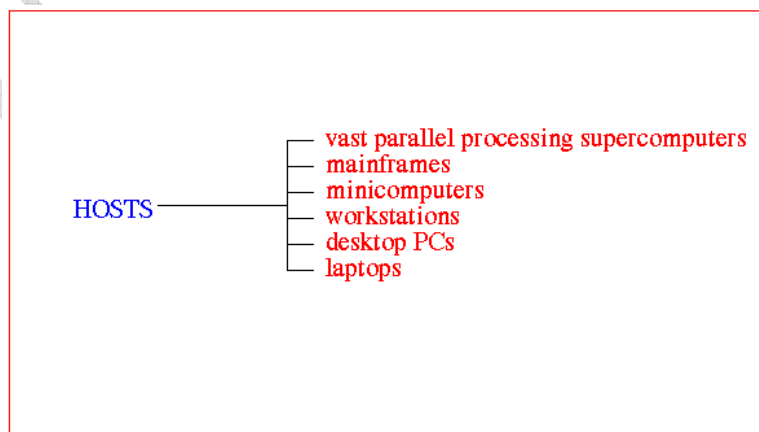
A variety of hosts

The most widely spread service of the Internet is **World Wide Web**. It's a graphical user interface of the Internet, typically used for displaying information. The content of the document, which contains links to another www-documents, is called a **hypertext**. The **linking** means that a certain spot of a document is activated with the command to the computer to take the connection to the address of another document. When you click on the link, your browser makes the connection to that destination.

We can use a **search engine** to find information in the Internet. They are searching information of all sorts of documents, which are connected to the Internet. You make a search with the help of some keywords, which would describe the search document.
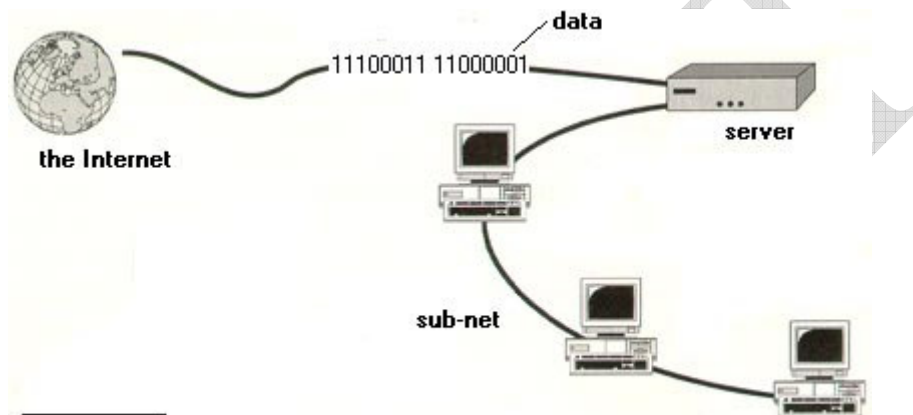
picture 1.2.

In reality, the Internet is really a collection of smaller networks linked together in many places. If we accept this model, then the process of **routing**, or sending Internet packets around the Internet is quite simple.

A host, or device, can only send messages within its own network. As the Internet grows, so do the networks, but remember that in the old Internet of the 1980's and early 1990's, there were only modems to communicate, so those acted as gateways. Even today if you are on, for example, the Telus network, then you must go through one of the Telus Internet gateways to see the rest of the Internet. Even to get out of your home network (hopefully protected by a firewall router), you must go through your router to get out of your house. This process of Internet datagram movement is called routing.

Each datagram has a source IP address, and a destination IP address in the IP header information. As a datagram is passed to the gateway (each host knows who its gateway is), it follows rules as to where it should go. Simply put, the router, or gateway looks at the packet and says "is this destination IP address in my network, or should I send it off to my gateway?". Obviously there is much more to it, but at the simplest level (recall our home firewall router example), that is really what happens in a "static routing table". There are, of course extremely complex rules automatically set by protocols such as border gate protocol (BDP) by higher level upstream providers (Telus, Sprint, etc.) since

your destination IP address may not just be upstream, but may also be downstream somewhere too.

Applications of Internet

Internet today is a large-scale network of millions of computers. It allows continuous communication across the globe. The various applications of the Internet are:

- World-Wide Web (WWW)
- Electronic Mail (E-Mail)
- File Transfer Protocol (FTP)
- Internet Relay Chat (IRC)
- USENET (a new service)

The **world-wide web** is the one commonly seen by majority of users. It is the most widely used service of the Internet, accessed through a **web browser** like *Internet Explore* or *Mozilla Firefox*. A **web** is an immense collection of web pages that are linked together by **hypertext links**.

Electronic Mail is similar to the traditional mail (now labeled as 'snail-mail'). The only advantage is the ability to send messages with attached files in less than a minute, anywhere in the globe. You can also sign up to newsletters and have information you want delivered right to your computer.

File Transfer Protocol is used to transfer files wherein people can share files, like music and videos, among each other and the rest of the world by *uploading* them to a server and allowing others to *download* them to their own computers.

IRC (Internet Relay Chat) is a service that allows you to connect to your chosen channel and **talk in real-time** to people with the same interests as you.

USENET (Unix User Network) is a system of bulletin boards where you and anyone else can **post messages** and people will read and reply to them.

Search Engines

A **Web search engine** is a tool which is designed for searching information over the World Wide Web. This information can be a web page, images, and other types of files. Unlike web directories which are maintained by human editors, search engines operate algorithmically or are a mixture of algorithmic and human input. Search engines are capable of searching a topic by using keywords, and conditional statements.

Some of the famous search engines are:

- Google
- Yahoo! Search

- MSN Search (Live Search)

How did a search engine works?

A search engine operates, in the following order

1. Web crawling
2. Indexing
3. Searching

When a user enters a query into a search engine (typically by using **keywords**), the engine examines its index and provides a listing of best matching web pages according to its criteria, usually with a short summary containing the document's title and sometimes parts of the text. Most of the search engine support the use of Boolean operators AND, OR and NOT to further specify the search query. Most of the search engine ranks the web pages so that the first one that will appear after the search is the 'best' among the rest. Many search engines are commercial ventures supported by advertising revenue and as a result, some employ the practice of allowing advertisers to pay money to have their listings ranked higher in search results.