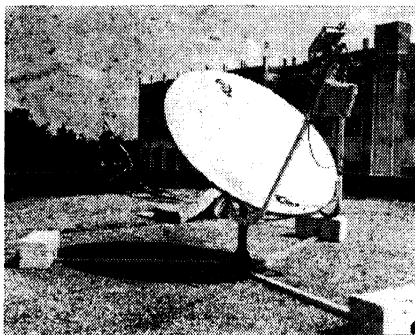


INFORMATION TECHNOLOGY IN AQUACULTURE RESEARCH



SPONSORED BY

DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

&

CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE
INDIAN COUNCIL OF AGRICULTURAL RESEARCH

February 10-13, 1998



CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE

(Indian Council of Agricultural Research)

Kausalyaganga, Bhubaneswar - 751002 (Orissa)

WORKSHOP
ON
INFORMATION TECHNOLOGY
IN
AQUACULTURE RESEARCH

SPONSORED BY
DEPARTMENT OF BIOTECHNOLOGY
GOVERNMENT OF INDIA

February 10-13, 1998

BIOINFORMATICS CENTRE
CENTRAL INSTITUTE OF FRESHWATER AQUACULTURE
(Indian Council of Agricultural Research)
Kausalyaganga, Bhubaneswar - 751002 (Orissa)

Director: Dr. S. Ayyappan

Coordinator: Shri M. Rout

Associates: Shri A.K. Roy

Shri N.K. Acharya

Shri P.K. Satapathy

Shri Ramesh Dash

Ms. S.S. Mohanty

ACKNOWLEDGEMENT

CIFA Bioinformatics Centre expresses its gratitude to Dr. J. R. Arora, Adviser, Department of Biotechnology, Government of India for his advice and encouragement to build up this centre as a Bioinformatics Base on Aquaculture. Special thanks to Dr. T. Madan Mohan, Principal Scientific Officer for the assistance rendered by him.

The Centre is greatly indebted to all the invited speakers and scientists of the Institute for contributing papers and presenting their talks to make this "Workshop-cum-Training Programme" a success.

Department of Biotechnology, Government of India is greatly thankful to Dr. S. Ayyappan, Director, CIFA for providing all the facilities to this Bioinformatics Centre to execute all its objectives laid down by Biotechnology Information System (BTIS) of DBT.

FOREWORD

Since the advent of modern science, attempts have been made to improve the speed and efficiency of scientific communication. Most of the scholarly information however, has continued to be published in print, i.e., in journals, books, conferences etc. The emergence of the Internet is radically changing the generation flow of utilisation of information globally. The WWW, or simply the World Wide Web, is the most popular and rapidly growing service on the Internet today.

In India, the introduction of electronic information products and services have grown to a large extent during later part of 80s. Now-a-days, a number of government and non-government users of Internet in India have been added to promote on-line database access. In aquaculture research, the use of Information Technology has tremendous effect to boost this developing science. Multimedia will make a definite impact on aquaculture which is based on integration of traditional data with text, audio, animation, video and CDROM. It gives a totally different dimension to research presentations. It has already made significant inroads in the Indian industry, education, research and entertainment arena. The present day global information highway is known as the Internet and it has something for everyone from corporate executives to college students and research workers.

The present workshop is designed to introduce the participants to the interesting world of data communication, internet, multimedia and its application to aquaculture research. The experience gained from this workshop-cum-training programme, will enable

identification of specific applications in different environments.

CIFA has made a modest beginning in this direction and developed computer environment in all these fields. Information Technology is the real big opportunity for us which we should avail this facility. I take this opportunity to thank the participants, organisations and all others who have contributed to this workshop for its success.

S. AYYAPPAN
DIRECTOR

C O N T E N T S

1.	Science and Technology Information Resources on the Internet	1
-	<i>M. Rout</i>	
2.	Backbone of Internet in Indian Context	6
-	<i>Manas Patnaik</i>	
3.	Internet - A Revolution in Communication	17
-	<i>A. K. Roy</i>	
4.	Fractal Geometry in Aquatic Animals	26
-	<i>Ms. Sanghamitra Mohanty and S. N. Nayak</i>	
5.	Multimedia on the PCs	29
-	<i>M. Rout</i>	
6.	Information Technology in Aquaculture	35
-	<i>A. K. Roy</i>	
7.	The PC's Memory Middleman (RAM)	39
-	<i>Surya Kumar Patnaik</i>	
8.	High Speed Cache Memory	41
-	<i>P. K. Satapathy and Ms. S. S. Mohanty</i>	
9.	ISDN - Integrated Services Digital Network	45
-	<i>N. K. Acharya</i>	
10.	The Internet	50
-	<i>Chittaranjan Kanungo</i>	
11.	Computer Viruses - How to Avoid Getting Them !	57
-	<i>M. Rout, P. K. Satapathy and Ms. S. S. Mohanty</i>	
12.	Impact of Y2K Crisis on Computer World	62
-	<i>A. K. Roy</i>	
13.	Use of Information System in Formulating and Implementing Projects	67
-	<i>M. Rout</i>	
14.	BTISNET : A Report	75
-	<i>N. K. Acharya</i>	
15.	VSAT - Quick Access Through Communication Satellite	78
-	<i>P. C. Mohanty</i>	
16.	Important Features in Internet	85



SCIENCE AND TECHNOLOGY INFORMATION RESOURCES ON THE INTERNET

M. ROUT

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar - 751002*

The latest, most effective and the most efficient means, tools, technology, methodology or mechanism in the whole world for accomplishing a task of achieving an objective or a result, in a given field depend mostly on electronics and telecommunication in recent days. Information technology is a relatively new and evolving area which provides the vital link with biosciences to form bioinformations. Internet has already revolutionized the media and advertising scenario all over the world. The qualitative improvement in scientific and technological communication are being brought about by the Internet through global connectivity of computers and the development of tools and techniques.

INTERNET AND THE WORLD WIDE WEB

The emergence of the Internet is radically changing the generation, flow and utilisation of scholarly information globally. Today it interconnects thousand of computer networks and millions of individual computers across the world using TCP/IP as the computer communication protocol. The Internet has made quick progress with the development of tools like Gopher, WAIS, and the World Wide Web.

WWW is an application system implemented on computers connected to the internet, enabling multiple computers with disparate operating systems to communicate using Hyper Text Markup Language (HTML). There are two key components to the WWW Web servers and Web browsers. Web servers host Web documents, written in HTML, and transmit

these over the Internet using Hyper Text Transmission Protocol (HTTP) which operates on TCP/IP

The growth in the variety of services and applications developed over the Web has been spectacular. Java is emerging as a very important high-level programming language for the WWW. Programs written in Java can be automatically transferred to the browser, where they are executed by an embedded Java interpreter.

S&T INFORMATION RESOURCES ON THE INTERNET

Most of the initial research and development leading to the emergence of the Internet was done at universities and research centres. E-Mail, which is used extensively on the Internet, has dramatically improved personal communication and collaborative research. E-Mail based discussion forums have enabled faster group communication across national boundaries. Internet successfully demonstrated the possibility of developing elegant, effective and inexpensive solutions to problems inherent to print publications. With the availability of WWW technology, there has been phenomenal growth in the number of Web sites providing access to a variety of S&T resources. Some of the important features are briefly outlined below of these resources.

Electronic Journals

Popularly known as e-journals, these represent a major growth area on the Internet. Major publishers of science journals have announced their commitment to provide Web access to their journals. Electronic journals offer several benefits. Users gain quick access to current and archival issues. Users have the choice of downloading only the desired articles. The hyper text feature used by many e-journals helps readers trace a reference quickly and gain immediate access to the full article. Quick access to e-journals however requires good network speed.

Tables of contents of Journals

Most publishers of science journals today deliver content pages of their journals by E-mail. The service allows users to register for journals whose content pages they wish to receive. Web access to content pages is also provided by most of the publishers today. A very popular service is the uncover service provided by the CARL agency providing free access to content pages of over 16000 journals.

Preprints

Preprints were used by scholars as a means to enhance the speed and efficiency of scientific communication. Preprints were among the earliest to be delivered electronically over the Internet, first by E-mail and later over the World Wide Web.

Discussion Forums and Usenet News

Discussion forums, also called mailing lists, discussion lists and list servers are a major network resource that serves the purpose of current awareness. Participation in discussion forums has several advantages. They help the participants to keep up-to-date with current developments in a field which are not reported fast enough in print media. Unlike discussion forums, Usenet News is not delivered to the user's E-mail box. Instead, News reading software is used to access news from the nearest Usenet News feed computer. News reading facility is now supported by Web browsers like Netscape. Usenet News groups are hierarchically structured. Since the number of messages posted every day to these groups is very large, setting up of news feed sites is quite expensive requiring high-based width connectivity and powerful News server computers with large disk storage. However, archives of most of the News groups can be searched using Web search tools like Altavista.

Technical Reports

Technical reports provide details of on going or completed R&D. projects and Ph. D. thesis. Departments in research

institutes and universities are good sources of technical reports. A large number of these report can be easily accessed often free of cost.

Library Catalogues

A large of number of library catalogues can be accessed on line via Internet. These are useful for finding books not available locally, to identify and select. Access modes include Telnet, Gopher and WWW. Catalogues of very large libraries like the University of California and the Library of Congress are examples of Internet-accessible library catalogues.

Campus Wide Information Services (CWIS)

These are on line information services of universities providing Web based access to a variety of information. In addition to research literature, these provide access to faculty and student directories, course details and research projects, campus computing, library catalogues and other databases admission on regulations and policies, placement information, campus phone directories etc.

INDIAN SITUATION

Educational and Research Network (ERNET) has been quite successful in creating awareness of the Internet among the higher education and research community in the country. So far, the usage of Internet has been limited to E-mail exchange and for accessing external information using tools like FTP, Telnet and the WWW. Only a few universities and educational institutions and government S&T departments have their own Web sites. There are only three Internet Service Providers in the country today - ERNET, VSNL and NIC. The cost of setting up a Web site with reasonable band width of 64 kbps is very high. Besides, the telecommunication tariff in India is among the highest in the world. Such high costs discourage developments related to setting up of campus wide information services, Web accessible data bases (e.g. library catalogues, theses)

publications and resource directories, discussion forums, mirroring of useful Internet sites and other such efforts.

CONCLUSION

Internet is collapsing natural boundaries and bringing together the scientific community in a way that has begun to fundamentally alter the way of research and education. A few resources on the Internet serve the purpose of current awareness by reporting new Internet sites. Most of these are available freely and can be subscribed using E-mail. The National Centre for Science Information (NCSI) at the Indian Institute of Science, Bangalore has made a modest beginning in this direction.



BACKBONE OF INTERNET IN INDIAN CONTEXT

DR. MANAS PATNAIK

Director

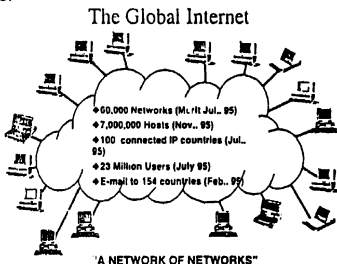
Software Technology Park, Bhubaneswar

THE INFORMATION HIGHWAY

By fusing computing and communications technologies, we can create an infrastructure that will profoundly reshape our economy and society. The agricultural age was based on ploughs and animals that pulled them the industrial age, on engines and fuels that fed them. The information age we are now creating will be based on computers and the networks that interconnect them. Computers have grown so powerful and cost-effective that they can be found nearly everywhere doing nearly everything: super computers, manipulating billions of commands per second, forecast the weather and analyse complex medical images. In a world in which hundreds of millions of computers, servants to their users, easily plug into a global information infrastructure, business mail would routinely reach its destination in five seconds instead of five days, dramatically altering the substance of business communications. Information touches all human activities. It comes in a multitude of different shapes—speech, pictures, video, office work, software, great art, invoices, music, stock prices, tax returns, orders to attack, love letters, novels and the news. Computers and networks are bound together by information and can fulfill roles roughly analogous to those of people and their communication schemes. Computers accept, store, process and present information, the networks move information among the machines they interconnect. Computers can manipulate information for faster than people ever will.

WHAT IS THE INTERNET

Internet is an inter-networked system of computers that allow free flow of information from one part of the network to any other, provided the information is packages according to certain conventions.



The Internet- also known as the net- is the world's largest computer network. Actually, the Internet isn't really a network- it's a network of networks, all freely exchanging information the networks range from the big and formal, like the corporates networks at AT&T, DEC, and Hewlett Packard to the small and informal, and everything in between. As of July 1995, more than 60,000 networks on every continent connecting more than 7 million computers were part of the internet, with 1,000 new networks and 1000,000 computers per month being added.

It is the collection of thousands of networks connecting millions of users at academic, industrial and Govt. institutions worldwide using TCP/IP family of protocols.

WHERE DID THE INTERNET COME FROM

The ancestor of the Internet was the ARPANET, a project started by the Department of Defence (DoD), USA, in 1969, both as an experimental in reliable networking and to link DoD and military research contractors, including the large number of universities doing military-funded research. ARPA stands for Advanced Research Projects Administration, the branch of

Defence in charge of handing out grant money. The ARPANET started small and connected three computers in California and one in Utah, but it quickly grew to span the continent. The reliable networking part involved dynamic rerouting. If one of the network links were to become disrupted by enemy attack, the traffic on it could automatically rerouted to other links.

The ARPANET was widely successful, and every university in the country wanted to sign up. This success meant that the ARPANET began getting hard to manage, particularly the large and growing number of university sites on it. So it was broken into two parts: MILNET, which had the military sites, and the new and smaller ARPANET, which had the non-military sites. The networks remained connected, however, thanks to technical scheme called IP (Internet Protocol), which enabled traffic to be routed from one network to another as necessary. All the networks connected by IP in the internet speak IP, so they all can exchange messages.

Although there were only two networks at that time, IP was designed to allow for tens of thousands of networks. An unusual fact about the IP design is that every computer on an IP network is, in principle, just as capable as any other, so any machine can communicate with any other machine. This communication scheme may seem obvious, but at that time most networks consisted of small number of enormous central computers and a great deal of remote terminals, which could communicate only with the central computers, not with other terminals.

INTERNET MEDIA CONNECTORS

For large networks we use

REPEATERS

HUBS

BRIDGES

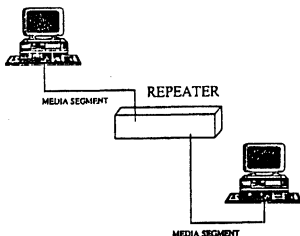
ROUTERS

GATEWAYS

REPEATERS

It is a device used to amplify incoming electromagnetic waves.

- a) amplifier: amplifies everything including noise.
- b) signal regenerator repeater: strips data out of the transmission signal, reconstructs and retransmits it on the other media segment.



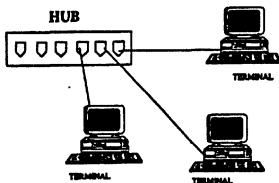
HUBS

It is device from which connections are given to the nodes. It is of three types.

PASSIVE: Just connects the elements of the network.

ACTIVE: It not only connects but also amplifies.

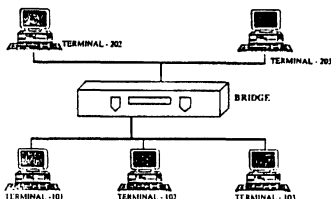
INTELLIGENT: Apart from amplification and connecting, it also performs intelligent path selection.



BRIDGES

A device used to extend the maximum distance of the network by connecting network segments. They also selectively pass signals from one medium to another. They are used to divide an overload network into separate segments as they can filter signals by address.

BRIDGES



ROUTERS

Routers are devices that connect two or more logically separate networks often called subnets. A router segregates the networks and passes the data to the network for which it is intended. Routers that performs both the functions of a router and bridge is called a BROUTER.

GATEWAYS

A gateway splices together two different kinds of protocols. For example, if your network talks IP and someone's network talks Novell or SNA, a gateway converts the traffic from one set of protocol to another. Gateways are not only specific to particular protocols but also are application specific.

INTERNET PROTOCOLS

The set of conventions used to pass packets from one host to another is known as the Internet protocol or IP. The internet, quite simply, is the collection of networks that pass packets to each other by using IP. Many other protocols are used in connection with IP. The other two best known are

Transmission Control Protocol (TCP) and user Datagram Protocol (UDP). TCP is so widely used that many people refer to TCP/IP. The combination of TCP and IP are used by most Internet applications.

TCP provides what looks like a dedicated connection from one computer to another. Any data you send to the other computer is guaranteed to be delivered, in the same order it was sent, just as a dedicated circuit were connected from one end to the other. What TCP provides isn't really a circuit. In fact, it's just a great deal of IP packets, so what TCP provides is called a virtual circuit. But it is real enough for most purposes, which is why nearly every Internet application uses it. TCP has to add a great deal of glop to each packet to do its magic, which makes TCP somewhat slower than the raw IP. The considerably less fancy UDP doesn't make any promises about reliability, making do with whatever IP gives it, for the benefit of applications that want to roll their own reliability features or that can live with the flakiness (in most cases IP delivers upward of 99 percent of all packets even without TCP's help).

HOW INTERNET WORKS

Since IP can not take anything larger than 1500 bytes sending big files will be a problem. To overcome this TCP (transmission control protocol) is used in conjunction with IP. Whatever we want to transmit TCP takes the information and breaks it into pieces. It numbers each piece so receipt can be verified and the data can be put back in the proper order. In order to pass the sequence number across the network, it has an envelope of its own which has the information it requires "written on it". On receiving side a TCP software package collects this envelope, extracts the data and puts it in the proper order. If some are missing it asks the sender to re-transmit them. Once it has all the information in proper order it passes the data to whatever application programme is using its service.

INTERNET SERVICES

- * REMOTE LOG IN (TELNET)
- * FILE TRANSFER (FTP)
- * ELECTRONIC MAIL (E-MAIL)
- * NETWORK NEWS (NET NEWS)
- * FINDING SOFTWARE (ARCHIE)
- * TUNNELING THROUGH THE INTERNET (GOPHER)
- * SEARCHING GOPHERSPACE USING "VERONICA"
- * HYPERTEXT SPANNING THE INTERNET (WWW)
- * WWW (WORLD WIDE WEB) BROWSERS -MOSAIC, NETSCAPE

REMOTE LOGIN (TELNET)

TELNET is used for logging into other computers on the internet. It is used to access lots of public services. It lets us sit at a key board connected to one computer and log on to a remote computer across the network. The connection can be to a machine in the same room on the same campus or a computer in a distant corner of the world.

FILE TRANSFER PROTOCOL

As the name implies this protocol job is to move files from one computer to another. Like telnet FTP has spawned a broad range of database and services, if we are a serious researcher we will find FTP invaluable. Anonymous FTP uses special service that lets us access public data bases without obtaining an account. Most public archives provide anonymous FTP access which means that we can get GB of information for free, without even requiring that we have a log in name.

E-MAIL

Most network users get their start by using E-mail. It has the speed of telephone but acts like a postal mail. Unlike telephone, both communicating parties need not be present at the same time. It is an "any-to-all-communication" facility i.e. we

can send the same message to a group of people without being taking copies of the message. Security is low. Our e-mail message crosses so many machines in transit and it is not secured unless we encrypt out main message.

NETWORK NEWS (NET NEWS)

Network news is the internet equivalent of a discussion group. To the user, network news organises discussion under a set of broad head lines called "News Group", a news reading programme presents the discussion in an orderly way. Inside each news group, there are usually multiple discussions going on under specific subjects. The news reader helps us keep everything in order. It keeps track of the items we have already seen and only displays new items that have arrived since our last seasons. Once the news reader has shown us what articles are available for any topic, we can select and read the items that interest us.

FINDING SOFTWARE (ARCHIE)

Archie allows searching of indexes of what files are available on public servers on the internet. It is the place we should start if we are searching for programmes data or text files. Currently it indexes about 1500 servers and more than 4 million files. Once we decide which of the files most likely meets our needs, we can easily move the file to our computer with anonymous FTP. ARCHIE is a neat tool for internet users to search the files.

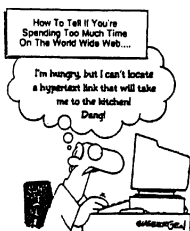
WORLD WIDE WEB

It is a fancy and portable way to present information bold, italics, bitmaps, color images, movies, sounds and more. It is a flexible way to organize your documents. It is mostly a harmless way to wander around the internet. It is an easy way to distribute lots of information including sounds and animations and it is perfect for image and postscript support.

One of the most useful innovations in the WWW is what are known as Universal Resource Locators (URL). The point of a URL is to have a short and consistent way to name any resource that one might find on the net. Although URLs are originally intended for use only within WWW, They're so useful that you see them all over the place as a shorthand for FTP archives, Gopher menus, telnet servers and WWW pages.

The majority of new information appearing on the internet is appearing on the Web. Several major web entry points and search engines simplifies the process of finding web based information. Finding information on the web can be difficult and very much time consuming. But, there are search tools for the web which makes the websurfing very simple, time saving and enjoyable. There are search engines like Webcrawler, Lycos, Yahoo, Infoseek, WWW Worm, Aliweb, SavvySearch and others.

The Fascination of the Web



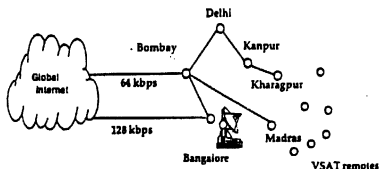
PRESENT SCENARIO IN INDIA

Networks offering on-line services in India are

- ERNET
- SOFTNET
- NICNET
- VSNL

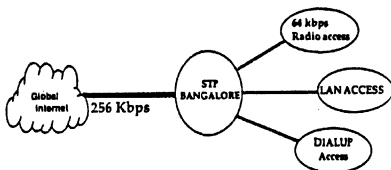
INTERNET ACCEESS IN INDIA : ERNET

It started offering internet services in the academic and research community since 1989. First it started as a leased line based network. In 1995, a VSAT based network was commissioned with 43 remotes.



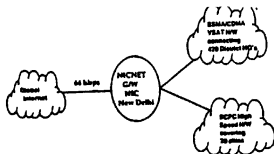
INTERNET ACCESS IN INDIA : SoftNET

SoftNET started offering internet services apart from point-to-point links in 1993. It is used exclusively for software exporters. The gateways are at Bangalore (256 kbps), Bhubaneswar (64 kbps), Hyderabad (64 kbps), Noida (64 kbps), Trivandrum (64 kbps),

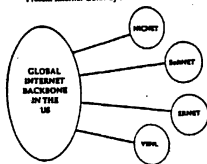


INTERNET ACCESS IN INDIA : NICNET

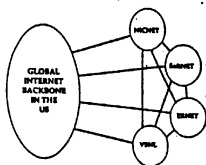
It is started in August 1994. It is meant exclusively for government use. It is extended through a vSAT network.



Present Internet Gateway Architecture in India



Desired Internet Gateway Architecture in India



In time, everything from home appliances to automobiles could be linked to the net. As it grows, so will applications such as telemedicines, in which rural dealers will share diagnostic tools with specialists around the world or a car might plug into a network in which engineers at a manufacturing plant could comment on the car's condition. Perhaps refrigerators to grocery store computer that they are running low on supplies and require a home delivery billed to the customer's account. This is what is in store for future internet in India.



INTERNET - A REVOLUTION IN COMMUNICATION

A. K. ROY

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar - 751002*

INTRODUCTION

In the simplest form Internet is the network of networks. Internet (known as Net) is the world's largest computer network. A computer network is generally a bunch of computers hooked together somehow for exchanging information freely. It is a new communication technology that is affecting our lives on a scale as significant as the telephone and television. Its capabilities are very expansive. It is a worldwide computer network connecting nearly 5 million computers around the world. It offers various devices to its users. There is no censorship. Probably that is one of the reasons of its popularity, growing exponentially. Someone commented that Internet is giving shape to a global university in a global village.

COMPUTER NETWORK

Computer networking refers to a method in which the computer systems are connected together in such a way that they can exchange information among themselves. They can be connected by wires, phone lines, satellite links or any combination of these. Each computer network has a host computer, known as server, which controls the complete network. If networking is done in the same building or in small area, it is known as Local Area Network (LAN), if the computers are spread over the metropolitan area then it is known as Metropolitan Area Network (MAN). When the computers are spread over larger area, the network is called

Wide Area Network (WAN). Networking is done for sharing resources like printers, hard disc drive and software. If one on the network updates data, it is instantly available to every one. Brief description of some Indian Networks in operation are presented below.

SOME INDIAN NETWORKS

NICNET: National Informatics Centre (NIC) was set up in 1975. Host computer alongwith mother earth station is located at Delhi. The network has terminals at state capitals and district headquarters. NIC provides services to user departments through a number of application division organised around sectors like finance, agriculture, water, human resource, industry, commerce, etc.

ERNET: The dept. of electronics, Government of India, along with with severn other institutes set up a project entitled "Education and Research in Computer Networking " (ERNET) in 1986 for establishing communication facilities. The project aimed at setting up of LAN in the institute campuses and interconnecting them through a satellite link to form a WAN.

INDONET: It makes use of reliable, dedicated data channels giving electronic links for instantneous communication and data transfer. It provides access to international data network and databases to the user through the Gateway Packet Switching System of VSNL (Videsh Sanchar Nigam Ltd).

METNET: METNET is termed to be the world's most comprehensive information network as observed by the World Meteorological Organisation (WMO) from its headquarters, Geneva. Global Telecommunication System (GTS) to which India is linked from New Delhi covers some countries and spreads across, worldwide.

PRESS NETWORK : Now newspapers are going in for their own network to connect their H.Q. with regional offices. Many

computers have been networked with few servers installed in big cities form uninterrupted online transmission of news

OILCOMNET : It is a communication network to serve the oil industry Oil co-ordination committee (OCC) was set up in 1986 to develop this network

SIRNET: The Scientific and Industrial Research Network (SIRNET) is created to provide data communication facilities to all CSIR laboratories It is based on indigenous software and hardware

AIRLINE NETWORK: Indian Airlines installed the largest Commercial Private network in early 1980 to facilitate real time Passenger Reservation System and inhouse data processing and dissemination of messages It has a gateway connection to other airlines computers of the world

INFLIBNET· It is a cooperative network It aims to contribute to pooling, sharing and optimisation of resources, facilities and services of libraries, information centres of university and R&D complexes It is a multiple function service network It offers catalogue based services, data base services, document supply services, collection, development and communication based services

WHO USES INTERNET ?

The answer was given by experts replying like who does not use it ? Once closely guarded by scientists and technonards, today the Internet is open to researchers, students, parents, police, businessmen, world leaders, executives, sport fans, shoppers and terrorists Internet is the largest and most complete learning tool for groups of people with varied educational backgrounds and interests Professors, students others can share ideas instantly across vast distances

SUBJECTS COVERED BY INTERNET

Internet covers almost all the subjects imaginable. Some of which are Arts and Culture, Books and literature, Business and Career, Computers and Software, Education and Teaching tools, Environment and Nature, Food and Cooking, Games and Sports, Government and Politics, Health and Nutrition, History, Household and Consumer finance, Humor, International affair, Language and Linguistics, Law, Movies and video tapes, Music, Religion and new age, Science and Technology, Space and Astronomy, Shopping, Sports, Recreation and Hobbies, Television, Travel and Geography and many more.

LENGTH AND BREADTH OF INTERNET :

The information available on the internet has been indexed. If one read only index pages at the rate of 100 pages daily, it will take 4 years to read the complete index which is equivalent to 1,46,000 page. As per the latest report available, there are 2.2 million current users of internet and every month 1,50,000 new users are joining it. The internet has 40,000 host computers also known as web sites. It is estimated that by 2000, there will be 100 million users and 1 million hosts on the internet.

NAVIGATIONAL TOOLS OF INTERNET :

We must familiarise ourselves with some of the tools one will be using to fully explore the Internet. These are briefly described below :

E-mail : E-mail (electronic mail) is the basic foundation tool for communicating in the Internet. Any on-line service that offers even the barest of connections to the Internet offers E-mail.

FTP: File Transfer Protocol (FTP) is a program one uses to copy files stored in computers around the globe. Software upgrades, games, pictures and documents can be downloaded by using FTP at ease.

Telnet : One use Telnet to 'learn' or 'login' to other computers on the net located anywhere in the world and control them as though they are in front of one's desk

Gopher: Gopher is one of the easiest Internet tools one can use to search for view, download documents, files and other freebies. It is a menu driven and very simple, therefore it is the most popular way to browse through cyberspace. Very often, the Gopher site one is accessing is connected to many other Gopher sites and utilities (such as FTP and Telenet) that one can easily access.

World Wide Web (Mosaic): The WWW (Mosaic) is a collection of documents, graphics, video and other files scattered throughout the Internet and linked together into hypertext documents on every conceivable subject and many those are inconceivable for one to browse through.

Finger: Finger command is used mainly to find out information about other users and computers. One can also modify what information is displayed about one when someone uses the Finger command with one's user ID.

Usenet: Usenet is a collection of literally thousands of special interest newsgroups that one can access to read and discuss thousands of different topics.

Mailing Lists (Listservers): Mailing lists are almost like newsgroups except instead of one going to them, they come to the client. If one subscribes to a mailing list, messages are sent to one's Internet address as soon as they are posted. In this way one is constantly sent the latest information about whatever topic the mailing list covers.

Viewers: Graphic Interchange Format (GIF) and Joint Photographic Expert Group (JPEG) files are photographs, drawings, and other types of pictures that have been converted to electronic files. One can download these files just like any other file.

Archives: Some files available for downloading from the Internet have been compressed so that they take up less space when stored on disk. Taking up less storage space also means that such files will take less time to download. Benefit of compression scheme is that multiple files can be combined into a single compressed 'archive' file that is smaller in size than the total size of the component files in the archive. Archie is both a program and a system server.

Encoding: Many newsgroups are more than libraries for collection of pictures on a particular subject such as fine arts, cartoons or even erotica. As Newsgroups can only be used to store and transmit text files, and since most pictures are binary, UUENCODE was developed to convert binary files to text files which can be sent through E-mail.

Lynx: A World Wide Web client program that works with plain old terminals, which means that it is generally available on shell provider accounts.

Internet Relay Chat (IRC): Used to have an on-line interactive discussion. It enables group discussions also.

WAIS: Wide Area Information Servers. It is used to navigate and find information on Net through its archives.

VERONICA: A program that helps find things in Gopher space; a friend of Archie's.

BULLETIN BOARD SYSTEM (BBS): A system that lets people read each other's messages and post new ones. The usenet system of newsgroups is in effect the world's largest distributed BBS.

FREE NETS: Free-Nets are a type of BBS, but are broad in appeal to the community. Freenet connects community members with professionals in the community (doctors, lawyers, travel agents, etc.) as well as provide information about community information, available jobs etc.

VARIOUS APPLICATIONS OF INTERNET :

Internet has given access to an enormous amount of information. This information can be accessed and used from any corner of the world and knowledge of access tools is necessary to make maximum use of internet. In India and all over the world the Internet is being used for wide variety of purposes, only few are mentioned below.

ELECTRONIC PAPERS/JOURNALS/NEWSLETTER :

Newspapers and magazines are available on the Internet. People with Internet connection need not buy newspapers and magazines to read them, rather they can browse it on the internet. Recently many Indian News papers have been introduced on the Internet. The Express Computer - a computer weekly is also in the Internet. Global Network Navigator (GNN) is an on-line Web magazine. Besides there are lots of on-line newsletters like 'The Scout Report', 'Yahoo Picks', WEBster, I Watch Digest, Online Business Today, Net Happenings, Matrix News, Internet Business Report, Internet Business Journals, Inside the Internet, The Cook Report and Wired. Slowly Internet may replace television and Newspaper and printing media may be obsolete.

MATRIMONIAL ALLIANCES :

Matrimonial alliances are being done through Internet for which some companies have started matrimonial service site.

PATIENT CARE SUPPORT :

Internet is a continuously updated database for providing patient care support and serves as a distant learning facility for student physicians. On-line medical journals, through which the latest research and development in the field is known.

INTERNET PHONE :

One can now-a-days place calls over the Internet to standard phones or PC's running Vocal Tee Internet Software alongwith placing calls via the internet. Users can place calls from within WWW pages or to other PC's or to standard phone. It gives Internet users a vocal two-way communication facility. This Internet phoning is now as simple as E-mailing or traditional phoning. The rate is lower than STD/ISD calls.

NET VARSITY :

Another Interesting thing is that recently NIIT has established an on-line learning facility on the Internet by the name of 'Net Varsity' based on the conventional model of a university. According to NIIT, the NIIT varsity has all the features of an institution of higher learning including registration procedure, testing and certification. Other features include a library where the vast resources of the internet have been summarised, a student querying service to offer tutor support to students, a student advisory service to provide counselling on learning opportunities and a placement assistance service. The students will be eligible for certification for the education they get at the 'Net Varsity'.

POSITIVE USE IN INDIA :

Government organisations like CSIR, ICAR have set up Website on the Internet which gives information about their objectives, activities and also about various laboratories. Department of Science and Technology Website informs about National Resources available for Science and Technology. NIC has a wealth of information on its Website.

DARKER SIDE OF INTERNET :

Due to the scope of unhindered use on uncensored subjects, it is being misused also in areas like pornography, nefarious and subversive activities by unscrupulous criminals

breaking the database of banks, confidential records of defence establishments and secrets commercial rivals. Recently, there appeared news about the credit card fraud that hits the internet by school boy hackers. This computer scam fuels fears about shopping on the web. These are darker sides of internet which can not be ignored.

CYBER SOCIETY :

Communication technology is based on computers is computer mediated communication (CMC) which encompasses e-mail, virtual reality and computer game etc. Internet is a new way of using space and time. CMC provides a space - the cyberspace, within which new forms of social relations are being formed. At this moment it is difficult to comprehend the consequences of newly formed contours of cybersociety.

CONCLUSION :

Computer networking is perhaps one of the most important milestones in the innovative creations using Information Technology (IT) and an even bigger phenomenon is the Internet. Internet has brought computer networking to an unprecedented frontier and can be described as the biggest IT event in computer and communication technology. In scientific and research community, internet is an essential and indispensable tool. Through internet, scientists can gain instant access to the world's most advanced research facilities and discuss their research problems with others working in the same field. They may be benefitted most through proper use of Internet facilities after gaining basic ideas about the Internet, its navigational tools and services available as discussed above. Never before such freedom of thought and expression have been possible for ordinary and not so ordinary people alike.



FRACTAL GEOMETRY IN AQUATIC ANIMALS

SANGHAMITRA MOHANTY¹ & S.N. NAYAK²

*¹Department of Computer Science and Application
Utkal University, Bhubaneswar - 751004*

²Science & Technology Department, Bhubaneswar - 751001

INTRODUCTION

Natural objects are difficult to explain due to complexity in their features. Analysing the construction technique of natural objects we see that they are self similar and iterative i.e. each unit is having the information of its future as well as its past. Tree, Inflorescence, Cell, Cloud, Weather etc. are some such good examples. While trying to explain the dimension or the way of measuring these natural phenomena we find that they do not satisfy normal Euclidian Geometry or they do not have integer dimensions. To explain these we use Fractal Geometry where Geometric entities are represented by fractional dimensions. The fractal curve is found not to be one-dimensional and the fractal surface is also not at all two-dimensional. this idea has been implemented by scientists like Cantor, Von Koch, Peano, Hausdorff, Besicovitch, Julia, Mandelbrot and Bransley etc using high speed computers in their study of the natural occurrences. In Fractals generally expressions in the next state of a parameter depend solely on a simple relationship with the current state of the matter. We have tried to explain the fractal geometry of some of the aquatic animals like Conch and Sponge as they are having complex geometrical constructions.

Section 2 contains the idea on fractals and section 3 with its application two aquatic animals while section four contains the conclusions.

FRACTAL

Fractal is a curve with fractional dimension. We normally view a curve with integer dimension. But we can divide it into fractions and further fractions and iterate the same process of drawing the line again and again through computer taking into consideration the slight incremental and decremental value of the variables. According to L. F. Richardson, within certain limits: 'The graph of $\log (L)$ vs. $\log (\epsilon)$ is a straight line'. Mathematically,

$$\log L = a + b \log \epsilon, \text{ where } b < 0 \quad \dots\dots\dots (1)$$

$$\text{or } L = A\epsilon^{1-D}, \text{ Where } D = 1-b \quad \dots\dots\dots (2)$$

This leads to the definition of dimension D. But since L equals ϵ times the number $N(\epsilon)$ of steps of size ϵ used to measure L, we have:

$$A\epsilon^{1-D} = \epsilon N(\epsilon) \quad \dots\dots\dots (3)$$

$$\text{and } N(\epsilon) \approx 1/\epsilon^D \quad \dots\dots\dots (4)$$

Fractals look similar at every level of magnification. In general D dimensional self similar object is one which can be divided into N smaller copies of itself, each scaled down by a factor:

$$r = 1/N^{1/D} \quad \dots\dots\dots (5)$$

$$\text{or } N = 1/r^D \quad \dots\dots\dots (6)$$

$$\text{or } D = \log N / \log (1/r) \quad \dots\dots\dots (7)$$

For a set of points in D dimensions the number $N(1)$ of D-spheres of diameter 1 needed to cover the set increases like

$$N(1) \propto 1^{-D} \text{ for } 1 \rightarrow 0 \dots\dots\dots (8)$$

For self similar objects

$$\text{or } D = - (\log N(1) / N(1')) / \log (1/1') \dots\dots\dots (9)$$

This D the fractal dimension explains the way of measuring of the object.

Fractals in Aquatic animals

Aquatic animals like Conch and Sponge are quite popular among Biological scientists. But the constructional beauty is too complex. We have made an humble attempt to simulate it through a computer. Using the above theory we find that the Conch is a Serpinski Set having the Fibonacci Series in the construction of the arch of its shell and the theory of Condensation Transformation along with IFS attractor with Successive Approximations is used in its construction technique. The dimension is fractal which can be calculated by knowing two successive archs.

Sponge, a member of Phylum porifera is a sessile aquatic animal with a single cavity in the body with numerous pores. Analysing the construction of sponge it is found that it has fractal dimension $D = 2.7268$ when it has $l = 20$ and $l' = 3$.

Conclusion

We have found that aquatic animals the beautiful series in nature are having fractal dimensions. This values may help the biological scientists to see the past as well as the present of any such species in their research which is a naive tool towards their effective attempts.



MULTIMEDIA ON THE PCs

M. ROUT

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar 751002 (Orissa)*

Introduction of multimedia technology is an integral part of informatics services which has been given much priority during the present days. Low cost multimedia workstations have been installed in the country by connecting existing PC-XTs, PC-ATs etc. It provides a unified audio/video and computer environment with a centrally controlled video based instruction stations. The system works with new developed hardware and software tools to integrate video and audio into the PC platform. This is an analog device in which computer output from CGA card and video output from a VCR display the entire output on the same monitor. It also has a built-in audio amplifier with a volume control and a speaker to listen to the VCR. The addition of CD-ROM facilities to the PC machine along with a sound card now allow multimedia programs to run. The true multimedia machine would be able to control video records (preferably video disk recorders), tape recorders (either audio or video) and CD units to allow full interaction of sound and moving pictures with the computer, allowing you, the users, to decide what you want to see and hear and what form.

During the beginning of 1970s, the computers were single-medium devices which had not monitor screens and their output was only to paper. With the microcomputers during mid 1970s, came monitor screens so that computers could show text and some crude pictures on a TV type of screen.

By the early 80's, machines were strated to appear with a built-in loudspeaker so that sound also could be obtained, computers work with numbers and whatever they store or display must be coded into number form. An image on the screen for example, can be coded as a set of numbers, using the number to code the colour of the light from one dot on the

screen. For the standard VGA screen used on the PC, this amounts to 640x480 numbers, a total of 307, 200 numbers for one screen image. Though there are ways of reducing this (compressing the data), the fact remains that images need a lot of storage space. Text, by contrast, can be coded as one number per character, and a full screen of 25 lines of 80 characters, this needs only 2,000 numbers to be stored. Sound presents the most formidable obstacle of all.

Information Technology : In the last decade, revolutionary advances have been made in the field of information technology. Basic human instinct drives researchers to seek avenues to disseminate the results of their work in a presentable manner. Till recent years, the distribution of information was constrained by lack of large scale communication technique except print media. The information age has revolutionised the storage and dissemination of massive volumes of information. Decision making whether for business, government or an individual is based on a central element - information. Information forms the basic input for successful analysis of the current situation, evaluate the possible options and select the action to be taken.

The acquisition, efficient management and effective dissemination of information is achieved through the application of information technology. The information on global research that had to be obtained through books and journals two decades back, is now available at the finger tips through the electronic media. The growth of technology especially that of electronics and telecommunication has opened up the world and considered as the second most important revolution since the industrial revolution.

The CD-ROM (Compact Disk Read Only Memory), is now perceived to be the single biggest stimulus which has transformed the personal computer into a mass produced consumer item which has already overtaken television in the west, as a vehicle of family entertainment and gainful knowledge. The CD is a shiny 12 mm diameter of aluminium-coated polycarbonate which when slipped into a suitable drive, can open the doors to about 250000 pages of text and pictures;

or about four hours of music or a 133-minute feature film with a crystal clear digital sound track. But in recent months, the developments in CD technology have come so thick and fast, that users and buyers have become thoroughly confused and fearful that what they buy today may become an expensive paper weight tomorrow.

IT Trends

The early CDs did this at 150 kilobytes per second - so a "4X" drive quadrupled the speed to 600 KB/Sec. Within weeks, "6X" (900 KB/sec) and "8X" (1200 KB/sec) became available. Currently most suppliers offer "12X" (1800 KB/sec) or "16X" (2400 KB/sec) drives with multimedia PCs but "20X" drives are available separately for just under Rs.5,000 each. So within one year, the effective CD drive speed has improved five fold can one over hope to keep up ?

CD-R : (Recordable) - Disk on which one can put data of his choice. The "read only" port of CD-ROM has ceased and blank CDs available which are known as "WORM" (write once, read many). CD-Erasable disks are also strated coming to market which are known as CD-RW or CD-ReWrite-able disks which can be used for recording and erasing as many times one can please - like a floppy disk. These are also known as CD-Erasable disks.

Some of the CDs, named as per the following terminology are described.

CD : Compact Disk - a digital medium made from 12 cm polycarbonate substrate and a reflective metalized layer. Typically it can store 650 MB of data or 74 minutes of music.

CD-I : Compact Disk Interactive - This is a WORM disk (write once read multiple media), on which you can record data - but only once. It can be played on a standard CD player.

Hybrid disk : A CD which can work on both IBM and Apple Mac PCs.

Recordable CDs : Every CD-ROM these days is an interactive CD-ROM. The break through came when the essentially "Read only" CDs, became recordable. CD-R as they are still known can be recorded just once - after which the data is frozen on the CD. ISI 9660 is a global standard defines CD-R performance. One needs special recording software to write on to CD-Rs.

CD-I interactive : where the user could interact with the data on the CD by using a mouse attached to the computer. Who would use CD-R ? Large offices will benefit enormously by converting massive physical copies of old files to digital format by scanning them, then converting them to CD-ROMs by writing on to CD-Rs.

Managing CD-based information has become a niche activity and many early pioneers who brought CD services to India like Bangalore - based Informatics (India) Pvt. Ltd. now offer archiving and back up solution based on CDs as well as proprietary Network CD systems.

CD-RW : The single biggest limitation of the CD-R, that one could record on the disk only once, has been overcome in 1997 by the new CD-Re-Writable products. How does multiple record/erase work ? The new disks are based on a phase-change recording technology. Data is represented in a recording layer by the transitions from amorphous material with low reflectivity to crystalline areas of higher reflectivity. The transitions between the amorphous and crystalline phases are induced by heating the recording layer with a laser of varying intensity during recording. Thus to record the disk drive heats up a small area of surface changing its quality from higher reflection (light) to low reflection (dark). To erase data, the process is reverted. To read data the pattern of light and dark is scanned by a low intensity laser and transformed into computer data.

Digital versatile disks :

The next wave in the CD business is already lapping on the shores of home entertainment - and it is called the Digital Versatile Disk or DVD

How are DVDs different from conventional CD-ROMs ?

There are a number of features to help to squeeze a lot more data the pits are half the size as in the current CD-ROMs The total track length is double - almost 11 Kms The diameter and thickness of the disk is the same but it stores about twice as much as the CD-ROM of today The total thickness of 12 mm is broken up into two layers of 6 mm each bonded together In a single layer single sided operation the DVD can store 4.7 Gigabytes of information In the future when the second of the two layers presently blank is loaded with information, the DVD will hold 9.4 GB And if both sides of both layers are recorded, it can hold 17 GB But at that time, the drive will have to be modified to do a "disk flip" like turning over a gramophone disk Single layer DVD (4.7 GB) can hold a 133 minute movie - making it the ideal vehicle to see films DVDs have adapted the new MPEG (Motion Picture Export Group) standard for movies, where the existing video CDs conform to MPEG-1

How the CD-ROM works

The CD-ROM is a 12 cm diameter disk with a polycarbonate substrate, a reflective metalised layer on one side with a protective lacquer finish The first CDs which appeared in 1985 were audio disks Music, suitably digitised was fed to a laser beam as a series of pulses afterwards

The beam illuminates portions of a photosensitive coating on a master disk A pulse in the signal (a "one") burns a small hole or pit on the master disk Absence of a pulse (a "zero") creates a land The pattern on pits and lands is eventually etched on the master This pattern is stamped on the polycarbonate plastic base on the CD and a reflective aluminium

coating topped by a vinyl coating is applied. The pits and lands form a spiral track from inside to outside.

When the CD-ROM thus prepared is placed on the player or drive, another miniature laser scans the spiral track. When the laser encounters a "land" the beam is reflected back to a photo diode. When it encounters a "pit" it is diffused and not reflected. The off and on signals are reconstructed to create the music, picture or whatever has been stored on the CD.



INFORMATION TECHNOLOGY IN AQUACULTURE

A. K. ROY

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar - 751002*

INTRODUCTION

Information Technology is a convergence and integration of three main technologies taken together viz. computers, telecommunication and microelectronics. It is multifaced profit making and time & space saving. At present no country can develop without full utilization of advancement of information technology. As thought of it is not the luxury meant exclusively for developed nations but a potential tool for developing nations also. It is now viewed as an important resource for solving numerous and unique problems of developing countries. The Department of Electronics, Govt. of India announced new information policy in November, 1984 with the aim of large scale computerisation and networking as an effective way to solve the information problems of the country. The scene is fast changing as the DOT is setting up a Public Data Network (PDN) and telephone systems.

Need for Information System

Information is a vital ingredient for operation and management of any organisation. Effective information and documentation service is indispensable for aquacultural research. The service should be efficient, speedy and cost effective. The importance of aquaculture has prompted many countries to set up information systems. Electronic data processing equipments have revolutionised information handling and use.

Modernisation of Information Systems at ICAR

Hardware, software and communication facilities are required for information systems development and operation. Moreover, access to precise and reliable technical, scientific and managerial informations at right time by the right person and in a most convenient manner would help in minimising the wastage of scarce resources and energy. With this aim ICAR has established National Agricultural Research Information Systems. Similarly ICAR has established also Agricultural Finance Research Information System.

Agricultural Databases

Latest development in the field of computer technology is the online transmission of information to far off countries of the world and their linkage with number of databases. It is estimated that there are about 1000 such databases in the field of science and technology including agriculture. Survey of World Documentation Services published by FAO reveals that there are 124 indexing services (29 computerised) and 230 abstracting services (45 computerised) published in 41 countries and in 21 languages. Total annual output covered 632000 title citations and 137000 abstracts.. Notable important indexing services with worldwide coverage is AGRICOLA of the USDA through which printed bibliography of agriculture is published. AGRIS is a pro-eminent international input based for agricultural information service.

NISSAT- National Information System for Science and Technology under Deptt. of Science and Technology is also a notable one for promoting service through metropolitan network. India's information databases like INSDOC, DESIDOC, SENDOC, NASSDOC are noteworthy.

Information Technology for Aquaculture

It is well known that aquaculture is an applied and interdisciplinary science. Our reserach and its application is bound to shape according to our needs taking into confidence the tools

and devices of computers. Use of computers in aquaculture should be projected and moulded according to our needs and knowledge conceived from our aquacultural practices and requirements. There should be an integrating systems concepts in research, information, extension and practice. The conception, construction, implementation and validation of our research results need to be structured for ease of reference and adoption on a large scale operation in a particular area. The databases of such models in terms of project analysis, appraisal, formulation of investment projects and aspects of economic planning are inter-disciplinary approach involving scientists, technicians, financiers and administrators.

The formulation of indigenous network for aquacultural sciences through computer application will meet the information requirements of the country to a large extent. It will give birth to a complex information technology in aquacultural sciences. Combinations of information technology produced through interaction of information scientists and extension agencies will form a complex of information technology.

Management of Information System

Information system should accommodate sources of information comprising suitable data for effective retrieval whenever needed by planners, administrators and executives. Some of the essential data requirements may be collected on aquacultural development at block level on area covered under culture, species ratio, combination, input use, productivity etc.

Infrastructure Related to communication facilities at CIFA

In order to build an effective information system on aquaculture and to disseminate the same to the whole country, CIFA has acquired and installed the following hardware, software and equipments related to information dissemination.

- i) Ten personal computers with DOS, UNIX and Windows operating systems.
- ii) Both black and white and coloured printers like dot matrix, laserjet and deskjet.
- iii) A MODEM for e-mail service.
- iv) VSAT for quick information retrieval from INTERNET.
- v) INTERNET accessibility in text mode.
- vi) CD-ROM search facilities.
- vii) Databases in CD's like ASFA, FISHBASE, AGRICOLA, DIALOG ON DISK.
- viii) Multimedia system is procured, installed and in use.
- ix) LCD projection pannel for electronic presentation.
- x) Statistical packages like M-STATc, Minitab, SPSS and SAS are in operation and service for research workers, students and others.

Future Developments and Implications

There is a diversity of opinion regarding the potential impacts of computer and communication technology on individuals, organisation and society. The fifth generation computer may provide access to vast amounts of knowledge in usable form for many people. Developments in telecommunication and changes in regulatory policy are creating a merging of telecommunications and information processing industries and making many forms of information readily available at lower cost. A significant development is an integrated service digital network (ISDN), a utility that accomodates a broad spectrum of communication and information needs. There will be continuing shifts in employment towards the information sector .



THE PC's MEMORY MIDDLEMAN (RAM)

SURYA KUMAR PATNAIK

Member Technical

Software technology Parks of India

Bhubaneswar

PC users often use the terms RAM and memory interchangeably. This is mostly, but not entirely, accurate. Psychologists say where the human brain ends, the mind begins. RAM chips are like brain cells, and memory is like the mind. Memory is what occurs inside RAM chips. On the other hand, although RAM comprises the largest amount of "memory" in a computer additional forms of memory do exist. For example, CPU chips have some built-in memory space. Most video display adapter cards have memory chips that help drive the images on the monitors. Another important memory chip that is easily confused with RAM is ROM (Read Only Memory). ROM contains permanent, preprogrammed instructions that users can not alter. When a computer is turned on POST (Power on Self Test) sequence starts. Those POST instructions are written on ROM chips. ROM loads basic inputs and output instructions (BIOS) into RAM. After reading those instructions, the CPU knows how to communicate with various components.

RAM (Random Access Memory) serves as temporary storage for data and instructions that must flow quickly in and out of the CPU or microprocessor. RAM gives the CPU room to think. All the data in RAM is equally accessible and can be plucked at random by the CPU as needed. To get idea about memory, you must understand how easily computers think. Computers use a binary logic that turns everything to either on or off, one or zero. A one or a zero is a "bit" ("binary digit"). Eight bits make a byte. A byte represents a normal type written character. For example, this is what an uppercase C in binary code looks like 01000011. A kilobyte (KB) is not exactly on

thousand bytes. It is 2 to the 10th power, or 1,024. A megabyte (MB) equal 1024 KB or 1,048,576 bytes.

There are two types of RAM, one is DRAM (Dynamic RAM) and the other SRAM (Static RAM). The most common type of RAM chip, DRAM (Dynamic RAM), contains thousands of microscopic capacitors etched on a silver of silicon. Capacitors temporarily store an electric charge after being connected to power source. Data is written into RAM by charging selected capacitors in the chips. Each bit has an address or location in memory (specified by columns and rows). When called to "remember" certain data, the specified addresses in the chips are read, and the data is sent to the CPU. When new data is wrtten into RAM, the relevant portions of the old patterns are overwritten with the new pattern.

SRAM (Static RAM) chips hold thousands of tiny, flip flop transistors that act as on/off switches. When one of those transistors receives a control pulse, it turnss on (one), send it another pulse, and it turns off (zero). SRAM is several times faster than DRAM, but more expensive and less compact. It is used in special places where speed is critical.



HIGH SPEED CACHE MEMORY

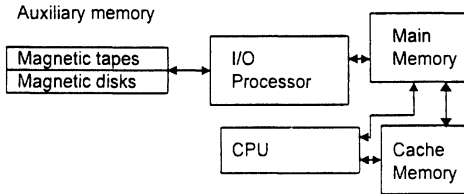
P. K. SATAPATHY & MS. S.S. MOHANTY

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar 751002 (Orissa)*

INTRODUCTION

Small fast memories placed between the processor and main memories are called cache. Caches are faster than main memory. The caches although are fast yet are very expensive memories and are used in only small sizes (e.g. 64 K, 128 K, 256 K, etc. with 1 to 16 MB RAM sizes). Thus small cache memories are intended to provide fast speed of memory retrieval without sacrificing the size of memory (because of main memory size). Analysis of a large number of typical programs has shown that the references to main memory at any given interval of time tend to be confined with a few localised areas in memory. The principle of locality, which says that if a particular memory location is accessed at a time then it is highly likely that its nearby locations will be accessed in near future. Cache contains a copy of certain portions of main memory. The memory read or write operation first checked with cache and if the desired location data is available in cache then used by CPU, else a block of words are read from main memory to cache and the word is used by the CPU from cache. Since cache has limited space, so for this incoming block a portion called a slot need to be vacated in cache. The contents of this vacating block is written back to main memory at the position it belongs to. This way the active portions of the program and data are placed in a fast small memory, the average memory access time can be reduced, thus reducing the total execution time of the programs. The position of cache in memory hierarchy is shown in the next page :-

Memory hierarchy in a computer system



The performance of cache memory is closely related to the nature of the programs being executed, therefore it is very difficult to say what should be the optimum size of cache, but in general a cache size is between 1 K to 256 K is considered to be optimum for most of the cases. A cache consist of number of slots and as the cache size is smaller than that of main memory, therefore, there is no possibility of one to one mapping of the contents of main memory to cache.

Hit ratio

The performance of cache memory is frequently measured in terms of a quantity called hit ratio. When the CPU refers to memory and finds the word in cache, it is said to produce hit. If the word is not found in cache, it is in main memory and it counts as miss. The ratio of the number of hits divided by the total CPU reference to memory (hits plus misses) is the hit ratio.

The average memory access time of a computer system can be improved considerably by use of a cache. If the hit ratio is high enough so that most of the time the CPU accesses the cache instead of main memory, the average access time is closer to the access time of the fast cache memory. The basic characteristic of cache memory is its fast access time. Therefore, very little or no time must be wasted when searching for words in the cache. The transformation of data from main memory to cache memory is referred to a mapping process.

Three types of mapping procedures are of practical interest when considering the organisation of cache memory :

1. Direct mapping
2. Associative mapping
3. Set-associative mapping

Direct mapping

In this mapping each block of memory is mapped in a fixed slot of cache only. In this technique, it can be easily determined whether a block is in cache or not. This technique is simple; but there is a disadvantage of this scheme suppose two words which are referenced alternately repeatedly are falling in the same slot then the swapping of these two blocks will take place in cache, thus resulting in reduced efficiency of cache.

Associative mapping

In associative mapping, any block of the memory can be mapped on to any location of the cache. But here the main difficulty is to determine "whether a block is in cache or not ?" This process of determination is normally carried out simultaneously. The main disadvantage of this mapping is the complex circuitary to examine all the cache slots in parallel to determine the presence or absence of a block in cache.

Set Associative Mapping

This is a compromise between the above two types of mapping. Here the advantages of both direct and associative cache can be obtained. The cache here is divided in some sets say A. The scheme is that a direct mapping is used to map the main memory blocks in one of the A sets and within this set any slot can be assigned to this block. Thus, we have associative mapping inside each set of 'A' sets.

Another important feature of cache is the replacement algorithm. For direct mapping no algorithm is needed since only

one slot can be occupied by a block in cache but in associative and set associative mapping many slots may be used by a block. So which slot should be vacated for this new block. The reason is that the probability of accessing a block which was used quite long back is less in compared to blocks which are used afterwards. This scheme is also derived from the principle of locality.

Cache coherence

The primary advantage of cache is its ability to reduce the average access time in uniprocessors. When the processor finds a word in cache during a read operation, the main memory is not involved in transfer. If the operation used procedures to update memory. In the write-through policy, both cache and main memory are updated with every write operation. In the write-back policy, only the cache is updated and the location is marked so that it can be copied later into main memory. In a shared memory multiprocessor system, all the processors share a common memory. In addition, each processor may have local memory, part or all of which may be a cache. The compelling reason for having separate caches for each processor is to reduce the access time in each processor. The same information may reside in a number of copies in some caches and main memory. To ensure the ability of the system to execute memory operations correctly, the multiple copies must be kept identical. This requirement imposes a cache coherence problem. A memory scheme is coherent if the value returned on a load instruction is always the value given by the latest store instruction with the same address. Without a proper solution to the cache coherence problem caching cannot be used in bus-oriented multiprocessors with two or more processors. There are various schemes to solve the cache coherence problem in shared multi processors. Cache coherence-problem can be resolved by detecting a write operation into any cache and updating or invalidating all other cache values for that variable. The cache coherence problem can also be solved by means of a combination of software and hardware or by means of hardware-only schemes.



ISDN - INTEGRATED SERVICES DIGITAL NETWORK

N. K. ACHARYA

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar - 751002*

The developments in computer technology plays a crucial role in the development of telecommunication. Presently Department of Telecommunication (DoT), Govt. of India is making every effort to automate its activities by computerisation. Since, the existing telephone network is the largest communication network in the country, so DoT is planning for its upgradation and renovation. Recent technological developments in DoT have laid a firm foundation for the provision of new and modern services by means of Integrated Services Digital Network (ISDN). As a consequence, DoT is now poised to offer a range of powerful services that are of significance for the subscribers.

Difference of ISDN from existing phones

Integrated Services Digital Network (ISDN) has emerged as a powerful tool worldwide for provisioning of different services- voice, data and image by means of the existing telephone network. In ISDN even subscriber voice is sent in the digital form and so the phone is called a digital phone. An ISDN subscriber can establish at least two simultaneous independent calls on the existing pair of telephone line whereas only one call is possible in the present telephones. The two simultaneous calls in ISDN can be of any type- speech, data, image or video. The call setup time for a call between two ISDN subscribers will be very short, of the order of 1 to 2 seconds. ISDN subscribers will have full connectivity both nationally and internationally to other telephone subscribers.

DoT has planned to offer ISDN service at Delhi, Mumbai, Calcutta, Chennai, Bangalore and Ahmedabad initially. This will be offered through the new technology imported exchanges.

Equipments for ISDN

In the ISDN, the telephone line is terminated on a common box, called the network termination provided at the subscriber's premises. Beyond this box, on the internal wiring in the subscriber's premises, upto 8 ISDN terminals can be connected. These ISDN terminals can be of several types, for example, ISDN telephone, personal computer (PC), fax machine, push button telephones, modems etc. with suitable connectors.

Services provided by ISDN

A wide range of services catering to the needs of residential and business subscribers will be offered. Data files between PCs will be transmitted at a high speed of 64000 bps. The attractive service of ISDN is video conferencing which reduces the travelling requirements of business executives. Video conferencing can be achieved between any two ISDN customers on dial-up basis on existing telephone lines. For high quality video, three ISDN lines will be required by the customer to incorporate 384 kbps speed data transmission. Still pictures of documents and drawings can be transmitted with this. But in case of ordinary video conferencing a single ISDN line will be sufficient enough to take care of 128 kbps data transfer rate.

Additional facilities in ISDN

ISDN will support a whole new set of additional facilities, called supplementary services for speech calls. The following services will be available for calls made between ISDN subscribers.

Calling Line Identification Presentation (CLIP)

At present the caller telephone number can not be known to the receiver unless the caller tells or the caller is known. But in ISDN telephone, the caller telephone number is displayed on the subscriber's ISDN telephone set before the called subscriber answers the call. There is a LCD display resembling as that of a calculator.

Calling Line Identification Restriction (CLIR)

In case the caller is an ISDN subscriber and want to prevent the presentation of his telephone number at the other end, he can do it by paying one time charge.

Advice of Charge (AOC)

While calling, the chargeable call units are displayed on the calling subscriber's ISDN telephone. This is quite helpful while making long distance calls because the metering is continuously updated as the call progresses.

Multiple Subscriber Number (MSN)

As discussed earlier, 8 terminals can be connected to an ISDN subscriber and separate numbers can be allotted to each terminal if required. This is helpful in case of calls received from the normal subscriber whereas in case of ISDN caller the selection of terminal is automatic.

Call Forwarding Services (CF)

In case the called number is busy, the call can be forwarded to another number.

Call Forwarding Busy (CFB)

If the called subscriber is busy, the incoming calls to his number can be diverted to another number specified by him.

Terminal Portability (TP)

Since the subscriber can put 8 terminals on a single ISDN line in different rooms of his premises, during conversation it is possible to transfer the call from one terminal to another or even the terminals can be removed and connected to another socket at a different location. This facility is available for calling as well as called subscriber.

Call Hold (CH)

During conversation, it is possible to hold at least two more calls. The subscriber can switch between these calls.

Closed User Group (CUG)

Companies with offices in different cities can have their ISDN number in a closed user group. The subscribers can call each other using short numbers as if they are connected to a PABX.

ISDN Phone

Unlike the usual the telephone equipments, the ISDN phone set has handset, dialing key pad with additional LCD display and key for storing frequently dialed numbers.

Display

The ISDN phone has an LCD display resembling those available in calculators. By this, the possibility of dialing a wrong number is eliminated by a caller. This reduces wrong calling. The calling number is displayed in case of CLIP service in addition to seeing the called unit number at AOC.

Logging

The logging facility provides for automatic storing of calling subscriber number, when the call could not be answered. The calling number can be recalled using the log.

Other Features

The features like redialing, memory dialing and speaker phone are also available in ISDN telephone. Since the phone is a digital phone, it provides clear and noise-free conversation. In ISDN the line condition is good because of continuous checking. In fact ISDN has brought revolution in telecommunication and data transfer.



THE INTERNET

CHITTARANJAN KANUNGO

Principal Systems Analyst

National Informatics Centre

Bhubaneswar

It is a network of networks of computer hosts able to seamlessly communicate - usually through the Internet Protocol (IP) and services.

History of the Internet

The history of the Internet begins at the height of the cold war in the 1960's. People at the Rand Corporation, America's foremost military think tank, were trying to figure out an important strategic problem : how could US authorities talk to each other in the aftermath of a nuclear attack ?

The Internet has come a long way from its military beginnings. Touching almost every aspect of society, it is now more likely to be used to plan a family vacation than to transmit military secrets. Following are highlights of the history of the Internet; how it grew, what technologies grew with it, and the impact of success on the Internet itself.

1962-1969

The Internet is first conceived in the early '60s. Under the leadership of the Department of Defense's Advanced Research Project Association (ARPA), it grows from a paper architecture into a small network (ARPANET) intended to promote the sharing of super-computers amongst researchers in the United States.

1970s

- US Govt. encouraged the educational community to use ARPANET
- TCP/IP is built into UNIX OS

1980s

Emergence of NSFNET as a new backbone founded by National Science Foundation, USA.

1982 - The term "Internet" is used for the first time.

1984 - William Gibson coins the term "cyberspace" in his novel "Neuromancer." The number of Internet hosts exceeds 1,000.

1986 - Case Western Reserve University in Cleveland, Ohio creates the first "Freenet" for the Society for Public Access Computing.

1987 - The number of Internet hosts exceeds 10,000.

1992 - The first audio and video broadcast take place over a portion of the Internet known as the "MBONE." More than 1,000,000 hosts are part of the Internet.

1993 - Mosaic, the first graphics-based Web browser, becomes available. Traffic on the Internet expands at a 341,634% annual growth rate.

1994-1996

As the Internet celebrates its 25th anniversary, the military strategies that influenced its birth become historical footnotes. Approximately 40 million people are connected to the Internet. More than \$1 billion per year changes hands at Internet shopping malls, and Internet related companies like Netscape are the darlings of high-tech investors. The age of the Internet has arrived.

1996 - Users in almost 150 countries around the world are now connected to the Internet. The number of computer hosts approaches 10 million.

Who Uses The Internet ?

- Institutions of all kinds academic, government and commercial
- Professional communities of all kinds - especially research and development organizations
- Business enterprises which specialize in providing or collecting information
- General Public via local access providers and gateways to commercial public e-mail carriers and other kinds of networks

Internet Standard Domain Names

The Network Information Centre (NIC) has specified a set of standard top-level domain names that form the basis of both a geographical and non-geographical naming system.

- | | |
|----------------|---|
| - com | commercial organisations |
| - edu | educational organisations |
| - gov | government institutions |
| - mil | military groups |
| - net | major network supporting centres |
| - org | organisations other than the above |
| - int | international organisations |
| - country code | two character identifier for a country in the geographical scheme |

Domains and Sub Domains

A Domain represents a country name, network, organisation etc. like,

.in
.edu

A Sub Domain indicates a sub categorisation as a province, subnetwork, department etc. like,

nic.in
harvard.edu

Host Name & Internet Address

In order to uniquely identify a host on the Internet, each host is assigned a unique IP address. The IP address is a 32-bit code, divided into four parts : eg, 164.100.140.2

A host name is made up of domain names, separated by periods : eg, nic.in

A Domain Name system (DNS) service translates a host name to an IP address.

INTERNET CONNECTIVITY

Mail only connection

The simplest way to get the Internet E-mail link is through UUCP connectivity to any of the nodes on dialup. The "mail only connection" are links that enables one to send and receive electronic mail and Bulletin Board Services.

Shell Account

Dial-up terminal connection links one to an Internet node as a terminal and set up a shell account which uses a OS command line.

SLIP/PPP

On demand direct connection - A variant of TCP/IP designed for PCs connected through telephone lines is called the Serial Line Interface Protocol (SLIP) or the Point to Point Protocol (PPP).

INTERNET SERVICES

Basic services

- Transferring Files
- Universal Email

Mailing Lists and Bulletin Board Services

- Automated Lists

Interactive Information Delivery Services

- Gopher
- WAIS

Directory Services

- WHOIS
- X.500

Interactive Multiuser Services

- Talk
- Collage

Indexing Services

- Archie

Internet Navigation Tools

With a resource as large as the Internet, just finding the information or software or resources we need can be quite challenging. Fortunately, there is a set of tools that enable us to find what we are looking for in a relatively comfortable and productive way. Navigation Tools that are common today are,

- Archie of anonymous ftp archives
- Gopher

It is a menu-driven aid to finding resources on the Internet

- WAIS

It is a database of databases that describes a way for one computer to ask another to do searches for it.

- WWW

WWW is a system for HTML documents spread across the world, covering the globe like a web. Each web site and document has an associated address, called a URL and the Clients (browsers) request HTML documents by their URL.

CONCLUSION

Within 30 years, the Internet has grown from a Cold War concept for controlling the tattered remains of a post-nuclear society to the Information Superhighway. Just as the railroads of the 19th century enabled the Machine Age, and revolutionized the society of the time, the Internet takes us into the Information Age, and profoundly affects the world in which we live. Today some people telecommute over the Internet, allowing them to choose where to live based on quality of life, not proximity to work. Many cities view the Internet as a solution to their clogged highways and fouled air. Schools use the Internet as a vast electronic library, with untold possibilities. Doctors use the Internet to consult with colleagues half a world away. And even

as the Internet offers a single Global Village, it threatens to create a 2nd class citizenship among those without access.

As a new generation grows up as accustomed to communicating through a keyboard as in person, life on the Internet will become an increasingly important part of life on Earth .



COMPUTER VIRUSES - HOW TO AVOID GETTING THEM!

M. ROUT, P. K. SATAPATHY & MS. S. S. MOHANTY

Central Institute of Freshwater Aquaculture

Kausalyaganga, Bhubaneswar 751002

The battle against the computer virus is not over yet. These viruses continue to bug our computers and infect it in spite of the multifarious antivirus software available today. A few smart tips available on how to keep them away for harddisk and how to show them the boot in case they do manage to enter our system.

In fact, of the many thousands of known computer viruses, only about 500 are in the wild - that is, outside the confines of the research laboratories. If you do catch a virus, most will do no serious harm to our machine. And most new viruses are too poorly designed to spread: they are squashed almost immediately by antivirus software, which every computer user with half a brain has installed.

We are not perfectly safe. When we insert disks into our computer, read email attachments, access shared files or download software from the internet, we will eventually encounter viruses. They can destroy our work and even damage our computer. The best defence against computer viruses is education.

Prevention: Six Simple Steps

Although there are thousands of computer viruses known to researchers, the vast majority are locked away in computer labs. Of the 500 or so viruses that exist "in the wild" most are relatively harmless they may eat up a bit of extra memory but they probably won't overwrite our hard drive or destroy our work files.

But one should not take any chances. Follow these steps, and will be on our way to carfree computing.

- * **Get some antivirus software.** No antivirus software is perfect and false alarms can be almost as annoying as viruses themselves. But no computer in today's highly network disk-sharing world should be without antivirus software. But sure to update it frequently new viruses appear all the time.
- * **Watch those disks.** In general, we should be very wary about inserting floppy disks from unknown sources into our disk drive, especially if the disks have been shared by several other people. But some times we have no choice. In those cases, the second thing we should do, after putting the disk in the drive, is to scan the disk with antivirus software. Scan every file on the disk not just the program files.

Likewise, when you give a floppy to somebody else, always write protect it. That way, a virus on some one else's machine won't pass over to our disk. CD-ROMs are less risk, but scan them the first time you use them anyway.

- * **Download with care.** Many computer users believe that downloaded files are the most common source of viruses travel through shared disks or files on a network. Still, you can not be too carefull, especially if you are using illegal or "underground" software like AOL4 Free (which in many cases is actually a wicked Trojan Horse). To be safe, download, all files into a special folder on our hard disk drive. Then be sure to scan these files before we open them.
- * **Scan attachments before reading them.** While it is impossible to get a virus simply by reading an email message, it is very possible to get one through an attachment. Some email programs will automatically open

certain attachments with appropriate program. Disable the potential nightmare in email program, then scan any attachments we receive before we open them.

- * **Save shared files in RTF or ASCII format** If we want to share data on a network server, and use work our computing experience to remain perfectly virus-free, save all files in RTF or ASCII format. Neither file format saves macros and formatting information, so this step will help prevent macro virus.
- * **Back up everything** : Back up our workfiles and system configuration files regularly. Store these backups in a safe place, separate from your hard drive. That way, if your system becomes infected by a virus, we have copies to fall back on.

How to remove a virus

Most of today's antivirus software scans our machines memory as you power up, and the software should alert you anytime you try to open an infected file. At that point, let the software clean the infected file, or delete the file if necessary after keeping back up.

None the less, some times a virus gets by all your defences. May be somebody was using our machine during lunch, may be our antivirus software is outdated, or may be the virus is a leftover from our prior days of ignorance.

So then what do you do?

Stay calm: you can cry, scream, plead with your boss to extend his or her ridiculous deadlines, about what ever you do, don't panic. The virus has probably not restored your computer, but throwing your system though the window almost certainly will.

Do a clean reboot: Switch off your computer and start it up from a clean, write-protected boot disk.

Find and repair the infected files: Run your antivirus software to find and repair the infected files. If the damage is too great for the software to fix, replace the files with your clean backups.

Double check: Scan your entire system with antivirus software one more time. Usually the software will have removed the virus and restored your system.

Typical viruses encountered

Some common viruses encountered are listed below with their characteristics.

- * **Pakistani Brain or C-Brain Virus :** Infection of the boot sector of disks and label of disk changed to "C-Brain" are indications of this type of virus. This virus gets activated on start up and starts destroying files/data on the disk.
- * **Internet Virus :** In late 1988, a virus devised by a student Robert Morris jammed more than 6,000 Military computers across America for two days. This virus is known as "Internet" virus.
- * **Friday the 13th Virus :** It is a time bomb virus. This takes shelter in .EXE or .COM files. If any Friday falls on 13th of the month it removes the files which is infected, from the disk.
- * **Israeli virus :** It is named so as it was first reported by an Israeli daily news paper in January 1988. The virus activates on May 13 and slows down the response of computer on the thirteenth of every month. This virus can be noticed by inspecting the sizes of executable files.
- * **Lehigh Virus :** If affects the COMMAND.COM file and destroys the file after four replications.
- * **Bouncing Ball :** It appears like a bouncing ball in the screen and it may not damage any file.

- * **Happy Birthday Joshi** : It prints a prompt "HAPPY BIRTHDAY" on the screen when it strikes after infecting partition table or boot sector. This may cause lot of damage to data files.
- * **Stoned** : It produces a message "Your PC is stoned" and infects partition table or boot sector and causes damage to data files and may not allow the system to be started sometimes.
- * **Dir-2 Virus** : It is a boot sector virus and is difficult to recognise.
- * **Raindrop cascade or Gravity virus** : This normally takes shelter in .COM files. Its effect will be manifested in the showering of characters and letters on the screen.



IMPACT OF Y2K CRISIS ON COMPUTER WORLD

A. K. ROY

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar 751002*

INTRODUCTION

A wide variety of computer programs that display, manipulate or store dates have adopted the shorthand convention of using only the last two digits of the year. Many of these programs will fail when using dates beyond 1999, particularly if they compare those dates with earlier dates.

It is obvious that spread of the year 2000 (Y2K) problem may be very great particularly in administrative application that represents dates internally as character strings. It may not be a problem in systems that store and manipulate 'time' internally as an offset from some fixed date e.g. Unix environments. It is estimated that the effort required to identify and fix the problem in all systems may take several years and thousands of programmers hours to complete. This paper describes types of problems, misconceptions and remedies associated with Y2K crisis.

BACKGROUND OF Y2K PROBLEM

As believed, the year 2000 problem comes from, but not limited to, the use of a 2-digit year (yy) format, instead of a 4-digit (yyyy) format for year representation within programs, databases, files and processes. As for an example, the year 1997 is represented as '97'. The year 1998 as '98', and so on. Likewise February 29, 2000 is represented as 02/29/00 (using MMDDYY format) which might be interpreted as February 29, 1900. Consequently, programs those perform arithmetic operations, comparisons or sorting of date fields to yield correct

results when manipulating dates in the year 2000 and beyond may be affected.

Some of the misconceptions about the year 2000 challenge with clarification are as follows.

Misconceptions

- i) That the problem occurs only when or after the century rolls over
- ii) That it is a hardware clock problem which should be solved by computer vendors.
- iii) That this is a problem that occurs only in mainframe systems and or core application

Clarification

- i) In forecasting applications that deal with future dates will face problems in advance of the year 2000. Cases that deal with expiration dates that go beyond the 2000 are already at risk.
- ii) Contrary to the belief that it is a hardware problem, in reality the problem comes mostly from application programs and data using two digits for year representations, though the hardware clock provide a 4-digit year format.
- iii) Any program or system can be affected if it uses only two digits for representation of year in any file, database, logs with 2-digit year fields and any data entry, update and output processing that employs 2-digit year fields.

THE NATURE AND STATIFICATION OF THE PROBLEM

The year 2000 problem (phenomenon) has broad impact and can be visible in various ways. This phenomenon has both a information processing systemwide and an institutionwide impact

on computing environment. Within system, this phenomenon can originate from or affect many key components like hardware, software, people, data and procedures. Institutionally this can act as the contaminated data files to other computing systems inside or outside the organisations. This is a complicated problem with far reaching consequences but it is not beyond solution. This problem may also affect microcoded hardware like VCR and digital clocks.

The year 2000 syndrome is compounded by many variations used to express year and date notation in data, the mathematical calculations performed on those date notations and in many places where date data may occur. These variations are stratified as follows:

Incorrect entry: Likely problems may be encountered when the 1st two digits in a year are assumed to be 19 and ignored during data entry, manipulation or hard coded on output.

Dates used as a special value: Sometimes special values of the last two digits in a year might be used for a special purpose, for example 99, 365/99 or 12.31.99 might be used to indicate "no expiration date" or 00 to indicate an 'unknown year' ..

Incorrect field format determination: Many programs determine the date time format (MM DD YY or DD MM YY or YY MM DD) by testing an appropriate part of the date field. A value of zero might be considered as lack of any date at all.

Arithmetic calculation: Many arithmetic calculations that operate on dates with 2-digit year representation might have potential danger. A person with a birth year of 1951 will be considered to be 51 years old rather than 49 years old in 2000 if the year 1951 and 2000 are represented by 51 and 00 respectively.

Sorting: When two digits are used to represent a year, programs that compile year data will sort that data out of

sequence if there are dates both before and after the year 2000 transition.

Archival data: Data archives like magnetic tapes of data bases containing students records or research data or financial records may have fixed 2-digit year data should not be modified. Instead special program may be written to read and convert archival data particularly if the data are to be used in union with data from beyond 1999.

Data exchange: When data are to be exchanged between systems, there occurs a special case of the year 2000 mitigation. There must be close co-ordination between systems updates on both sides of exchanges otherwise the receiving systems may fail.

Unique number generation: Sometimes date information is used by the system as part of their algorithm to generate a unique key or serial member. If a 2 digit year is used, this may cause confusion in some cases. This type of problem is likely to be an issue only with datasets covering more than 100 years.

Leap year calculation: This is not a 2-digit problem rather a problem in the year 2000, 2400 etc. The year 1900 is not a leap year because it is not a multiple of 400 but 2000 is a leap year. Date conversion routines may not have been programmed to take into account this anomaly since it occurs only once in 400 years.

Some of the problems caused by the identification of the 2000 as a non-leap year that would manifest in dates after February 28 are as follows.

- i) **Day-in-year** calculations (the year 2000 has 366 days not 365)
- ii) **Day-of-the-week** calculations (march, 1, 2000 is a Wednesday, not a Tuesday which is February 29, 2000.
- iii) **Week of the year** calculation:

The 11th week of the year 2000 is 5 through 11 March, not 6 through 12 March.

APPREHENSIONS AND REMEDIES OF Y2K CRISIS

It is apprehended that the "millennium bug computer crisis" threatens a global liquidity lock up that could result in the world's financial market crashing. Presently computers and automated systems dominate global financial trade. Failure of a small proportion of systems on January 1, 2000 would bring chaos as per the experts. Banks will not be able to settle the accounts, investors will not be able to access funds, traders will not be able to make deals, consumers will not be able to get cash, companies will not be able to buy materials. Information technology experts are concerned that the magnitude of the problem is underestimated. It is estimated that if everybody in the world who has a modest understanding of computer programming starts work correcting the millennium bug today, then only 25% of the world's affected system could be rectified. A global survey of millennicium bug awareness and preparedness reveals that companies underestimate the problem significantly. In the international foreign exchange markets, more than \$ 1 trillion a day changes hands. Insurance is seen as one solution, at least in terms of compensating firms hit by losses from the bug. But insurers themselves face millennium problems and may end up being the victims of the crisis. They have to tackle their own internal systems problems, their financial market transaction could be frozen by a global system failure, their investments could plunge and liability claims could be immense. Who will pay the damage by the thousands of cars likely to be in accidents caused by computer - controlled traffic lights that just blink out all over the world on January 1, 2000? There is a silver lining to the millennium cloud for some because it could see the end of three percent of the worlds companies.

A number of software vendors have developed modern tools as a remedy in the process. But these are not guarantee to solve all problems but will likely identify where problems exist and recommend solutions, speeding the process .



USE OF INFORMATION SYSTEM IN FORMULATING AND IMPLEMENTING PROJECTS

M. ROUT

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar 751002 (Orissa)*

INTRODUCTION

The transfer of information and information technology are being considered indispensable and given top priority for proper planning and decision making. There is tremendous flow of knowhow of the indigenous information which is not properly streamlined and logically trimmed. Man is confronted with ever increasing abundance of facts and information owing to rising standards of knowledge and highly sophisticated means of communication. It is estimated that there are about 12 million research workers in the world and they produce about two million papers a year. There are about 50 to 60 thousand current scientific and technical journals. Emphasis is now given to information collection from these materials, storage for information processing and formulation of projects which are very useful for planners, policy makers, investors, research organizations etc. Information systems through computer networks play an important role in solving the much needed scientific development in the country.

So the ongoing research information systems and outputs are unique among scientific and technical research workers. This information has a scientific and technical focus on one hand and an administrative focus on the other.

INFORMATION SYSTEM

Computerised information system has created revolution in applied management techniques which builds structures from

data by processing it to reveal patterns, trends, and tendencies. These patterns, trends and so forth are the information that users need in order to perform their job.

Database

A database is a self describing collection of integrated records. It contains application data and data dictionary. The data dictionary makes program. The structure and the contents of the database can be determined by examining the database itself. The structure of data in the database such as adding a new data item to an existing record, that change in data dictionary is simple entered. A database includes not only files, but also data dictionary and a description of the relationship among records in the files. These relationship descriptions are stored and recalled during database processing. Hierarchy of data structures are bits, aggregated into bytes or characters, characters are aggregated into fields, fields are aggregated into records, and records are aggregated into files and ultimately files are aggregated into databases.

A database contains representations of facts about an organisation that can be manipulated to produce information. Each item of data displays in a tiny measurement of the organization's status of some point in time. The names and addresses of employees, the names and quantities of parts in inventory and amount of cash receivables and payables are measurements of the status of the organisation. The collection of all these measurements is a model of representation of organisation. Similarly for formulating a project, initial information like title of the project, project leader and associates, plan of work, brief history of work done etc. are required for forming a database.

Database management system

The development of database technology and its use have been progressed considerably in the last decade. This technology is used to produce effective information systems far quickly and reliably. The use of computer application has added

new approach of data storage and retrieval and is used to facilitate database development. The evolution of DBMS products has enabled to focus more and more on the needs of users. The most fundamental reason for studying database technology is that it facilitates the production of information.

The database is fully utilized as a safeguard against the repetition of research efforts. All the research schemes received can be screened through the database prior to consideration by the scientific panel for final acceptance.

Database Processing

Database processing is one of the most important aspect in the information systems. It can store large volumes of corporate operational data. Such databases become the heart of many transaction processing applications such as entry, inventory control and general accounting. Database can be queried on an adhoc basis, making them the foundations for the decision support systems. Data stored in a database can be readily accessed and processed. Consequently users can get answers to their questions much faster if data is stored in a database than they would if it were stored in files. Databases can be implemented on computers of all sizes, making them feasible for almost any business or organisations.

In the mid-1960's, major organisations were producing data at phenomenal rates in file processing systems. The limitations of file processing prevented easy integration of data. Large organisation began to develop multi application, multiuser databases. By the mid-1970's, effective multiuser, multi application databases have been developed and are in use in many organisation effectively and reliably, processing daily operational data. Relational database management systems can be used for most applications including transaction processing of operational data.

RESEARCH PROJECT

A research project has been defined as a self contained area of investigation with a specified objective which terminates when its specific set objectives has been achieved. Some research workers defined research as the application of human intelligence in a systematic manner to a problem whose solution is not immediately available. The assistance of scientific methods are generally enlisted in solving problems and resolving unanswered question.

Project Definition

The project definition phases in a planning porcess step designed to establish project boundaries. The interrelationships between sub-objectives and their major objectives will be established more clearly when the project plan is developed. In developing project definition the following points are taken into account. (i) Limits and constraints within which the project is concerned, are identified. (ii) Major end item sub-divisions are checked to insure coverage of all work. (iii) Milestone dates are assigned for the start and completion of major end items. (iv) The work breakdown structure that has developed is consistent with project proposal etc.

Project Proposal

A research proposal is a written document requesting both authorisation and funds to undertake a specific research project. The pertinent literature has to be consulted and the leader in consultation with his team prepares a project proposal with (i) the aims and goals of the project (ii) the objective of research (iii) the practical utility (iv) outline of previous work done (v) technical programme (vi) scientific and technical personnel (vii) the budget estimates and time to be taken for completion of the project.

Project Workflow

There is a strong relationship between the project definition and that of developing the workflow. The graphical representation of the actual workflow can take several forms of representation such as bar charts, milestone charts, and networks. The form of representation will be decided by the nature of the project, whether or not it is deterministic or probabilistic. The network concepts can be used as a means of representing work plans.

Preparation of general project plan, development sub-networks and detailed networks, distribution of activities and tasks, start and completion points, identification of each activity or task, identifications of milestone events and lastly approval of workflow by management have to be properly taken into consideration.

PROJECT APPRAISAL

Agricultural research is to increase food production by improving production technology for a specific category thereby increasing farm income and employment, changing the nutrient content, conservation or saving of inputs etc. There is a need for a balanced research programme in which a certain proportion of research effort is devoted to long-term research, to basic research and to exploratory research.

Priorities are assigned to research project either by systematic approach, using formulae or equations, and the subjective approach, using individual or group judgements.

Systematic Approach

In agricultural research, the general trend is towards a quantitative approach to the problem of assigning priorities to the research programmes by means of formulae developed. A formula, however developed from the mathematical point of view, but based on ingredients that can not possibly be reliable,

may be given an air of pseudo-objectivity to decisions on priorities but can not serve as a reliable alternative to subjective judgements.

Subjective Approach

Priorities are fixed based on judgement of an individual or group of individuals of diverse background, resulting from experience and familiarity with one or more aspects of the problem, intuition, taking into account of all pertinent data and other information such as a critique of the state of the art, the possible economic significance, the researchers' competence etc

Rating Systems

Rating systems have been devised for providing guidelines to groups that have to determine research priorities. This is only a device to strengthen objectivity in what is essentially a subjective process. Pre-requisites for the usefulness of the rating system include major relevant criteria of importance in judging the individual projects which are amenable to quantitative rating. The criteria and the respective weights are given below :

	<u>Criterion</u>	<u>Weight</u>
1.	Urgency of research	10
2.	Extent of which it meets the national goals	9
3.	Contribution to knowledge	9
4.	Scope and size considering area people and units affected	8
5.	Benefits of research in relation to cost	7
6.	Likelihood that research results will not be available else-where	6
7.	Likelihood of extension and immediate adoption of results	6
8.	Feasibility of implementation	5
	TOTAL	60

PROJECT MANAGEMENT TECHNIQUES

Efficient management enhances the research productivity and developmental projects could be executed without wasting invaluable time. The basic elements of management are (i) planning (ii) scheduling (iii) guiding (iv) supervising (v) organising the resources (vi) monitoring (vii) controlling. Sometimes modification of existing techniques or integration of two or more than two is a must for efficient project management. In general, the utility of these techniques increases as one goes up in the hierarchy in any organisation.

Networks

Network in the diagrammatic representation of various activities of the project showing the preceding and immediate succeeding activity relationships and their time and cost requirements accomplishes a particular activity. There are many types of networks (i) Programme Evaluation and Review Technique (PERT) (ii) Critical Path Method (CPM) (iii) Graphical Evaluation and Review Technique (GERT) (iv) Venture Evaluation and Review Technique (VERT) (v) Activity-on-Arrow Diagram (AONAD) etc.

The basic phenomenon in almost all networks is the maintenance of the logical relationships between activities of a project. Entire project is broken into smaller component i.e. tasks and each task is broken into activities. Expected activity time can be calculated as

$$t_e = \frac{a+4m+b}{6}$$

Where a = optimistic time, m = most like time and b = pessimistic time.

Programme Evaluation and Review Technique (PERT)

Now-a-days, PERT is a popular technique. It helps the project leaders for calculating the expected duration of time based on three time estimates i.e. optimistic, pessimistic and most likely time for accomplishing the entire project work. It is event oriented and concerned with uncertainty. A project is split into different types of activity with symbol A, B, C, etc., preceeding activity and time in months. The various activities, their relationships (preceeding, succeeding activity relationships) and time requirement for each activity are prepared in a tabular form for implementation.

CONCLUSION

There is vast network of research infrastructure with Agricultural Universities, ICAR Research Institutes, Central and State Governments sponsored projects and schemes. Since there are various types of researches being carried out in the field of an Information System to identify the research gaps and lacune for the development of teaching methodology and transfer technology and also for planning identification and selection of projects including review and monitoring of research. The country has already taken steps in this regard.

The use of computer has introduced a new approach to systems and procedures for information system. The combination of modern communication with the computer allows the integration of administrative information to an extent previously impossible. With the pool of information, the system is able to aid in coordination of many organisations activities. The availability of accurate and standardised data will provide the basis for the automation of routine communication and decision functions for project formulation, implementation, monitoring and transfer of technology.

Thus the potentiality of a computerized information system in India is indeed very essential for solving problems of the farming community and to meet the national goals for increased production.



BTISNET: A REPORT

N. K. ACHARYA

*Central Institute of Freshwater Aquaculture
Kausalyaganga, Bhubaneswar - 751002*

INTRODUCTION

In earlier days, computers were used only for calculations as a number crunching machine with the help of programming languages. These calculations are done more easily as the time passes out. Because of this, more and more advancements in research are coming out with lot of publications of books, journals, research papers etc. Hence, it becomes a problem to keep abreast of the recent developments in a particular field. Biological science is a very wide subject where a lot of people around the world are doing research in various aspects of biology. The rapid developments in the computer technology boost the idea to manage this ever increasing volume of informations with the help of computers. Hence, it is now felt that the advancement of scientific research may not be of good quality without a good management information system. Computer is used to sort out the required information in addition to doing complex numerical calculations. The technology developed to store and process this information is called Bioinformatics.

AIMS AND OBJECTIVES

Keeping in view of the above, the Department of Biotechnology (DBT), Government of India sponsored an integrated network project in the name of Biotechnology Information Systems (BTIS). Various independent information centres are set up employing the recent developments in computer networks oriented modern technologies of microwave and satellite linkages at the national level. Its major objective is to integrate specialised centres and infrastructural facilities through a nation wide network in order to establish a national

bioinformatics network for bridging the gap between information and scientists.

The BTIS network will cater to the needs of the scientists engaged in research in various organisations by providing scientific and other published information. The network will provide access to relevant databases abroad.

BTISNET

Biotechnology Information Systems Network (BTISNET) consists of ten Distributed Information Centres (DICs) and 23 Distributed Information Sub-Centres (DISCs) spreading across the country at universities and R&D institutes. Apex Centre is situated at the Department of Biotechnology, New Delhi. The network has been equipped with modern computers and communication system. These centres are also having trained manpower to cope with the fast growing requirements in Bioinformatics. The DICs and DISCs are connected with NICNET to provide better accessibility to the network users of the country. Every DIC and DISCs have their own specialised area on which they collect, manage and update information for disseminating to the users. For example Bose Institute, Calcutta and Central Institute of Freshwater Aquaculture, Bhubaneswar have been identified to dispose the Bioinformatics activities in the field of Genetics/ Genetic Engineering and Aquaculture respectively. The services include analysis of biological data, bibliographic information, software development, molecular modelling and simulation, genome mapping and comparison, structure function determination etc. The DICs and DISCs which have been set up under the BTISNET are at Department of Biotechnology, New Delhi; Bose Institute, Calcutta; Centre for Cellular and Molecular Biology, Hyderabad; Indian Agricultural Research Institute, New Delhi; Indian Institute of Sciences, Bangalore; Institute of Microbial Technology, Chandigarh; Jawaharlal Nehru University, New Delhi; Madurai Kamraj University, Madurai; National Institute of Immunology, New Delhi; University of Pune, Pune; Aligarh Muslim University, Aligarh; All India Institute of Medical Sciences, New Delhi; Anna University, Chennai; Assam Agricultural University, Jorhat;

Banaras Hindu University, Varanasi; Biotech Consortium India Ltd., New Delhi; Calcutta University, Calcutta; Cancer Research Institute, Bombay; Central Drug Research Institute, Lucknow; Central Institute of Freshwater Aquaculture, Bhubaneswar; Devi Ahilya Vishwavidyalaya, Indore; Guru Nanak Dev University, Amritsar; Indian Institute of Technology, New Delhi; Indian Veterinary Research Institute, Izatnagar; Kerala Agricultural University, Thrissur; M.S. University of Baroda, Baroda; National Dairy Research Institute, Karnal; National Environmental Engg. Research Institute, Nagpur; National Institute of Oceanography, Goa; Pondicherry University, Pondicherry; Tamilnadu Agricultural University, Coimbatore; Tamilnadu Veterinary and Animal Sciences University, Chennai; University of Delhi, New Delhi.

OTHER RELEVANT INFORMATION

The use of INTERNET and sharing of resources has been accelerated with the help of BTISNET. The Home Pages <http://www.nic.in.India-Image/dbt> on Department of Biotechnology, <http://www.nic.in.India-Image/btis> on Biotechnology Information System and <http://www.nic.in.projects/farm> on FARM have been hosted on INTERNET for worldwide access. Software development is going on at different centres to cater to the needs of the scientists engaged in research in their specialised areas of interest. The databases of various types including textual for bibliographic and other purposes have also been developed and maintained at DICs and DISCs for ready reference. Besides the above activities, training programmes and workshops are arranged to spread the awareness and development of the Bioinformatics activities among the users as well the professionals engaged.

Realising the importance of information technology, the Department of Biotechnology, Govt. of India has taken the right decision to promote Bioinformatics. By this, the research in Biosciences will develop commendably.



VSAT - QUICK ACCESS THROUGH COMMUNICATION SATELLITE

P.C. MOHANTY

Engineer (VSAT)

INDIA SATCOM LTD., Bangalore - 560095

Now there is a vast change in the communication field and always in dynamic condition. Starting from ground level communication now we have changed our attitudes in the space communication most commonly in the field of communication satellite. Satellites are of two types stationary or Geostationary and dynamic in which Geostationary satellite are used commonly due to its fixed antenna system. At an altitude of approximately 36,000 kmtrs about the equator the satellite period is 24 hours and hence it revolves at the same rate as the earth under it after launching first communication satellite in 1962, now there are a lot of satellites are in the space for different areas of working.

This satellite can be thought of a big microwave repeater placed in the sky, which amplifies the received signal from the earth station and again transmitting to the receiving earth station. The typical satellite has 12 to 20 or more transponders each with a 36-50 MHL bandwidth. A 50 mbps transponder can be used to encode a single 50 mbps in the data stream, 80064 kbps digital voice channels or various combination. Also two transponder can be used same frequency range only changing in different polarisation. Transponder like a repeater in the satellite which listens to some portion of the spectrum, amplifies in coming signal and re-broadcasts it at another frequency, to avoid interference with the incoming signal.

For the commercial purpose of the use these satellite are used in different frequency band i.e. c-band, ku-band and ka-band.

In c-band two frequency ranges are assigned, the lower one for down link which ranges from 3.7 to 4.2 Ghz and the upper one for uplink frequency ranges from 5.925 to 6.425 Ghz. This c-band frequency has the problem in terrestrial interference and also it is now saturated as they are used by the common carriers for terrestrial microwave link.

The next higher frequency band is ku-band which down link frequency ranging from 11.7 to 12.2 Ghz and uplink frequency ranging from 14 to 14.5 Ghz. This band is not yet congested and these frequencies satellites can be spaced close as 1 degree. Here, rain is the main absorber of these short microwaves. ka-band is not yet used due to its high equipment cost.

In new development in communication satellite world is the development of low cost micro station called VSAT. The term VSAT signifies VERY SMALL APERTURE TERMINAL. Also the other names of VSAT are Micro Earth Station, Mini Earth Station, Personal Earth Station and on-premising earth station. These tiny terminals have 1 meter antenna and can work only 1 watt of power. The uplink or upload is generally good for 19.2 kbps and downlink or download is more about 512 kbps.

In many VSATs, the microstations do not have enough power to communication directly with one another. So for this a special ground station antenna of high gain called hub is required. Also hub is called as a Master Earth Station.

USES OF VSATS

Now-a-days VSATs are used in different areas such as in industry, they have networked different site offices or branch offices to their head office for daily activities. In banking sector a user can withdraw money at any places where ever the account may be. For reservation, in railway or hotel it is also possible. In remote telephony, where by lay-out of cable or fibre optics are not possible. In teleconference also a man sitting in one place can talk directly in other place. In education and research centre where it is more useful.

WHERE VSATS ARE MORE USEFUL

1. In remote area no other communication are possible.
2. For mobile people at the time of juggling, sailing and flying.
3. For broadcasting:- A common message can be broadcast to thousands of ground stations.
4. In poorly terrestrial infrastructure or islands area.
5. Where all underground and fibre optics are more expensive.
6. At the time of war or military operation.

GENERATION OF VSAT

First generation in 1980

Receive only

C-band

- low speed data (9.6 kbps)

Applications

- Broadcast

Second generation in 1983

Two-way interactive systems

c-band

- low data rate

ku-band

- high rate data

application

- Data communication

Hardware defined multiplexed networks

Third generation in 1987

Two way interactive systems

Sophisticated in terms of

- Network architecture
- Network management
- Bandwidth management
- Software definition
- Remote VSAT station design

VSAT TOPOLOGIES

Point to point
Point to multipoint
Star, mesh or hybrid

Point to point

Services
- Voice
- Data
- Image
Without hub

Point to multipoint

Services
- Broadcast
- Program quality audio
- Packaged data
- Centralized hub

Star, mesh or hybrid

Services
- Voice
- Data
- Image
With or without hub

OVERVIEW OF THE TECHNICAL FEATURES OF VSAT NETWORK

Objectives

VSAT Network

- Operation of frequency bands
- Modulation techniques
- Forward error correction techniques
- Satellite access techniques
- Base band multiplexing techniques

<u>VSAI</u>	<u>c-Band</u>	<u>ku-Band</u>
Transmitting freq. (GHz)	5.925-6.425	13.75-14.5
Receiving freq. (Ghz)	3.7-4.2	11.7-12.2
Antena (mtr)	1.8-2.4	1.2-1.8
Power amplifier (watt)	2-10	1-.3

Features of c-band

Merits

- Well established technology
- Rain attenuation is not a problem
- Low space segment cost

Demerits

- Terrestrial interference
- Large antenna

Features of ku-band

Merits

- No terrestrial interference
- More powerful satellite
- Smaller antenna

Demerits

- Rain attenuation
- High space segment cost
- Maturing technology

Satellite Access Technique

- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- Code Division Multiple Access (CDMA)

FDMA Technique

Each carrier occupies a certain BW and power

Carriers placed apart to reduce mutual interference

Types of systems

- Single channel per carrier (SCPC)
- Multi channel per carrier (MCPC)

Employed for thin route application

FDMA Merits

Simple configuration

No requirements for network synchronisation

Demerits

- Intermodulation products
- Requirements for output and input operation for power amplifier

TDMA Technique

BW is time shared among all users

Each user occupies same frequency at the assigned slot

Common timing and synchronised required to manage network

Suitable only for digital and operates in burst mode

Network robust for growth and reconfigurability

TDMA is used in conjunction with FDMA for most VSAT applications.

TDMA Merits

No intermodulation product

Efficient utilization of the space segment (90%)

Demerits

Complex network architect

Network timing requirement

CDMA Technique

Several station use the same carrier frequency and bandwidth all the time

"Spread Spectrum" adds an additional step of modulation in which a higher rate code sequence convoluted with information rate

Several station transmit simultaneously with different code sequence and all undesired signals appears as noise components

Merit

Useful in the frequency band shared with terrestrial system

No delay due to constant transmission

High throughput efficiency

Capacity equal to FDMA

Detection of signals under low C/N

Network capacity -> 1000 VSATs

Demerits

Total number of simultaneous transmissions (80)

Not suitable for heavy traffic.



Important features in Internet

Digital - All digital data is made up a series of 0's and 1's that are grouped in unique sequences.

Packet - A packet is a single sequence of digital data.

Megahertz (MHz) - One hertz represents a single cycle of current per second in a circuit.

Protocol - A protocol is nothing more than a set of rules.

Backbone - A backbone is nothing more than a major cable that carries network traffic.

Listserv - A listserv is basically an e-mail address that configured to forward every message it receives to the e-mail addresses of the users who have subscribed to it.

TCP/IP - Transmission Control Protocol/Internet Protocol.

Server and Client - In general sense, a server in any computer than "serves" or delivers information and data. A client is any computer that request or receives the information and data.

Web site - A collection of World Wide Web documents, usually consisting of a home page and several related pages.

Home page - The home page is the main or first page displayed for an organisation's or person's World Wide Web site.

HTML - Hypertext Markup Language HTML is the coding language for the World Wide Web that informs browsers how to display a document's text, links, graphics and other media.

Webmaster - The individual responsible for maintaining and updating the context of a World Wide Web document. Webmasters are the creative forces behind the World Wide Web.

URL - Uniform Resource Locator. A URL serves as identification for all World Wide Web documents.

ISDN - Integrated Services Digital Network lines are connections that use ordinary phone lines to transmit digital instead of analog signals.

SMTP - Simple Mail Transfer Protocol. This represents the "language" or protocol used so that e-mail clients and servers can talk to each other.

Browser - A software program that requests, interprets, and presents World Wide Web documents. Frequently used browsers include Internet Explorer, Netscape Navigator, Lynx, and Mosaic.

Yahoo ! - Yahoo !, is the original Web search engine started by two graduate students at Stanford university. Yahoo ! contains hundreds of thousand of pages in its database. It offers many unique options to people searching for the information on the Web.

FTP - FTP is nothing more than a set of rules for transferring files which is known as File Transfer Protocol. It is fast, efficient and reliable way to transfer information. It was one of the first Internet services developed to enable users to transfer files from one place to another.

Gopher - Gopher is another type of site on the Net that is full of information. Gopher was originally developed at the university of Minnesota in the 1980's to solve a particular campus computing problem.

Gopherspace - The term used to describe the portion of the Internet that contains Gopher sites.

Internet Service Provider (ISP) : An organization or company that provides users access to the Internet.

IP Address : An address used by Internet Protocol (IP) to identify each computer on the Internet. This number consists of four numbers between 0 and 255, each separated by a period. A typical IP address might be 35.8.7.92.

IRC - Internet Relay Chat is a multi-user version of a program called talk. Talk allowed only one-to-one conversions, so it was pretty limited. Using IRC, large group of people can simultaneously participate in discussion groups called channels.

Multi-User Dungeon (MUD) - A game on the Internet very similar to IRC. Users solve puzzles, finds clues, and interact with other players in hopes of mastering the game.

NNTP Server - Network News Transfer Protocol, an NNTP server transfers news to your client using the language of Usenet.

SLIP - Serial Line Internet Protocol was devised by Rick Adams in 1984 to connect Sun workstations to the Internet over a dial-up line using a modem.

Telnet - A method of establishing a direct terminal connection to an Internet host computer. VT100 and TN3270 are popular Telnet protocols.

PPP - Point to Point Protocol is used to provide a framing method that unambiguously delineates the end of one frame and the start of the next one.

WAN - Wide Area Network spans a large geographical area, often a country or continent. It contains a collection of machines intended for running user (i.e., application) programs.

WWW - World Wide Web is an architectural framework for accessing linked documents spread out over thousands of machines all over the Internet.



