**FUNDAMENTALS OF INFORMATION TECHNOLOGY**

**UNIT-4 COMPUTER NETWORK**

* Computer network connects two or more autonomous computers.
* The computers can be geographically located anywhere.



# TYPES OF NETWORK

1. LAN
2. MAN
3. WAN
* Network in small geographical Area (Room, Building or a Campus) is called LAN (Local Area Network)
* Network in a City is call MAN (Metropolitan Area Network)
* Network spread geographically (Country or across Globe) is called WAN (Wide Area Network)

# APPLICATIONS OF NETWORKS

1. Resource Sharing
	1. Hardware (computing resources, disks, printers)
	2. Software (application software)
2. Information Sharing
	1. Easy accessibility from anywhere (files, databases)
	2. Search Capability (WWW)
3. Communication
	1. Email
	2. Message broadcast
4. Remote computing
5. Distributed processing (GRID Computing)

# NETWORK COMPONENTS

1. Physical Media
2. Interconnecting Devices
3. Computers
4. Networking Software
5. Applications

# NETWORKING MEDIA

* Networking media can be defined simply as the means by which signals (data) are sent from one computer to another (either by cable or wireless means).

# NETWORKING DEVICES

* HUB, Switches, Routers, Wireless Access Points, Modems etc.

# COMPUTERS: CLIENTS AND SERVERS

* In a client/server network arrangement, network services are located in a dedicated computer whose only function is to respond to the requests of clients.
* The server contains the file, print, application, security, and other services in a central computer that is continuously available to respond to client requests.



# NETWORKING PROTOCOL: TCP/IP





**APPLICATIONS**

* E-mail
* Searchable Data (Web Sites)
* E-Commerce
* News Groups
* Internet Telephony (VoIP)
* Video Conferencing
* Chat Groups
* Instant Messengers
* Internet Radio

**WWW AND INTERNET**

**WWW**

* Via Internet, computers can contact each other
* Public files on computers can be read by remote user

o usually HyperText Markup Language (.html)

* HTTP - HyperText Transfer Protocol
* URL - Universal Resource Locator - is name of file on a remote computer
* The Web (World Wide Web) consists of information organized into Web pages containing text and graphic images.
* It contains hypertext links, or highlighted keywords and images that lead to related information.
* A collection of linked Web pages that has a common theme or focus is called a Web site.
* The main page that all of the pages on a particular Web site are organized around and link back to is called the site’s home page.
* Once you have your Internet connection, then you need special software called a browser to access the Web.
* Web browsers are used to connect you to remote computers, open and transfer files, display text and images.
* Web browsers are specialized programs.
* Examples of Web browser: Internet Explorer, Google Chrome, Mozilla etc.,

# INFORMATION ON THE WEB

* You can find information by two basic means.
* Search by Topic and Search by keywords.
* Some search services offer both methods, others only one.
* Yahoo offers both.
* Search by Topic
	+ You can navigate through topic lists
* Search by keywords
	+ You can navigate by entering a keyword or phase into a search text box.
* A number of search tools have been developed and available to you on certain Web sites that provide search services to help you find information.
	+ Examples:
* Yahoo  [www.yahoo.com](http://www.yahoo.com/)
* Excite  [www.excite.com](http://www.excite.com/)
* Lycos  [www.lycos.com](http://www.lycos.com/)
* AltaVista  www/alta-vista.com
* MSN Web Search  [www.search.msn.com](http://www.search.msn.com/)

# ACCESS THE WEB

* Once you have your Internet connection, then you need special software called a browser to access the Web.
* Web browsers are used to connect you to remote computers, open and transfer files, display text and images.
* Web browsers are specialized programs.
* Examples of Web browser: Netscape Navigator (Navigator) and Internet Explorer.

# INTERNET

* It is the largest network in the world that connects hundreds of thousands of individual networks all over the world.
* The popular term for the Internet is the “information highway”.
* Rather than moving through geographical space, it moves your ideas and information through cyberspace – the space of electronic movement of ideas and information.
* No one owns it
* It has no formal management organization.
* As it was originally developed by the Department of defense, this lack of centralization made it less vulnerable to wartime or terrorist attacks.
* To access the Internet, an existing network need to pay a small registration fee and agree to certain standards based on the TCP/IP (Transmission Control Protocol/Internet Protocol) .

# USES OF THE INTERNET

* Send e-mail messages.
* Send (upload) or receive (down load) files between computers.
* Participate in discussion groups, such as mailing lists and newsgroups.
* Surfing the web.

# ACCESS THE INTERNET

* Many schools and businesses have direct access to the Internet using special high-speed communication lines and equipment.
* Students and employees can access through the organization’s local area networks (LAN) or through their own personal computers.
* Another way to access the Internet is through Internet Service Provider (ISP).
* To access the Internet, an existing network need to pay a small registration fee and agree to certain standards based on the TCP/IP (Transmission Control Protocol/Internet Protocol) reference model.
* Each organization pays for its own networks and its own telephone bills, but those costs usually exist independent of the internet.
* The regional Internet companies route and forward all traffic, and the cost is still only that of a local telephone call.

# HYPERTEXT MARKUP LANGUAGE (HTML)

* The public files on the web servers are ordinary text files, much like the files used by word-processing software.
* To allow Web browser software to read them, the text must be formatted according to a generally accepted standard.

# HTTP

* The transfer protocol is the set of rules that the computers use to move files from one computer to another on the Internet.
* The most common transfer protocol used on the Internet is the Hypertext Transfer Protocol (HTTP).
* Two other protocols that you can use on the Internet are the File Transfer Protocol (FTP) and the Telnet Protocol

# E-MAIL - ELECTRONIC MAIL

* Send mail electronically via the Internet
* Requires an account on a mail server and supporting software on your PC
* The username and password will allow you to access your account
* All e-mail programs allow you to Send, Compose, Reply, and Forward mail
* E-mail Address Every e-mail address is unique and consists of two parts, a user name and a host computer
* The @ sign is required
* The host computer can be omitted if you are logged onto the same network or host computer

# E-MAIL PROTOCOLS

* POP Client – Post Office Protocol
	+ Lets you work without being connected to mail server
	+ Upload to send mail - Download to read mail
	+ Allows almost any e-mail program to access e-mail from server
* IMAP – Internet Message Access Protocol
	+ Permits a "client" email program to access remote message stores as if they were local
	+ Enables user to access messages from more than one computer

# E-MAIL ACCOUNT

* You will need an e-mail server (post office) in order to send and receive e-mail.
* You can obtain an account in school
* You can pay for an account through an ISP such as AOL
* You can get free accounts:
	+ [www.hotmail.com](http://www.hotmail.com/)
	+ [www.yahoo.com](http://www.yahoo.com/)

# MAIL FOLDERS

* *Inbox* – new messages as well as messages that have been read
* *Outbox* – messages not yet sent
* *Sent items* – messages that have been sent (moved here from outbox)
* *Deleted items* – messages deleted from any folder
* *Custom folders* – additional folders created by the user

# WEB DESIGN PURPOSE OF WEB DESIGN

* Inform/Educate
* Persuade

# INFLUENCES ON WEB DESIGN

* Technology Used by Both Target Audience and Designer
* Nature of the Content
* Economy (Budget, Time, and Scale of the Project)
* Amount and Type of Visuals Included
* Meeting Usability Objectives

# GOOD WEB DESIGN

Good Design is:

* Understandable
* Interesting
* Easy to use
* Uniform in look and feel
* Done from a visitor’s point of view: WYSIWYW (What You See Is What You WANT) **USES OF WEB DESIGN**
* Browsers don’t use web sites -- people do. Don’t design a site for a particular browser -- design a site for the user.
* There are no generic people. Try to envision a real person accessing your site.
	+ Most users absorb data visually.
	+ Most users will not expend effort to remember things about how your site works.

#  UNIT -5

**COMPUTERS AT HOME, EDUCATION, ENTERTAINMENT, SCIENCE, MEDICINE AND ENGINEERING**

Uses of Computers in various fields: Education, Business, Medical and Science

* Nowadays, all sectors are working with different types of computers and their software to complete their work quickly and effectively.
* Number of innovation techniques involve in computer environment for the

Graduate programmers. Following fields are using computers well and get the proper benefits.

1. Computer science
2. Physical Science
3. Scientific Modeling
4. Optical Physics.
5. Medical environment
6. Nano science and Technology
7. Computer Games
8. Entertainment
9. Work with social media

Uses of Computers in Education:

* + If you want to learn more things about your education then you should work with CBT programs those include with text, graphics and sound systems to learn quickly about new things in different types of educational fields.
	+ Number of people gets trained with CBT programs.

Benefits of CBT:

1. Simple learning tools from different things.
2. No need to spend money for training in real time.
3. Anyone can learn at anytime and at any place.
4. The proper online Training videos and audios available to the learners for simple prices.

Uses of Computers in Business:

* + The use of computer technology in business offer more facilities for both businessmen and customers.
	+ Proper interactive facilities improve the business tricks and profits due to provide good facilities to the customers anywhere in world through online marketing.
	+ Lot of business tasks get benefit with in limited span of time through online marking and etc.
	+ Stock Exchange is the best place for businessmen to improve business through contact with proper trade sectors and activities electrically so, anyone do business without building cost, paper work and etc.

Uses of computers in Medical Field:

* + Hospital Management System should maintain by the computer to know the complete environment and working operations of hospitals and etc.
	+ Nowadays, patients should have proper appointment to contact with doctor but that appointment process is very difficult to take.
	+ Due to the usage of computers in medical filed those appointments available in online not only taking appointments in online but also several things work well in online such as payroll admittance and discharge records.

Benefit of computers in medical field:

1. Maintain proper history of Patient
2. Diagnosis Machines
3. Surgery with help of Computers
4. CT scans
5. Best life support systems

Uses Of Computers part of science:

The advent of computers has contributed a lot for science sector.

Number of scientists to store information and records the information of science in computers those useful to use when they required to the scientists.

That information is useful to read data for the people who interested in scientist.

The name of the first scale computer was called “Colossus” that used in World War II that always work with high-speed recording of data but it take more time to work particular task.

Data, Mathematics and Data Detection:

Computers interact with collects of data; deal with common things of data those useful to the mathematical field.

Number of automated machines can perform high speed Calculations those decrease the burn of computer users and give the results quickly.

Automated Machines provide several tasks to the users to share the data manipulate the data and perform proper actions on those applications.

# INTRODUCTION TO COMPUTER SECURITY

* + Computer security, also known as cyber security or IT security, is the protection of [computer systems](https://en.wikipedia.org/wiki/Computer_system) from the theft and damage to

their [hardware,](https://en.wikipedia.org/wiki/Computer_hardware) [software](https://en.wikipedia.org/wiki/Software) or [information](https://en.wikipedia.org/wiki/Information), as well as from [disruption](https://en.wikipedia.org/wiki/Denial-of-service_attack) or [misdirection](https://en.wikipedia.org/wiki/Botnet) of the services they provide.

* + Cyber security includes [controlling physical access](https://en.wikipedia.org/wiki/Physical_security) to the hardware, as well as protecting against harm that may come via [network access,](https://en.wikipedia.org/wiki/Computer_network) [data](https://en.wikipedia.org/wiki/SQL_injection) and [code injection.](https://en.wikipedia.org/wiki/Code_injection)
	+ Also, due [to malpractice](https://en.wikipedia.org/wiki/Malpractice) by operators, whether [intentional](https://en.wikipedia.org/wiki/Insider_threat), [accidental](https://en.wikipedia.org/wiki/Error-tolerant_design), [IT](https://en.wikipedia.org/wiki/Information_technology) security is susceptible to [being tricked](https://en.wikipedia.org/wiki/Social_engineering_%28security%29) into deviating from secure procedures through various methods.
	+ The field is of growing importance due to the increasing reliance on computer systems and the [Internet,](https://en.wikipedia.org/wiki/Internet) [wireless networks](https://en.wikipedia.org/wiki/Wireless_network) such as [Bluetooth](https://en.wikipedia.org/wiki/Bluetooth) and [Wi-Fi](https://en.wikipedia.org/wiki/Wi-Fi), the growth of ["smart" devices,](https://en.wikipedia.org/wiki/Smart_devices) including [smart phones](https://en.wikipedia.org/wiki/Smartphone), [televisions](https://en.wikipedia.org/wiki/Television) and tiny devices as part of the [Internet of Things.](https://en.wikipedia.org/wiki/Internet_of_Things)

SECURITY

Security is the degree of resistance to, or protection from, harm. It applies to any vulnerable or valuable asset, such as a person, dwelling, community, item, nation, or organization.

Computer protection

In computer security a countermeasure is an action, device, procedure, or technique that reduces a [threat,](https://en.wikipedia.org/wiki/Threat_%28computer%29) a [vulnerability,](https://en.wikipedia.org/wiki/Vulnerability_%28computing%29) or an [attack](https://en.wikipedia.org/wiki/Attack_%28computing%29) by eliminating or preventing it, by minimizing the harm it can cause, or by discovering and reporting it so that corrective action can be taken.

Types of security software

* + [Access control](https://en.wikipedia.org/wiki/Access_control)
	+ [Anti-keyloggers](https://en.wikipedia.org/wiki/Anti-keylogger)
	+ [Anti-malware](https://en.wikipedia.org/wiki/Anti-malware)
	+ [Anti-spyware](https://en.wikipedia.org/wiki/Anti-spyware)
	+ [Antivirus software](https://en.wikipedia.org/wiki/Antivirus_software)
	+ [Cryptographic software](https://en.wikipedia.org/wiki/Cryptographic_software)
	+ [Firewall](https://en.wikipedia.org/wiki/Firewall_%28computing%29)
	+ [Security information management](https://en.wikipedia.org/wiki/Security_information_management)

# COMPUTER VIRUSES

* + A computer virus is a type of malicious software program ("[malware](https://en.wikipedia.org/wiki/Malware)") that, when executed, [replicates](https://en.wikipedia.org/wiki/Quine_%28computing%29) itself by modifying other [computer programs](https://en.wikipedia.org/wiki/Computer_program) and inserting its own code.
	+ Infected computer programs can include, as well, data [files,](https://en.wikipedia.org/wiki/Computer_file) or the ["boot" sector](https://en.wikipedia.org/wiki/Boot_sector) of the [hard drive.](https://en.wikipedia.org/wiki/Hard_disk_drive)
	+ When this replication succeeds, the affected areas are then said to be "infected" with a computer virus.
	+ Virus writers use [social engineering](https://en.wikipedia.org/wiki/Social_engineering_%28security%29) [deceptions](https://en.wikipedia.org/wiki/Deception) and exploit detailed knowledge of [security vulnerabilities](https://en.wikipedia.org/wiki/Vulnerability_%28computing%29) to initially infect systems and to spread the virus.
	+ The vast majority of viruses target systems running [Microsoft Windows](https://en.wikipedia.org/wiki/Microsoft_Windows), employing a variety of mechanisms to infect new hosts, and often using complex anti-detection/stealth strategies to evade [antivirus software.](https://en.wikipedia.org/wiki/Antivirus_software)
	+ Motives for creating viruses can include seekin[g profit](https://en.wikipedia.org/wiki/Income) (e.g., with [ransomware](https://en.wikipedia.org/wiki/Ransomware)), desire to send a political message, personal amusement, to demonstrate that a vulnerability exists in software, for [sabotage](https://en.wikipedia.org/wiki/Sabotage) and [denial of service,](https://en.wikipedia.org/wiki/Denial-of-service_attack) or simply because they wish to explore

 [cyber security](https://en.wikipedia.org/wiki/Cybersecurity) issues, [artificial life](https://en.wikipedia.org/wiki/Artificial_life) and [evolutionary algorithms](https://en.wikipedia.org/wiki/Evolutionary_algorithm).

* + Computer viruses currently cause billions of dollars' worth of economic damage each year, due to causing system failure, wasting computer resources, corrupting data, increasing maintenance costs, etc.
	+ In response, [free, open-source](https://en.wikipedia.org/wiki/Free_software) antivirus tools have been developed, and an industry of [antivirus software](https://en.wikipedia.org/wiki/Antivirus_software) has cropped up, selling or freely distributing virus protection to users of various [operating systems.](https://en.wikipedia.org/wiki/Operating_system)
	+ As of 2005, even though no currently existing antivirus software was able to uncover all computer viruses (especially new ones), computer security researchers are actively searching for new ways to enable antivirus solutions to more effectively detect emerging viruses, before they have already become widely distributed.

TYPES OF COMPUTER VIRUS

* + Boot Sector Virus. ...
	+ Direct Action Virus. ...
	+ Resident Virus. ...
	+ Multipartite Virus. ...
	+ Polymorphic Virus. ...
	+ Overwrite Virus. ...
	+ Space filler Virus

# COMPUTER WORM

* + A computer worm is a standalone [malware](https://en.wikipedia.org/wiki/Malware) [computer program](https://en.wikipedia.org/wiki/Computer_program) that replicates itself in order to spread to other computers.
	+ Often, it uses a [computer network](https://en.wikipedia.org/wiki/Computer_network) to spread itself, relying on security failures on the target computer to access it.
	+ Worms almost always cause at least some harm to the network, even if only by consuming [bandwidth](https://en.wikipedia.org/wiki/Bandwidth_%28computing%29), whereas viruses almost always corrupt or modify files on a targeted computer.
	+ Many worms that have been created are designed only to spread, and do not attempt to change the systems they pass through.
	+ However, as the [Morris worm](https://en.wikipedia.org/wiki/Morris_worm) and [Mydoom](https://en.wikipedia.org/wiki/Mydoom) showed, even these "payload-free" worms can cause major disruption by increasing network traffic and other unintended effects.