
UNIT 31 NETWORKS AND MULTIMEDIA

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31.0 OBJECTIVES

This unit will allow you to:

- Understand that computers provide rapid access to up-to-date information by networking
- Find out what a computer network can do for organizations and for individuals
- Look at some of the ordinary words used by computer users, as well as less well known words connected with computing
- Begin thinking about information sharing in corporate communications, and the use of sms or short messaging services

31.1 INTRODUCTION

The slogan in the information technology is “If it works, it’s obsolete”. Such is the pace of innovation today that even as a product is being perfected and made available to the market, the research and development wing of an organization is already working to improve it!

Computers provide a speed of access and a universality of access to information that drives continual improvement in other fields as well. Information sharing among special interest groups is now instantaneous. In my personal experience, a surgeon in India performed a complicated surgery that was simultaneously available for viewing at a teaching hospital in the United States. Another surgeon, faced with a

stubborn though minor problem in after-surgery healing, put his case on the Internet and was able to tell his patient that around 8% of people undergoing that surgery had a similar problem, but went on to recover fully.

This sense of a global community is made possible by the Internet and email, where interest groups are only a click away. Such is the growth in the use of computers that many of you are probably good users of the Internet already. On the other hand, many of us use a facility without knowing much about it. We ride in cars and aeroplanes without thinking about the internal combustion engine or the aerodynamics of flying. In this unit we attempt to refresh our basic knowledge of systems that most of us now use everyday, without thinking.

31.2 COMPUTER NETWORKS: EMAIL, INTERNET, INTRANETS, MULTIMEDIA

31.2.1 Information: its Explosion, Control and Dissemination

Nearly a million articles a year are published now in science alone. Rapid advances in research are possible because scientists get information faster. So there is a great need in today's world for storing information, packaging and processing it, and disseminating it or making it available.

You are familiar with the idea of a library as a place for storing knowledge. Books are stored under a system by which you can find them easily by author, title or even subject: the system allows you to *identify* and *retrieve* the information you need. It has been pointed out that these are also the functions of a computer! It can store information, and it has a system by which you can identify and retrieve the information you need. And it can do this much faster than the process of printing and publishing.

A **database** is an organized, integrated and inter-related collection of computer-based data. It has records or information that is machine-readable and it can be searched from a remote terminal, i.e. a computer that can connect with the database may be physically very distant from it. Databases can be internal to an organization (its accounts, its activities and plans, its history, for example). They can also be external: and they may be regional, national or international.

For example, the **Books in Print** database is the world's largest list of books currently available in the market. This database contains information pertaining to over 10 lakh books!

The USA has a database of **Federal Research in Progress** that provides access to information about government-funded projects in the physical sciences, engineering and the life sciences.

In India, **NISSAT** is a National Information System for Science and Technology. This database was established in 1977.

✓ Check Your Progress 1

1. Say if these statements are true or false:

1. Computers can function as libraries by storing and retrieving information. T/F
2. A database can be searched from anywhere in the world provided a computer is connected to it. T/F
3. Databases are only internal to an organization. T/F

2. Name some databases and say what kind of data they store and provide.

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31.2.2 Uses of Computer Networks

Networking of computers allows an automated sharing of resources.

A **LAN** is a Local Area Network that has a range of less than 10 kilometers. Computers in this network are linked by telephone cable or by fiber optic cable. It is usually a privately-owned network within a single building, or within a small campus such as a University or institution.

A **MAN** is a Metropolitan Area Network with a range of 10-100 kilometers. It uses dedicated telephone lines (telephone lines reserved only for the network) or fiber optic cable. It is a bigger version of a LAN.

A **WAN** is a Wide Area Network, with a range starting from a 100 kilometers. It uses telephone lines, or more usually, satellite links. A WAN spans a country or a continent!

The **Internet or the World Wide Web**, known as **www.**, is a way of accessing linked documents spread out over thousands of machines all over the world. The idea of the web actually began in 1989 at CERN, the European Centre for Nuclear Research. Its large teams of internationally dispersed scientists and researchers needed to interact with each other in the minimum of time. They needed to exchange and work together on reports, blueprints, drawings, photographs and so on. A prototype of a computer network to enable such sharing of information was made operational and a public demonstration was given at a conference in Texas in December 1991. A company called Netscape Communications Corporation was formed. In 1994 CERN and MIT set up the www consortium, which was joined by hundreds of universities and companies.

Up until the early 1990s, the Internet was largely populated by academic, government and industrial researchers. One new application, the World Wide Web, changed all that and brought millions of non-academic users to the net.

31.2.2.1 Networks for Organizations

Why do organizations use computer networks?

- **Resource sharing:** computer networks make the data available to everyone in the organization, no matter where they are. This ends "the tyranny of geography". All members of an organization can check their pay slips, the status of the organization's inventory or stock of items, or statistics relating to orders received and items delivered, for example, from wherever they are, on a computer linked to the company's network.

Another example of such networking is that of libraries. If a book you need is not available in your local library, the librarian can check the database of a networked

library. If that library has the book in their collection, you may be able to get the book on an inter-library loan.

- Reliability: information storage for industries like banking or air traffic control has to be reliable and unified. A network makes sure that all organizations within an industry have access to the same reliable information. Bankers can check the day's currency exchange rates. Air traffic controllers are linked the world over, to keep track of the airplanes that fly to destinations all over the world.
- Communication: two people separated in space can write a report together! When one of them makes a change, the other can see it immediately.

31.2.2.2 Networks for People

Our everyday lives are impacted by computer networks in a variety of ways.

- Access to remote information: electronic billing, banking, shopping; on-line newspapers

Many people receive their telephone bills via the computer. They may also have an arrangement with their bank for the bill to be paid electronically, by debiting their bank account. You may also be familiar with on line shopping facilities. You can purchase books and airplane tickets on line. You can have flowers and gifts delivered in another city as a gift, by placing an order on line, and paying for it electronically as well!

Many people who work with the information technology industry read newspapers on line while they are at work. (In the unit on the World Wide Web you will touch again on this topic, when you are asked to compare the print and on line editions of popular daily newspapers.)

- Person-to-person communication

E-mail or electronic mail is now widely used by millions of people. Many of them send messages that contain an audio or video clip in addition to text.

- Interactive entertainment

You can choose a video (such as a movie) to watch from a central service provider, using the remote control of your television. Video servers can store and output a large number of movies simultaneously. They are programmed to accept user requests, locate the movie from the storage device and play it in the output device, and bill the customer.

The video servers can store a large number of movies. There is also a mathematical way of computing the probability of how often a particular movie is requested by the customers. Suppose the server stores seven movies. By Zipf's law, "the most popular movie is seven times as popular as the number 7 movie"!

✓ Check Your Progress 2

[Say whether True or False.]

3. The Internet was invented to sell things across the globe. T/F
4. A LAN is smaller than a WAN. T/F

Personal e-mail has become a way of life in the 21st century. A newspaper report from the New York Times News Service (published in The Hindu on May 30, 2007) says that the British Library, which has a collection of such historic objects as the Gutenberg Bible, the Magna Carta and Shakespeare's First Folio, is collecting e-mail notes for a month. The project is known as Email Britain.

The Library wants "memorable or significant e-mail" messages that fall into any one of these 10 categories:

blunders complaints spam humour life-changing e-mails news
love and romance everyday e-mails world around you tales from
abroad

Here is an example of an email sent to a company network (the person was later fired!):

"To: All Users

Subject: The person who ate my muffin!!!

It would have been better if U asked for one of my muffins. Instead of just taking it without permission."

[A muffin is a small round cake or bun, often eaten with butter.]

Here is an example of a complaint, a note sent to a restaurant:

"I really really really ridiculously enjoy eating chicken and bacon sandwiches ... Unfortunately however, a Chicken and Bacon and Salad sandwich that I purchased today ... was not only an insult to man's greatest edible achievement, but also taints your own brand's impeccable reputation for excellence and customer satisfaction."

And this is a description of a life-changing moment. [Note: The London Eye is a giant wheel installed during the millennium celebrations (the year 2000). A work "do" is an informal British way of referring to a party at work. You will find this meaning listed in the dictionary under the entry for *do* as a *noun*.]

"Last night Dave surprised me and took me on the London Eye (I thought I was going to his work do). Anyway to cut a long story short ... he asked me to marry him - after lots of really girly behaviour of sobbing my heart-out I nodded my head!"

31.2.3 Web Pages and Languages on the Web

31.2.3.1 Words for the web

Many words relating to computers have become part of our everyday language. A **desktop** computer sits on your desk, and a **laptop** is meant to sit on your lap. The **screen** has **icons** or images that symbolize the **programs** installed on your computer. These programs or instructions in the brain of the computer constitute the **software**. The **hardware** is the machinery of the computer: its **motherboard**, for example.

To start a program, you click on an icon, which opens a **window** or a screen. The computer's **memory** is of two kinds: the long term memory is data stored on a **hard disk**. You can also make your **data portable** by storing it on a **CD**, a **DVD** or a **pen drive** (also called a **zip drive**).

From the user's point of view, the Internet or the World Wide Web consists of a vast world wide collection of documents, usually called **pages**. A web page may contain **links** or **pointers** to other pages anywhere in the world. You can get this

linked page by clicking on the link, a **hyperlink**, which is usually underlined or in a special colour. Pages that are linked in this way form a **hypertext**. That is, they are not a single text, but the pages can be put together by the user while reading, to form a large text of the user's choice.

You search the web or find your way through it (**navigate** the web) using a **browser**. The browser has **buttons** on which you click, which let you return to a previous page, save a page or print a page. To **surf** the Internet means to rapidly look through its sites (just as one surfs the ocean, or rides its waves using a surfboard). To surf the Internet, you need to be connected to it with a **modem**. You will also need a **browser**, which is software that enables you to view the web pages. To go to a particular **website** you need to type in its **URL** or web address. If you are not sure of the address, or not sure on which site or sites you can find some information, you can use a **search engine**. Once you find the site you want, you can **browse** the page using menus and links. You can **scroll up** or **down** the page (move the text up or down on your screen) by using a **button** or **mouse**.

You can **download** programs and information from the Internet. **Freeware** is what you don't pay for; **shareware** can be tried for free for a certain period, and then has to be paid for. You must be careful not to get a **computer virus** from the Internet. You can buy **anti-virus software** to protect you against viruses. Otherwise, your computer might **crash**!

Activity

How many of the words in bold do you know? Try to learn the words that are new to you, using a computer to do the activities of surfing, downloading etc., suggested by the words. (Visit an internet café if you don't have a computer of your own.)

31.2.3.2 Languages for the Computer

The Web is basically a "client server" system of networked computers. The languages in which web pages are written are HTML and Java. HTML is a "markup language". It contains explicit instructions on how documents are to be formatted, just as a copy editor in a publishing house "marks up" a document to tell the printer how to format a text.

So in HTML,

 means : start boldface mode

<?B> means : leave boldface mode

<I> means : start italics mode

</I> means : leave italics mode

Documents written in a markup language contrast with documents like this one, produced in a "What You See Is What You Get" or WYSIWYG mode using Microsoft Word. In the file you are now reading, the "markup" or the set of formatting instructions is stored in a hidden or embedded mode, or it might even be kept in a separate file.

Java allows highly interactive Web pages. Using Java you can design a web page with which a user can play noughts and crosses, or chess. Or you can get an income tax form, fill in items, and see the calculations made instantly. This is possible because Java uses "applets" or small applications that your computer downloads along with the Web page. For example, a game-playing program, written in Java, is downloaded along with the Web page.

31.2.4 Multimedia

31.2.4.1 What is Multimedia?

Multimedia has been called “the rising star in the networking firmament”. It allows audio and video to be digitized and transported electronically.

What is a digital signal? It is a signal that is not continuous (an analogue signal is a continuous signal). A digital signal specifies exact values for the signal at a series of chosen points. Think of a light switch: it is either *on* or *off*. It is digital. But some switches rotate continuously, to allow the light to grow gradually brighter or dimmer. These are analogue switches. (The American spelling is *analog*.)

The difference between analogue video and digital video is the following. Analogue video scans an image in horizontal lines. Digital video is a sequence of “pixels”, that is, “picture elements”, or small “dots of information” in a rectangular grid.

Today the term “multimedia” is restricted to mean “two or more continuous media”, that is, “media that have to be played during some well-defined time interval, usually with some user interaction”. So this term is used for a computer that has audio and video capability, and with which a user can interact.

Literally, however, multimedia is just two or more media. Even a simple book with illustrations uses “multi media”! Books have had pictures in them, to decorate or to illustrate the text, from earliest times. Then came a time when a book would be sold along with a cassette which had the book read out – a “talking book”, as it were. Can you think of some uses for talking books?

Children used to have grandparents or parents read out stories to them; now they can use the cassette instead, looking at the pages of the book – the print and the illustrations – as they listen. The read-out version of the book usually has a bell or a small sound to indicate at what point the child should turn the page to the next page.

Many people spend a lot of time driving to and from work. They find talking books a useful way of catching up with their “reading”: a cassette plays in the car as they drive. Or a CD (compact disc)!

And of course, talking books help the blind or the “visually challenged” to read. The well-known writer Ved Mehta describes how he used to listen far into the night to the great English and Russian classics in translation on gramophone records, read out by the best actors of the day. Ved Mehta is probably one of the most well-read people today!

In education, radio broadcasts have been used along with course books for distance education programmes. As video and television became available, these visual media were also integrated into courses.

31.2.4.2 Uses of Multimedia

Who uses multimedia?

Companies use it to make presentations. Sales charts and other graphics can be animated, given attractive music and voice over, and interwoven with video clips showing actual product use, customer responses, or projections for the future; and all this can be combined with the sales executive’s own voice or visual presence.

Institutions use it to give “visitors” a guided tour. Multimedia can create a “virtual world”, which can take you on a tour of the institution. Many institutions now have

their “prospectus” on a CD which tells you what the institution stands for, lets you see who its officials are and listen to them, shows you the campus and the buildings, and talks with the customers or students of the institution.

Advertisers use it to sell their product. They can mix animation and real-life video, fantasy and reality, using multimedia. Text can be animated, and so can pictures. One advertisement has a car that winks at us with its headlight. One of the earliest enduring images of Indian advertising was a little girl in a white frock for a popular brand of soap powder. The girl twirls her dress, and as she does so, she turns into an image on a packet of soap! You see these advertisements on television, of course, but also on the internet.

On-the-job training and updating is done with multimedia. Demonstration and introduction to new technological advances, product guides, procedures for using machinery, demonstrations of equipment, and knowledge renewal are some of the ways in which this technology is used. Since this technology can be interactive, individual trainees can take a course at their own pace and in their own time, to renew their knowledge and keep up-to-date. Aircraft mechanics, fire fighters, and industrial workers can now learn while on the job.

Educational multimedia is an entire industry in itself. Children in many countries – not to mention the U.S.A. – now spend more time at a television or computer screen than with a book. The concept of “edutainment” allows the child to learn while “playing”. One award-winning interactive game taught simple geography in the guise of a detective game. The user registered as a detective. (S)he had to solve a crime by pursuing the members of a gang who flew to destinations all over the world. Clues were given to the destination (e.g., “They have gone to climb Mount Everest”, “They are enjoying the beach at a French-speaking part of India”), and the user had to book air tickets to the correct place by using the clues. In this way, the user picked up some basic geographical knowledge. Other more straightforward multimedia packages are available for learning and checking your knowledge of biology or mathematics, of cricket or chess, and so on.

Multimedia is used for learning languages! Learners’ Dictionaries for English (for example) now come with CDs that “speak” a word you choose, in two accents: British, or American.

People like you and me can send an animated greeting card through email for birthdays, anniversaries and festivals, which will sing and dance at the user’s end. These cards are created using multimedia. So multimedia is used for general **social interaction**.

√ **Check Your Progress 3**

7. What is multimedia?

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8. What are some of the uses of multimedia? If you have any experience with multimedia, please give your own examples as illustrations.

31.3 THE SPREAD OF INFORMATION IN CORPORATES

As corporates get larger, so do their needs to communicate, both internally and externally. The communicative potential of video has made it a perfect business partner to the corporate world. Video is used for annual reports and for news magazines within corporations. Video conferencing has made possible instant interactive communication within the country as well as globally. The use of video in training has been taken to a very advanced stage. There may be a training video to familiarize the staff of a company with a new telephone system, for example; or about a bank's plan to relocate its employees. Corporate health videos are also attested, such as a video on the hazards of drunken driving (useful during the holiday season of Christmas and New Year), or an exercise video that encourages staff to keep fit. Many of these videos are produced by specialized production houses that make the video professionally comparable with network programming. Corporate video is thus a good example of a parallel narrowcasting network that

has sprung up. The tapes are distributed to various employees or groups, or else the company may have an intranet or even a satellite it leases for its offices in various cities.

31.4 TEXT MESSAGES

Text messages are short written messages between mobile phones. Text messaging is popularly called 'sms', or 'short messaging service'. Because it takes a long time to type full messages, and because space on the mobile phone is limited, the size of the message is better kept small. So text messages have evolved to use abbreviations.

Here are some common abbreviations used in sms. Do you know what they stand for? Check your answers with our answers, given at the end of the unit.

C U @ CU@7
R B 4 How RU 2

Text messages often leave out vowels and other letters judged to be redundant, or unnecessary. For example:

txt msg xmpl

Can you write the full words that these letters stand for?

Other common abbreviations are:

b4 l8r 4U 2day 2morrow gr8

Write out their full forms, and check your answers with those at the end of the unit.

Be careful not to use these sms forms in formal writing, such as in your examinations, formal letters, reports, and so on. There is nothing wrong in inventing such new forms for a new medium of written communication. In Unit 3 of Block 1, indeed, we have spoken of how writing systems have arisen in response to the needs of communication (on the one hand), and of the materials available for writing (on the other).

On the other hand, we have repeatedly stressed in this course the need for you to choose the appropriate style of communication for the appropriate occasion. Knowing the sms forms in addition to ordinary English spellings is essential; do not think of substituting text messaging for educated written English!

31.5 LET US SUM UP

- There is a need today for storing information, packaging and processing it, and disseminating it or making it available.
- A computer can store information, and you can identify and retrieve the information you need. It can do this much faster than the process of printing and publishing.
- A database is an organized, integrated and inter-related collection of computer-based data.
- The networking of computers allows an automated sharing of resources. A LAN is a Local Area Network that has a range of less than 10 kilometers. A MAN, a

Metropolitan Area Network, has a range of 10-100 kilometers. A WAN is a Wide Area Network, with a range starting from a 100 kilometers.

- The Internet or the World Wide Web, known as www., allows access to linked documents spread out over thousands of machines all over the world. The idea of the web actually began in 1989 at CERN, the European Centre for Nuclear Research.
- Until the early 1990s, the Internet was for academics, government and industrial researchers. The World Wide Web brought millions of non-academic users to the net.
- Organizations use computer networks for resource sharing, reliability in information storage, and for communication.
- Our everyday lives are impacted by computer networks in access to remote information, person-to-person communication by E-mail or electronic mail, and for interactive entertainment.
- Many words relating to computers have become part of everyday language.
- The languages in which web pages are written are HTML and Java. HTML is a “markup language”.
- Multimedia allows audio and video to be digitized and transported electronically. Multimedia is used by companies, institutions, in advertising, for training and knowledge updating in certain jobs, in education, and for social interaction.
- As corporates get larger, so do their needs to communicate, both internally and externally. Corporate video is a good example of a parallel narrowcasting network. The tapes are distributed to various employees or groups, or else the company may have an intranet or even a satellite it leases for its offices in various cities.
- Text messages are short written messages between mobile phones. Text messaging is popularly called ‘sms’, or ‘short messaging service’. Text messages use abbreviations.
- It is essential to know the ordinary English spellings of sms forms.

30.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. True
 2. True
 3. False
2. The Books in Print database is a list of books currently available. It contains information about more than 10 lakh books. NISSAT in India is a National Information System for Science and Technology. The USA has a database of Federal Research in Progress which has information about projects funded by the government in engineering and the physical and life sciences.

3. False
4. True
5. All members of an organization can check their pay slips, the organization's inventory of goods, or statistics relating to orders received and items delivered, wherever they are, if the information is available on a network. The data are available to everyone in the organization, no matter where they are. This is known as 'resource sharing', and it ends "the tyranny of geography".

Another example is libraries that are networked. If a book you need is not available in your local library, the librarian can check the database of a networked library, and may be able to get the book for you by inter-library loan.

Information storage for industries like banking or air traffic control has to be reliable and unified. A network makes sure that all organizations within an industry have access to the same reliable information. Bankers can check the day's currency exchange rates. Air traffic controllers are linked the world over, to keep track of the airplanes that fly to destinations all over the world.

Communication on a network is instantaneous across the globe. So two people separated in space can write a report together: when one of them makes a change, the other can see it immediately.

6. Computer networks provide access to remote information and so make possible electronic billing, banking, shopping, and on-line newspapers.

Many people receive their telephone bills via the computer. They can arrange with their bank for the bill to be paid electronically, by debiting their bank account. On line shopping facilities allow you to purchase books and airplane tickets on line. You can have flowers and gifts delivered in another city as a gift, by placing an order on line, and pay for it on line as well!

Many people read newspapers on line while they are at work. E-mail or electronic mail is now widely used by millions of people. These messages can contain an audio or video clip in addition to text. It is now also possible to choose a video to watch from a central service provider. Video servers are programmed to accept user requests, locate the movie from the storage device and play it in the output device, and bill the customer.

Check Your Progress 3

7. Multimedia allows audio and video to be digitized and transported electronically. So this term is used for a computer that has audio and video capability, and with which a user can interact.

Today the term "multimedia" is restricted to mean "two or more continuous media", that is, "media that have to be played during some well-defined time interval, usually with some user interaction". Literally, however, multimedia is just two or more media.

8. Multimedia is used by companies, institutions, in advertising, for training and knowledge updating in certain jobs, in education, and for social interaction.

Companies use it to make presentations. Institutions use it give “visitors” a guided tour of the institution in a “virtual world”. Advertisers use it to sell their product.

On-the-job training and updating is done with multimedia. Demonstration and introduction to new technological advances, product guides, procedures for using machinery, demonstrations of equipment, and knowledge renewal are some of the ways in which this technology is used. Since this technology can be interactive, individual trainees can take a course at their own pace and in their own time, to renew their knowledge and keep up-to-date. Aircraft mechanics, fire fighters, and industrial workers can now learn while on the job.

Educational multimedia is an entire industry in itself, and multimedia is used for learning languages. Animated greeting cards that can be sent through email for birthdays, anniversaries and festivals, illustrate the use of multimedia in social interaction.

Answers to sms or text messages

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|---------------|-------------|--------------|---------------------------------|
| C (see) | U (you) | @ (at) | CU@7 (see you at seven) |
| R (are) | B (be) | 4 (for) | How RU (how are you) |
| 2 (to or too) | | | |
| text | message | example | |
| b4 (before) | l8r (later) | 4U (for you) | 2day (today) 2morrow (tomorrow) |
| gr8 (great) | | | |