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Computer Networks



In the previous years, we have learnt to store information as files in computers and retrieve them when required. Suppose there is a file in your computer that stores the names of students in your class. How can you transfer this file to another computer?

Copy the file into a floppy disk. Then insert this floppy into the drive of the other computer and copy the file from floppy to the computer. If this is your answer, it is correct and easier as far as small files are concerned. How about copying thousands of files? What if the files with more than 1.44 MB size, more than a floppy can contain, are to be copied from computer to computer.? Even the usage of high storage media such as CD is unfeasible in such exchange of information. If the computers are far away from each other, it intensifies the difficulty.

Exchange of information between computers is essential in offices, banks, research centers etc. Connecting computers together so as to exchange information easily and rapidly is called networking.

Such a collection of inter connected computers is called network. Let us review what learnt about computer networks in earlier classes.



What we have already learnt

- *The telecommunication devices such as telephone and fax are network based.*
- *By networking the computers , resources such as information and peripheral devices can be shared.*
- *The computer network in the computer lab of a school is an example for Local Area Network (LAN).*





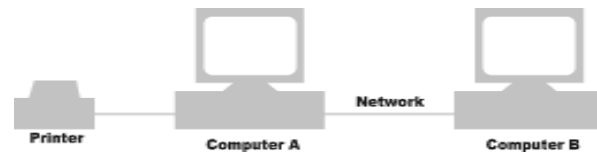
- *The network connecting computers at distant areas like railway reservation network is known as Wide Area Network (WAN).*
- *Internet is the extensive networking of computers communicating one another.*
- *WWW, E-mail, Chatting, Message exchanging etc. are the services available in Internet.*

Advantages of Networks

1. Resource Sharing

Many of the peripheral devices used along with computers for specific purposes are costly.

A huge amount is required to attach such devices with all computers networked together, the devices connected with one computer can be utilised by other computers. For example, consider the situation that a laser printer is connected to our computer(say, computer A). Another computer (say, computer B) is connected to computer A through a network. A person is typing a letter in computer B using a word processor. But to get the printout, computer B has no printer connected to it.



Hence computer B sends the print command along with the file to computer A. If the printer is idle (i.e, no printing is in progress) the file from computer B gets printed, otherwise it will be kept in the memory and printed later as the printer become free from print job. We can expand this network so that more than one computer is connected to A and all the computers can use the printer attached to computer A.

You see another example of sharing computer resources in Internet cafes. Usually we get connected to the Internet through telephone lines. In Internet cafes, only one computer is connected to the telephone line and other computers, through the network, share Internet services available in the computer having Internet connection.

2. Centrally Controlled Information

If there is computer network, there is no need to copy same



information in all the computers. Each may store different information in all the computers. The important data / information may be stored in a particular computer and they can be made accessible to other computers through the net work. Some of the information may be of confidential nature. What will happen if such information available to all?

It cannot be allowed and hence some sort of control should enforced and hence there is a facility to decide what information is accessible by whom and what kind of access rights can be provided. A person is made responsible to arrange and control the computers in a network in this manner.

3. Security of Information

The information stored in computers may be lost due to machine failure, virus infection, fire, natural calamities, attacks etc. Imagine the situation of losing the information on the transactions in a bank! This kind of important information can be copied and stored in a distant computer through computer network. If the information stored in one computer is lost, the copy stored in some other computer will be safe. The network is utilised by defence institutions, bank, software development companies, research institutions etc. in this manner.

4. Media for Communication

There are different ways to utilise network as communication media. WWW, E-mail, chatting, video conferencing etc., are some of the examples. As a media, the main advantage of the network is that we can share audio, video, pictures, etc.

Types of Networks

Last year you learnt that networks are classified into two, based on distance. If the distance between two computers in a network is short, the network is called LAN, the acronym of Local Area Network. The network within a room, a building or an organisation comes under the category of LAN. The computer lab in your school also belongs to this type.

The network constituted by connecting computers at distant areas

is called WAN, the acronym of Wide Area Network. The computers at thousands of kilometers away from each other can be members of WAN. They use satellites and/or fibre optic cables as the media for exchanging information. ERNET (Educational Research Network) that connects main educational institutions in India is an example of WAN.

How are computers connected?

When two computers are connected, we have to think how the information is transmitted from one computer to another. We have learnt that the information is stored in as well as transmitted from the computer in the form of bits. Many kinds of media are used to transmit such bit. The following are some of the commonly used media.

1. Coaxial Cables

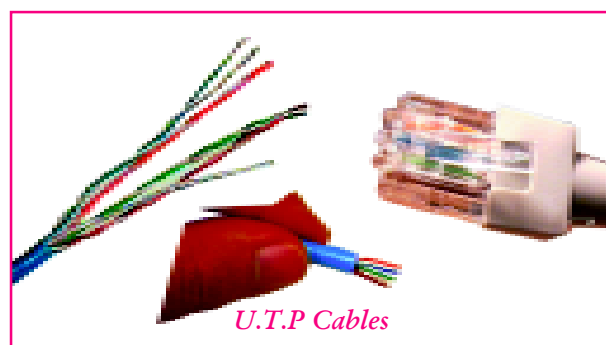
Have you noticed the cables used for distributing cable TV channels? They are coaxial cables. Computer networks can be materialised by using similar kind of cables. Information is transmitted in the form of electric signals through this type of cables.



Coaxial Cables

2. U.T.P Cables (Un-shielded Twisted Pair Cables)

U.T.P cable is a set of twisted paired wires. They are largely used to design small net works. They also transmit information in the form of electric signals. Perhaps this kind of cables may be used in your school computer lab.



U.T.P Cables

3. Fiber Optic Cables

Information is transmitted in the form of light rays in fibre optic cables. These cables can transmit large amount of data at high speed and hence they are used in constructing large networks.



4. Infrared Rays

Infra red rays are electromagnetic waves with frequency greater than red rays. If the distance between the computers is short, these rays can also be used as the medium. But there should not be any obstructions in between the computers. The advantage of networks using this medium is that even cables are not needed. Using these rays the information can be exchanged between two adjacent computers or a computer and the devices attached to it.

5. Radio Waves

Radio waves can also be used as a medium of network. When radio waves are used the problem associated with the exchange of information caused by obstruction in between computers are comparatively less than using infrared rays. In addition radio waves are better for networking computers situated far apart.

Network Interface Cards

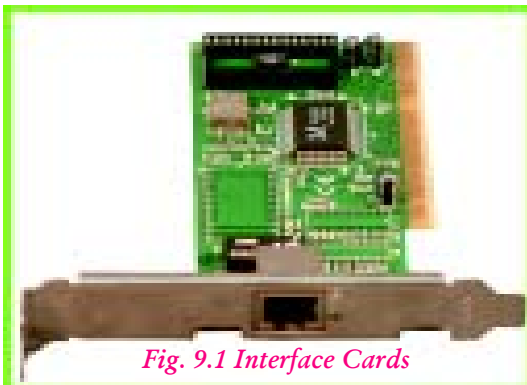


Fig. 9.1 Interface Cards

If a computer is to be attached to the network, a special circuit board is to be fixed into the computer. It is this circuit board that helps our computer to communicate with other computers through the network media. This is called network interface card (NIC). The cables used for networking are connected to this card. Fig (9.1)

Network Protocols

All computers in a network need not be of same type. The processor, memory and speed of operation of computers may vary. The operating systems, the mode of storing information etc. may also be different. Hence computers in the network should follow certain rules and regulations for proper exchange of information. These rules and regulations are called 'Protocols'. Today the widely used protocol is TCP/IP (Transmission Control Protocol / Internet Protocol).



IP Addresses

Each computer in the network has a special address. If the computers are using protocols belonging to TCP / IP, the address is known as IP address. Usually IP address is written as four numbers separated by three dots.

Eg: 192.168. 0. 1

210. 0. 7. 2

Computers are identified using these addresses for sending and receiving information.



Communication through Networks

1. Exchange of Files

A file stored in a networked computer can be retrieved from some other computer in the network. But the folder containing the file should be shared in the computer. You can seek the help of your teacher to share the folder that contains the files you require. Let see how the file / folder in a computer can be copied into our computer.



File Exchange in GNU/Linux

Open the file manager by double clicking the Home icon in the desktop. Type in 'smb' at the address bar and press Enter key. The names of different available computer groups and pictures appear in the window. Double click on any of them. The names and symbols of all computers in that group will be displayed. Open the computer in



TCP/IP

(Transfer Control Protocol / Internet Protocol)

The information through Internet reaches the destination from the source as small pieces or chunks. The smallest unit of such a piece is called a packet. When we send messages or files through Internet they are converted into such packets and they are converted back to its original form at the destination computer. TCP/IP protocol helps this process.

which the file you want to open is available. Now open the concerned folder and open the file for use or copy it in your computer.

File Exchange in Windows

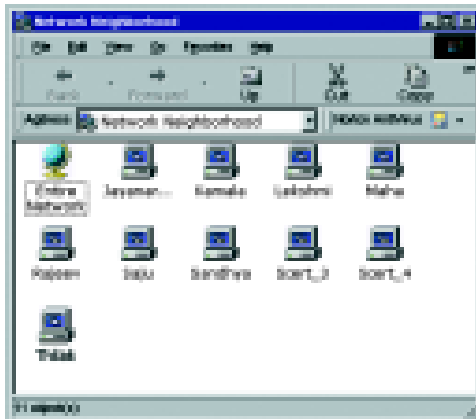


Figure 9.2 Window showing the computers connected to the network

There will be an icon 'Network Neighbourhood' in the desktop of those computers that are networked. A window showing the names and symbols of computers appears if you double click this icon (fig: 9.2). Open the computer from which you want to retrieve the file. You can see the file icon if you open the concerned folder. The file can be opened and used or it can be copied into your computer.

Chatting

Chatting is one of the attractive facilities available in the Internet. It provides live (on line) communication between people at different places by typing in the computer. Now chatting can even be performed by talking and seeing each other. For this, web cameras and microphones should be connected in both the computers. Also the software that facilitates chatting should be executed.

You know that an e-mail id and password are required to use e-mail. Similarly, you need a chat id and password for chatting. As your e-mail id has two parts in the form of user name @domain, chat id has also the same.

Creating Chat ID

The domain name should be known to create chat id. You can get it from your teacher. Otherwise, you can use the IP address of the computer in the place of domain name. Password can be decided by yourself. You can use your name itself at the user name. Note that no two persons can have the same user name. For example, If the domain name is myschool.edu, then your chat id will be in the form of 'myname @myschool.edu'. Once the chat id and password are decided, we can create the chat id.

Gaim - To Chat in GNU/Linux

Gaim is the best software for chatting in GNU/Linux. You can open Gaim by executing the commands Main Menu → Internet Instant Messenger. (fig: 9.3)

- Now click Account button in the Gaim window to create chat id.
- Click Add button (fig : 9.4) in the resultant window. A new window appears. (fig : 9.5)
- Type in the chat id and password you have selected. Then select Jabber from the Protocol list menu. Now the window is transformed (fig: 9.6)
- Tick mark the check box 'Register with Server' and click OK button. Now your chat id appears in Accounts window (fig: 9.7)
- Select your id and click the Sign On/Off button. A new window showing 'Registration Successful' appears within no time.

It indicates that the creation of chat id is completed. Now let us close all the windows of Gaim.

Let us Chat

Open Gaim by clicking the series of commands Main Menu → Internet → Instant Messenger.

Type in chat id at the 'Screen Name' and password at the 'Password' and click Sign On button. (This process is called login.) Then a new window appears (fig : 9.8).

Click File → Internet Messaging buttons to chat with your friend. Click the chat id of your friend in the new dialog box and click OK button (fig: 9.9).



Figure 9.3 Gaim Window



Figure 9.4 View of Gaim's Account Window



Figure 9.5 View of Gaim's Add Account Window



Figure 9.6 Add Account window of Gaim

A new window appears which is for chatting (fig : 9.10)

Type in your message at the bottom and press Enter key. This message appears at the top portion (fig: 9.11) At the same time the message would have appeared in a similar window of your friends computer provided he has logged in.

Now your friend can type in the reply to your message at the bottom of that window and in this way chatting can be continued as long as you wish.

Exodus - To chat in Windows



Figure 9.7 Account window of Gaim after Chat ID is added

Exodus is a free-software that helps chatting in Windows operating system. It can be executed by executing the following:

Start Menu Exodus Exodus (fig: 9.12)

Now let us create the chat id. For this click on the link 'Click here to log in' of the Exodus window. A new window is opened (fig: 9.13). Click on the link 'Profile'. Here you can see two options; 'Create Profile' and 'Default Profile'.

Click on Create Profile, then type in the chat id that we have decided in the resultant window and then click OK button. A new window appears (fig : 9.14) in which you type your name at the User name box, domain name at the Server box and password at the Password box. Then click OK button.

A window indicating the completion of the creation of chat id appears. Now let us close the window (Exodus Exit).



Figure 9.8 Login window

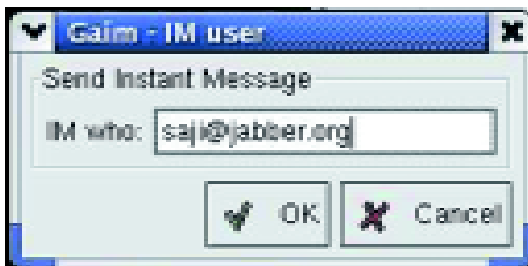


Figure 9.9 Chat ID dialog box in Gaim on starting chat

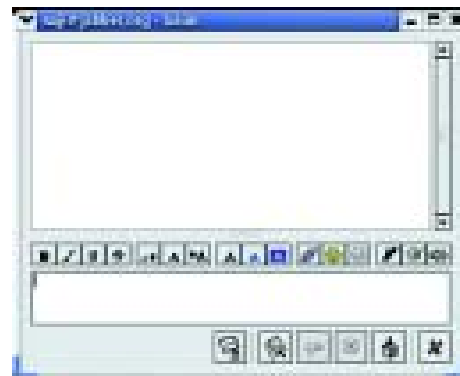


Figure 9.10 The chat window

Let us Chat

- Execute Exodus by performing Start Menu Exodus Exodus.
- A window is opened and click on the link 'Click here to sign in' it.
- Select your chat id from the dialog box obtained and click OK button. Then a dialog box requesting the password appears (fig: 9.15)

Here you type your password and click OK button. Now the window 'Click here to log in' disappears from the Exodus window and is about to start chatting. Click Exodus Start

Chat to chat with your friend in the resultant window and click OK button.

A new window appears, which is for chatting (fig: 9.16)

Type in your message at bottom and press Enter key. This message appears at the top portion (fig: 9.17).

At the same time the message would have appeared in a similar window provided your friend has logged in.

Now your friend can type in the reply to your message at the bottom in that window. In this way chatting can be continued as long as you wish.



Figure 9.11 The message we typed is displayed above



Figure 9.12 The main window of Exodus

More activities for you

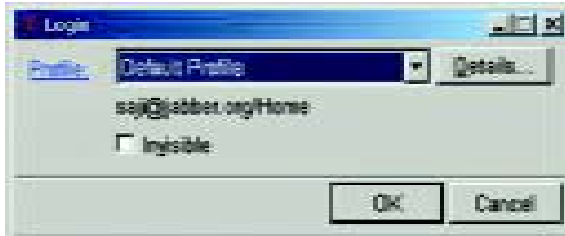


Figure 9.13 Dialog box in Exodus where chat ID is entered



Figure 9.14 Account registration window in

1. Go through the Internet and news magazines and collect the information regarding the application of computer networks in different fields. Also note it down in your workbook.
2. Make a list of IP addresses and names of computers networked in your school computer lab.
3. What are the requirements for computer network? Based on knowledge acquired in standards 8,9 and 10 organise a group discussions in your class.
4. Observe the window of the software that is used for chatting. Record the uses of its various buttons in your workbook with the help of your teacher.
5. Compare chatting with other communication methods and arrange an open forum to discuss their merits and demerits.
6. Prepare a table of LAN and WAN in the computer. (Use the software packages such as Paint, Word processor, Draw etc.)
7. Prepare a table containing the information regarding different network media, their merits and demerits. You can make use of Internet, magazines etc. for data collection.

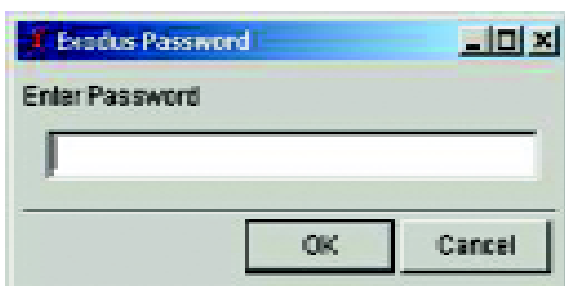


Figure 9.15 Password dialog box in Exodus

8. Visit a networked computer lab and collect the IP addresses of the computers. Based on the information collected, discuss in your class on the necessity of IP addresses.



Figure 9.16 Chat window in Exodus

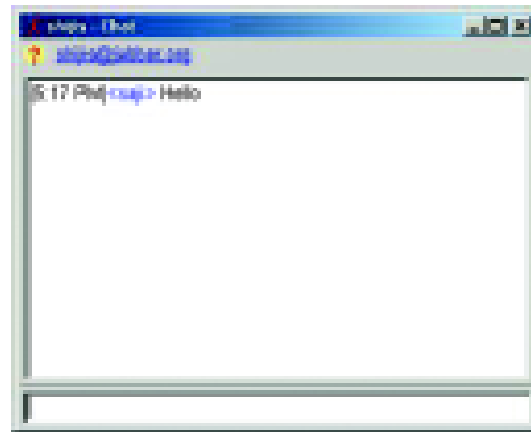


Figure 9.17 The message typed appears in box above

What we have learnt? A self assessment

1. What are the advantages of networking computers?
2. How does a network achieve centralisation of information, controlling and security?
3. Distinguish between different types of networks.
4. Explain the media used for connecting computers together?
5. How is a file copied from one computer into another within the network?
6. What are the requirements for chatting?

Jabber for Chatting

We are practicing the chatting method named Jabber. In addition to this, there are many other ways of chatting such as msn, yahoo etc. The website like Jabber.com can be used as the server for jabber chatting. In situations where Internet is not available, we can create our own jabber server. The Gaim application can be used in GNU/Linux for all kinds of chatting like msn, yahoo, jabber etc. Separate applications are also available for each of them. Separate and suitable softwares are available for Windows also.

