

THE INTERNET

PROJECT REPORT

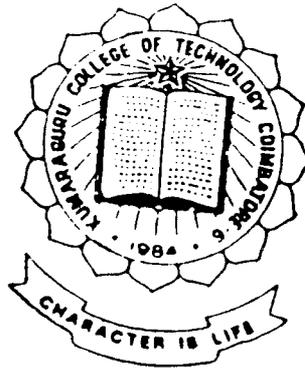
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1999-2000

DEPARTMENT OF ENGLISH
Kumaraguru College of Technology

(Affiliated to Bharathiyar University)

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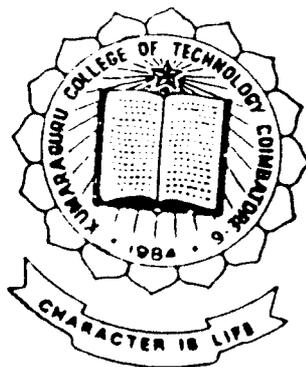
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BONAFIDE CERTIFICATE

This is to certify that the Project entitled

“INTERNET”

*is a bonafide record of studies carried out by this
group under the guidance of*

Mr. Jiju Varghese Jacob

*at Kumaraguru College of Technology, and submitted
to the*

*Department of English in partial fulfilment of the requirements
for the completion of English paper
(TBE) during the year 1999-2000.*

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SYNOPSIS

Today we are in an era of information technology and widespread global communication. Communication, has evolved into a major 'necessity' of every individual. The word most widely spoken of, in this context is nothing other than the Internet. This is the most rapidly sought after, 'Hot cake' of the day.

Through the Internet, business can be made, mail can be sent, banking can be effected and the most important of them all, people can communicate faster. A french and an Australian can use the internet to start off a business. Now this is the trend. Internet has also provided for virtual university admissions and courses. A student of India now gets a change to clear his doubts, with the scientists of the American Research Oragnisation. And, there is always the playful browser who could, just browse through the various websites of the Internet. Internet proves to be an advancing advertizing firm too.

The latest technology that is about to come up is that, people around the world can see and hear each other over the net. Surpassing all these, a recent research is being held to give Internet connection to every house via Electrical coires.

Our Project, on this innovation shows only some of the exciting features of the net. The Diversification, in the various services of the net claims its popularity and widespread challenges.

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INTRODUCTION

WHAT IS INTERNET

The word 'Internet' means different things to different people some use it as a verb, as in "to internet an IBM SNA environment with a DEC DEC net environment." Others use it as noun to mean, a network comprised of two or more dissimilar networks i.e., an internet (or internet work) between two Packet Switched Public Networks (PSPDNs). It is also proper noun, the Internet, that refers to a collection of networks, located around the world, that interconnect for the purposes of user and computer communication. Just as the word has diverse meanings, the Internet has diverse challenges.

The Internet is a widely successful, rapidly - growing, global digital library built on a remarkably flexible, communication technology. The internet digital library offers a variety of services used to create, browse, access, search, view and communicate information on a diverse set of topics ranging from the results of scientific experiments to discussions of recreational activities. Information in the internet digital library can be recorded in memos, organized into menus, stored as hypermedia document, or stored in textual documents. In addition, information accessible through the Internet can consist of data, including audio and video, that is gathered, communicated, and delivered instantly without being stored. Furthermore, because the services have been integrated and cross-referenced, a user can move seamlessly from the information on another computer and from one access service to another.

PART - I

A BRIEF HISTORY OF INTERNET TIME

*... how the Internet grew
from its humble beginnings to
become the largest network in
the world*

CHAPTER - I

INTERNET : THE EARLY YEARS

INTRODUCTION :

By the late 1970s, computer networking began to blossom. Several computer manufacturers introduced small minicomputers with sufficient computational power to handle many users. Because such computers are inexpensive, each department in a large organisation can afford one.

To interconnect mini computers and to permit the rapid transfer of information among them many organisations began installing Local Area Networks. Because LAN technology is both inexpensive and easy to install, an individual department can purchase, install and operate LAN for their machine without consulting a central administration.

THE PROLIFERATION OF LAN

Allowing each group within an organisation to build and operate a computer network has both advantages and disadvantages. When granted independence, a group can choose the network technology for their needs. They can budget funds to pay for the LAN installation and operation. They can decide who has access, and can device policys regarding network use.

Allowing autonomy can also have severe disadvantages most important, because not all computer vendors supply interface hardware for all

types of networks. Allowing groups to act independently can encourage proliferation of any LAN network.

FEW WANS, MANY LANS

Although LAN technology became available in the 1970s., early WANs costs much more than LANs. Unlike the low cost LAN, a WAN requires more planning and significantly more hardware. To install a WAN, a company must lease long-distance transmission lines as well as acquire modems, special purpose computers, and the software used by a WAN. The company also needs interface hardware that connects each of the company's computers to the WAN. Because transmission lines and dedicated computers that form a WAN were expensive in the 1970s, only a few companies used WANs.

WAN'S AND LAN'S ARE INCOMPATIBLE

Many local area network and wide area network technologies exist, and most are incompatible with each other. One cannot produce a usable large network merely by interconnecting the wires from two different networks.

THE DESIRABILITY OF SINGLE NETWORK :

In the best of all worlds, each computer in an organisation has access to all resources. Ofcourse, policies on use may restrict the set of resources a given computer or user can access, and systems try to keep

resources secure from unauthorized use. However it should be unnecessary to manually transfer data from one network to another. It should also be unnecessary to force users to move from one computer to another merely to access different resources.

THE DEPARTMENT OF DEFENSE HAD MULTIPLE NETWORKS :

By the late 1960s, the US department of defense became interested in using computer networks. Because the idea of computer networking was new, little was known about how to build networks or how they could be used. Through the Advanced Research Project Agency (ARPA) the military funded research on networking using a variety of technologies. By the 1970s ARPA had several operational computer networks and had begun to pass technology on to military. ARPA projects included a wide area network called the ARPANET as well as networks that use satellites and radio transmission communication.

ARPA realized that the military would face a problem that many organizations with multiple network systems faced : each network connected a set of computers on separate networks. In essence, each network formed an isolated island that connected a set of computers, with no path between the islands.

CONNECTING DISCONNECTED MACHINES

ARPA research examined how to interconnect all the machines from a large organization. ARPA started with a few basic ideas, awarded grants to researchers to cooperate in solving the problem. Researchers discussed their findings, and generated new ideas at regular meetings.

THE INTERNET EMERGES :

A key idea in the ARPA research was a new approach to interconnecting LANs and WANs that became known as an internetwork. The term is usually abbreviated internet, and is applied to both the project and to the prototype network that was built. To distinguish their internet from other internets, researchers working on the ARPA project adopted the convention of writing internet in lowercase when referring to internetworks in general, and writing internet with an uppercase I when referring to their experimental prototype. The convention persists.

INTERNET SOFTWARE :

Computer software forms a important part of the technology that makes it possible to interconnect networks. ARPA's Internet project produced many innovations to make networking more general and efficient. Although the software consists of many programs that interact in complex ways, researchers wanted the software to form an integrated system. The end system is a smooth apparently Seamless software design. The parts work together so well that most users do not sense the underlying complexity.

THE NAME IS TCP / IP :

Two pieces of the internet software stand out as particularly important and innovative. The Internet Protocol (IP) software provides basic communication. The Transmission Control Protocol (TCP) software provides additional facilities that applications need. Usually the term is written with a slash between the names : TCP / IP.

CHAPTER II

A DECADE OF INCREDIBLE GROWTH

INTRODUCTION :

During the decade from 1986 to 1996, the internet changed from a small, experimental research project into the world's largest computer network. This chapter chronicles the phenomenal growth of the internet and the changes that accompanied it.

DISSEMINATING THE SOFTWARE :

By 1980, the internet was becoming a viable network system. Experimental TCP / IP software was available for several brands of computers. A handful of universities and research labs had copies of the TCP / IP software, and were using it everyday. The internet reached researchers at a dozen academic and industrial research labs.

Before US military could use the internet for production work, however, the technology needed to become more robust. The software needed to be polished and tested, and the whole system needed more tuning. ARPA considered the next step in its research program carefully.

THE U.S. MILITARY MAKES A COMMITMENT :

In the early 1980s, the internet operated reliably. It interconnected academic and research sites. More important, the internet demonstrated that the basic principles of internet working were sound. Convinced of the internet viability, the U.S. military started to connect computers to the internet and to use TCP / IP software.

In 1982, the U.S. military chose the internet as its primary computer communication system. Consequently, a cutoff date was planned. At the beginning of 1983, the ARPANET and associated military networks stopped running old communications software. All connections were switched to use TCP / IP, and any computer that did not understand TCP / IP could not communicate.

THE INTERNET DOUBLES IN SIZE IN ONE YEAR :

Before U.S. military started switching its computers to TCP / IP the internet interconnected approximately 200 computers. One year later, it had doubled in size in retrospect, the increase seems trivial. It involved hundreds, not thousands of computers. At the time, however, the increase was significant. As one might expect, the increase in internet size uncovered limits in the computers software.

THE IETF :

The IETF had as its original charter the problem of short term internet development. The group responsible for guiding the research and development of the internet is known as the Internet Architecture Board (IAB). The primary subgroup responsible for technical matters is known as the Internet Engineering Task Force (IETF).

THE INTERNET IMPROVES SCIENCE :

By the mid 1980's, the National Science Foundation (NSF) recognized that eminence in science would soon demand computer communication. Computer communication changed the way scientists do research. Scientists connected to the internet can exchange documents or experimental data instantly. In fact, scientists can use the internet to disseminate data as an experiment proceeds, making it possible for many other scientists to analyse the results without traveling to the site of the experiment. More important, scientists can use the internet for informal discussions that are not published.

EXPONENTIAL GROWTH :

As NSF connected scientists and engineers, the internet grew incredibly fast. In 1983, the internet connected 562 computers. Ten years later, it connected over 1,200,000 computers and was growing quickly. Such staggering growth best be understood by considering individual computers :

By early 1997, the internet was growing so fast that on the average, a new computer was added to the internet every 4 seconds - furthermore, the rate continues to increase.

A COMMERCIAL ASSESSMENT :

Phenomenal growth has been both a curse and an opportunity. On one hand, it haunts groups who are responsible for operating the internet and pushes engineers who must plan new technologies that accommodate expansion. On the other hand, it provides an incredible opportunity for vendors who sell TCP / IP and internet technologies. A decade ago, most implementation of TCP / IP software were found in universities or computer science research laboratories. Now, businesses use TCP / IP. More important, companies have begun selling services that deliver information across the internet.

THE END OF GROWTH :

The internet cannot continue to grow indefinitely. Although the technologies have managed to accommodate an incredible expansion, exponential growth must end soon. When the traffic approached the capacity of the dedicated switching computers that comprise the internet, faster computers were found with significantly more processing power. While researchers agree that growth cannot continue unchecked, few are willing to venture a guess about the future.

CHAPTER - III

THE GLOBAL INTERNET

INTRODUCTION

Because it spans many countries, people often refer to the internet as The Global Internet. This chapter describes the scope of the internet, and gives examples of how it reaches much of the world.

EARLY ARPA NETWORKS :

Although ARPA is an agency of the U.S. Government and most of the network research, ARPA funded focussed on U.S. participants, a few of the research networks included connections to other countries. For Example, ARPA used satellites to experiment with communications with sites in Norway and England.

As ARPA concentrated research funding on the internet project, it used existing connections outside the U.S. to test internet technology on a larger scale. Thus, those sites became the first foreign sites to have internet access.

NETWORKS IN EUROPE :

As computer technology emerged, Europeans began to establish computer networks. Most countries of Europe have an organisation known

as the post, Telegraph, and telephone (PTT). The PTTs are agencies of the government, and have control over many forms of communication including computer networking.

Many countries in Europe adopted the X.25 technology for computer networks because PTTs controlled networking and followed ITUs recommendation for computer networks in the same way that they followed ITUs recommendations for voice networks.

EBONE : A EUROPEAN BACKBONE

In 1991 several European countries had experimental networks using TCP / IP : a few had connections to the internet. Most of the experimental networks connected computers at universities or research labs.

By the mid 1990s, the European backbone organizations consisted of 25 members, each of whom paid an annual fee. In exchange for its fee, a member received reliable network connectivity to other sites and to the US portion of the Internet.

The EBONE is a WAN that connects sites to the global Internet.

PART - II

INSIDE THE INTERNET

*... an explanation of the
underlying technology and basic
capabilities of the Infrastructure.*

CHAPTER - IV

PACKET SWITCHING

This chapter begins with the basic communication technology that the internet uses. It describes the fundamental mechanism all computer networks use to transfer data, and explains why the scheme works well. Succeeding chapters show how the internet uses the mechanism. Understanding how networks function is important because it explains which high-level services are possible.

PACKET SWITCHING AVOIDS DELAYS :

Both LANs and WANs use packet switching. A computer can divide data into pieces easily. If A needs to send a long message to C, the computer divides the messages into many packets. If B has a short message for D, the message will fit into single packet or a few packets. After A sends its one packet of its message, B can send its packet. Thus, B need not wait for A to finish before it has opportunity to send packets. Consequently, short message need not wait for long transfers to complete.

EACH PACKET MUST BE LABELED :

Each packet sent across a network originates at one computer and is destined for another. To enable network hardware to distinguish among packets, each packet follows the same format. The packets include a header at the beginning, and data at the end. Think of the header as a label that

specifies which computer sent the packet and which computer should receive the packet.

COMPUTERS HAVE ADDRESSES :

Each computer on a network has a unique number known as the computer's address. To identify the pair of communicating computers, the header at the beginning of the packet contains two important address : the address of the computer that sent the packet and the address to which the packet has been sent. The sender's address is called as the source, while the receiver's address is called as the destination address. Network hardware always uses the numeric addresses to send or receive packets. Although many types of devices can connect directly to a computer network, each device must contain a small computer that handles communication.

MANY DEVICES CAN USE PACKET SWITCHING

Devices such as cash registers, video cameras, bar code scanners, and magnetic strip readers can all connect to a packet switching network. Many vendors also sell printers that connect to a network. Because a single network printer can be accessed by all computers on a network, using network printers can reduce costs : each computer does not need a separate printer.

Although many types of devices can connect directly to a computer network, each such device must contain a small computer that handles communications.

CHAPTER V

INTERNET : A NETWORK OF NETWORKS

The previous chapter describes packet switching and shows the dividing long messages into short packet lowers delays for computers that share a transmission path. This chapter describes how multiple packet switching can be interconnected to form an internet that functions like a single, large network.

TWO FUNDAMENTAL CONCEPTS :

Two simple ideas will help explain some of the technology used to interconnect networks within the internet. The first reveals how it is possible to solve the problem of distant connections ; the second reveals how it is possible to connect networks that are incompatible.

USING A COMPUTER TO INTERCONNECT THE NETWORKS :

Computers that interconnect networks are dedicated to interconnection task. Although they use conventional hardware, they run special-purpose software that starts automatically when the system is powered on and remains operating at all times.

INTERCONNECTING COMPUTERS PASS PACKETS :

A computer that interconnects networks has one major task to perform : it forwards packets from one network to the other. The next chapter describes how packet forwarding works, but the idea is simple : the computer receives a packet sent to it across one network, and sends the packet on to its destination across the other network. For example, computers A and G do not attach to the same network. If computer A generates a packet for computer G, it sends the packet to D, the computer that interconnects the networks. D receives the packet from Network 1 and then uses Network 2 to send the packet to G.

ROUTERS ARE THE BUILDING BLOCK OF THE INTERNET :

The internet is not a conventional computer network. It consists of thousands of computer networks interconnected by dedicated, special-purpose computers called routers.

INTERCONNECTING NETWORKS WAS REVOLUTIONARY :

Using a dedicated computer to interconnect two networks may not seem like a fundamental idea, but it is. Before Internet technology appeared, a company needed to choose one network technology for all all computers or have several, independent networks. Routers enable a company to allow each to choose an appropriate network technology, while providing a way to interconnect networks.

CHAPTER VI

IP : SOFTWARE TO CREATE A VIRTUAL NETWORK

The previous chapter describes the internet as a network of networks, formed by using special purpose computers called routers to interconnect networks. Of course merely connecting hardware together does not make an internet. Interconnected computers need software before they can communicate. This chapter describes the basic software that makes the hardware behave like a single, large network.

PROTOCOL : AN AGREEMENT FOR COMMUNICATION :

It is impossible for humans to communicate unless they agree to speak a common language. The same holds true for computers - two computers cannot communicate unless they share a common language. A communication protocol is an agreement that specifies a common language two computers use to exchange messages. The term derives from diplomatic vocabulary, in which a protocol specifies the rules under which a diplomatic exchange occurs. A computer communication protocol defines communication precisely.

INTERNET PACKETS ARE CALLED DATA -GRAMS :

To distinguish between internet packets and packets for other networks, we call a packet that follows the IP specifications an IP datagram. A data-gram travels across the internet independent of the sender, just as a telegram travels to its destination independent of the person who sent the message. Each packet sent across the internet must follow the format specified by the internet protocol. Such packets are called IP data -grams.

THE REALITY OF INTERNAL STRUCTURE :

Although users believe the internet to be a single large network, the internet contains a complex internal physical structure that users never see. When a data-gram either travels across a physical network or through a router to another network, it must follow a physical path. Eventually the data-gram reaches its final destination.

EVERY COMPUTER IS ASSIGNED A UNIQUE ADDRESS :

To make data-gram routing and delivery possible, each computer attached to the internet must be assigned a unique address. Like addresses used by conventional networks, the addresses used on the internet are numeric. One computer must know the address of another computer before it can communicate, just as a person must know someone's telephone number before calling them on the phone.

INTERNET ADDRESS :

The number assigned to the computer is called its internet Address, often abbreviated IP address. Each computer, including routers, needs to be assigned an IP address before the computer can communicate on the internet. When an organisation connects to the internet, it obtains a set of IP addresses for the organisation's computers from the internet authority. If the organisations acquires a new computer, an address from the set is assigned to the new machine.

IP ADDRESSES ARE NOT RANDOM :

IP addresses are like the telephone numbers in another way : the assignment of the numbers is not random. Instead, IP addresses are assigned so that all computers on the same network have the same prefix. The address assignment has been chosen to make it efficient to route IP data-grams through the internet

CHAPTER VII

TCP : SOFTWARE FOR RELIABLE COMMUNICATION

The previous chapter discusses the internet protocol and describes how IP software on computers routers make it possible to send an IP data-gram from any machine on the internet to any other. This chapter continues the discussion of the internet communication software. It examines the second major communication protocol. TCP, Transfer Control Protocol.

TCP HELPS IP GUARANTEE DELIVERY :

Although IP software allows a computer to send and receive data-gram, IP does not handle all the problems that can arise. A computer using the internet also needs TCP software to provide reliable, error free communication.

TCP PROVIDES A CONNECTION BETWEEN COMPUTER PROGRAMS :

TCP software makes it possible for two computer programs to communicate across the internet in a manner similar to the way humans use a telephone. Once the programs establish a connection, they can exchange arbitrary amounts of data then terminate communication.

TCP RETRANSMISSION IS AUTOMATIC :

TCP's scheme differs from the one used by other protocols because it adapts to work every where on the internet. If the destination computers resides close to the source, TCP waits a short time before transmitting. Furthermore, the timeout mechanism is completely automatic - TCP measures current delays on the internet and adjust the timeout automatically. TCP's ability to automatically adjusts timeout values has contributed much to success to the internet.

TCP AND IP WORK TOGETHER :

A computer connected to the internet needs both TCP and IP software. IP provides a way to transfer a packet from it's source to its destination, but does not handle problems like data-gram loss or delivery out of order. TCP handles the problems that IP does not. Together, they provide a reliable way to send data across the internet. Often, vendors sell a single package that includes software for TCP, IP, and a few related communication protocols, collectively, the set is known as TCP/IP software.

IP software does not detect missing data-grams. To handle such communication errors, a computer must also have TCP software. TCP eliminates duplicate data, ensures that data is reassembled in exactly the order is was sent and resends data when a data-gram is lost. The problem of data loss is especially difficult because loss can occur in the middle of the

internet, even when the networkers and routers adjacent to both the source and destination computers do not experience problems. TCP uses acknowledgements and timeouts to handle the problem of loss. The sender retransmits data unless an acknowledgement arrives before the timer expires. TCP's scheme or timeout works across the internet because TCP changes the timeout automatically depending on whether the destination is close or far away from the source.

CHAPTER - VIII

WHY THE INTERNET WORKS WELL?

Introduction

Previous chapters describe the basic Internet technology, including TCP/IP software. This chapter considers reasons for the Internet's success and the lessons that can be learned.

IP Provides Flexibility

The Internet Protocol provides the flexibility needed to accommodate a wide range of underlying network hardware.

The secret of IP's success stems from a tolerant approach. Because it does not demand much from the network hardware. IP tolerates almost any mechanism that can send bits from one location to another. In terms of the design:

The Internet Protocol accommodates many types of hardware because it makes almost no assumptions about the underlying network hardware.

Although IP makes minimal assumptions about networks, all implementations of IP must use exactly the same rules for communication. To ensure compatibility among implementations of TCP/IP, complete

specifications for the protocols have been written in documents informally called standards.

Because TCP/IP standards documents specify the exact way to send IP datagrams on a given type of network, computers and routers from multiple vendors always agree on the details.

TCP Provides Reliability

TCP and IP form a complementary pair that work together well. TCP handles communication problems that IP does not handle, and provides with reliable communication.

TCP also handles the most different problem found in packet switching systems : rapid changes in the performance. Computers tend to send information in bursts - the computer remains quiet for a while, then emits data for a short time, and then resumes its quiet state. For example, when a user first starts an application, the application may need to interact with a server (e.g. to fetch a file or to obtain the first screen of information).

The secret of TCP's success arises from the way it automatically adapts to change.

Because it constantly monitors conditions on the Internet and automatically adapts. TCP makes reliable communication possible even when the Internet experiences temporary congestion.

TCP/IP Software Was Engineered For Efficiency

In any complex computer system, engineers must choose among a variety of possible designs. TCP/IP protocols have been carefully designed to run efficiently. For example, TCP/IP is designed so it does not require extensive computation when sending or receiving a packet. In addition, TCP/IP is designed so it does not send more than the minimum network packets required to communicate.

TCP/IP Research Emphasized Practical Results

In a keynote address at the INTEROP 92 conference, David Clark characterized the style of development used for TCP/IP and the Internet as rough consensus and working code. The phrase captures a simple idea : although much of TCP/IP arose from a consensus among researchers, no idea was accepted until it had been implemented and demonstrated.

To emphasize pragmatics and to make implementations interoperate, researchers working on the Internet project urged one

another to design software that tolerated errors or unexpected packets. They challenged one another to build software that would anticipate possible mistakes or flaws in the software on other computers, and tried carefully not to violate the Internet specifications.

The Formula For Success

People who encounter the Internet project and success of the TCP/IP technology ask, "What lesson were learned?". Some ask more pointedly, "How can I repeat the success with research projects at my organization?". Here are a few highlights :

- ❖ TCP/IP protocol software and the Internet were designed by talented, dedicated people.
- ❖ The Internet was a dream that inspired and challenged the research team.
- ❖ Researchers were allowed to experiment, even when there was no short-term economic payoff. Indeed, Internet research often used, new, innovative technologies that were expensive compared to existing technologies.
- ❖ Instead of dreaming about a system that solved all problems researchers built the Internet to operate efficiently.

PART - III

APPLICATIONS / SERVICES HOW PEOPLE USE THE INTERNET

*... Examples of services currently
available on the net and
explanations of a few exciting
applications*

CHAPTER - IX

TELNET

Introduction

This chapter and the next five begin our exploration of internet working by examining high-level internet services and the protocols that support them. These services form an integral part of TCP/IP. They determine how users perceive an internet and demonstrate the power of the technology.

Telnet Protocol

The TCP/IP protocol suite includes a simple remote terminal protocol called TELNET. TELNET allows a user at one site to establish a TCP connection to a login server at another. TELNET then passes keystrokes from the user's keyboard directly to the remote computer as if they had been typed on a keyboard attached to the remote machine. TELNET also carries output from the remote machine back to the user's screen. The service is called transparent because it gives the appearance that the user's keyboard and display attach directly to the remote machine.

TELNET offers three basic services, First, it defines a network virtual terminal that provides a standard interface to remote systems. Client programs do not have to understand the details of all possible remote systems ; they are built to use standard interface. TELNET includes a mechanism that allows the client and server to negotiate options, and it provides a set of standard (e.g. one of the options controls whether data passed across the connection uses the standard 7 - bit ASCII character set or an 8 - bit character set). Finally, TELNET treats both ends of the connection symmetrically. In particular, TELNET does not force client input to come from a keyboard, nor does it force the client to display output on a screen.

Accommodating Heterogeneity

To make TELNET interoperate between as many systems as possible, it must accommodate the details of heterogeneous computers and operating systems. For example, some systems require lines of a text to be terminated by the ASCII carriage control character (CR). Others require the ASCII linefeed (LF) character. Still others require the two-character sequence of CR-LF. In addition, most interactive systems provide a way for a user to enter a key that interrupts, a running program varies from system to system (e.g. some systems are Control-C, while others use ESCAPE).

Passing Commands that Control the Remote Side

In practice, most keyboards do not provide extra keys for commands. Instead individual operating systems or command interpreters have a variety of ways to generate them. We already mentioned the most common technique : binding an individual ASCII character to a control function so when the user presses the key, the operating system takes the appropriate action instead of accepting the character as input. The NVT designers chose to keep commands separate from the normal ASCII character set for two reason. First, defining the control functions separately means TELNET has greater flexibility. It can transfer all possible ASCII character sequences between client and server as well as all possible control functions Second, by separating signals from normal data. NVT allows the client to specify signals unambiguously - there is never confusion about whether an input character should be treated as data or as a control function.

To pass control functions across the TCP connection, TELNET encodes them using an escape sequence. An escape uses a reserved octet to indicate that a control code octet follows. In TELNET the reserved octet that starts an escape sequence is known as the interpret as command (IAC) octet.

Forcing The Server To Read A Control Function

TELNET cannot rely on the conventional data stream alone to carry control sequences between client and server, because a misbehaving application that needs to be controlled might inadvertently block the data stream.

TELNET Options

Our simple description of TELNET omits one of the most complex aspects ; options. In TELNET options are negotiable, making it possible for the client and server to reconfigure their connection. For example, we said that usually the data stream passes 7 bit data and uses octets with the eighth bit set to pass control information like the Interrupt Process command.

TELNET Option Negotiation

TELNET uses a symmetric option negotiation mechanism to allow clients and servers to reconfigure the parameters controlling their interaction. Because, all TELNET software understands a basic NVT protocol, clients and servers can interoperate even if one understands options another does not.

Rlogin (BSD UNIX)

Operating systems derived from BSD UNIX include a remote login service, rlogin, that supports trusted hosts. It allows system administrators to choose a set of machines over which login names and file access protections are shared and to establish equivalences among user logins. Users can control access to their accounts by authorizing remote login based on remote host and remote user name. Thus, it is possible for a user to have login name X on one machine and Y on another, and still be able to remotely login from one of the machines to the other without typing a password each time.

CHAPTER - X

FTP, TFTP

Introduction

This chapter continues our exploration of application protocols. It examines the file access and transfer protocols that are part of the TCP/IP protocol suite. It describes their design and shows an example of a typical user interface.

File Access and Transfer

Many network systems provide computers with the ability to access files on remote machines. Designers have explored a variety of approaches to remote access ; each approach optimizes for a particular set of goals. For example, some designs use remote file access to lower overall cost.

On - line Shared Access

File sharing comes in two distinct forms ; on -line and whole-file copying. Shared on-line access means allowing multiple programs to access a single file concurrently. Changes to the file take effect immediately and are available to all programs that access the file. Whole-file copying means that whenever a program wants to access a file, it obtains a local copy.

Sharing By File Transfer

The alternative to integrated, transparent on-line access is file transfer. Accessing remote data with a transfer mechanism is a two-step process ; the user first obtains a local copy of a file and then operates on the copy. Most transfer mechanism operate out-side the local file system (ie they are not integrated) A user must invoke a special purpose client program to transfer files: When invoking the client, the user specifies a remote computer on which the desired file resides and possibly, an authorization needed to obtain access (e.g. an account or password) The client contacts a server on the remote machine and requests a copy of the file. Once the transfer is complete, the user terminates the client and uses application programs on the local system to read or modify the local copy.

FTP : The Major TCP/IP file Transfer Protocol

File transfer is among the most frequently used TCP/IP applications, and it accounts for much network traffic. Standard file transfer protocols existed for the ARPANET before TCP/IP became operational. These early versions of file transfer software evolved into a current standard known as the File Transfer Protocol (FTP).

FTP Features

- ❖ Interactive Access
- ❖ Format (representation) Specification.
- ❖ Authentication Control.

FTP Process Model

Unlike most servers, however, the slave process does not perform all the necessary computation. Instead, the slave accepts and handles the control connection from the client, but uses an additional process or processes to handle a separate data transfer connection.

Data transfer connections and the data transfer that use them can be created dynamically when needed, but the control connection persists throughout a session. Once the control connection disappears, the session is terminated and the software at both ends terminates all data transfer processes.

TCP Port Number Assignment

In addition to passing user commands to the server, FTP uses the control connection to allow client and server control processes to coordinate their use of dynamically assigned TCP protocol ports and the creation of data transfer processes that use those ports.

Unlike the full TELNET protocol, FTP does not allow option negotiation, it uses only the basic NVT definition.

TFTP: TRIVIAL FILE TRANSFER PROTOCOL :

Although FTP is the most general file transfer protocol in the TCP/IP suite, it is also the most complex and difficult to program. Many applications do not need the full functionality FTP offers, nor can afford the complexity. For example, FTP requires clients and servers to manage multiple concurrent TCP connections, something that may be different or impossible on personal computers that do not have sophisticated operating systems.

The TCP/IP suite contains a second file transfer protocol that provides inexpensive, unsophisticated service. Known as the Trivial File Transfer Protocol, or (TFTP) it is intended for applications that do not need complex interactions between the client and server. TFTP restricts operations to simple file transfers and does not provide authentication. Because it is more restrictive, TFTP software is much smaller than FTP.

NFS

Initially developed by Sun Microsystems Incorporated, the Network File System (NFS) provides on-line shared file access that is transparent and integrated, many TCP/IP sites use NFS to interconnect their computer's file systems. From the user's perspective, NFS is almost invisible. A user can execute an application program and use arbitrary files for input or output. The file names themselves do not show whether the files are local or remote.

CHAPTER - XI

EMAIL

Introduction

This chapter continues our exploration of internet working by considering electronic mail service and the protocols that support it. The chapter describes how a mail system is organized, explains alias expansion, and shows how mail system software uses the client-server paradigm to transfer each message.

Electronic Mail

Many users first encounter computer networks when they send or receive electronic mail (e-mail) to or from a remote site. E-mail is the most widely used application service. Indeed, many computer users access networks only through electronic mail.

E-mail is popular because it offers a fast, convenient method of transferring information. E-mail can accommodate small notes or large voluminous memos with a single mechanism. It should not surprise you to learn that more users send files with electronic mail than with file transfer protocols.

In the case of electronic mail, however the system must provide for instances when the remote machine or the network connections have failed. A sender does not want to wait for the remote machine to become available before continuing work, nor does the user want the transfer to abort merely because communication with the remote machine becomes temporarily unavailable.

The background transfer process sweeps through the spool area periodically, typically once every 30 minutes, checking for undelivered mail. Whenever it finds a message or whenever a user deposits new outgoing mail, the background process attempts delivery again. If it finds that a mail message cannot be delivered after an extended time (e.g. 3 days) the mail software returns the message to the sender.

Mailbox Names And Aliases

There are three important ideas hidden in our simplistic description of mail delivery. First, users specify recipients by giving pairs of strings that identify the mail destination machine name and a mailbox address on that machine. Second, the names used in such specifications are independent of other names assigned to machines. Usually, a mailbox address is the same as a user's login id, and a destination machine name is the same as a machine's domain name, but that is not necessary.

Third, our simplistic diagram fails to account for mail processing and mail forwarding, which include mail sent from one user to another on the same machine, and mail that arrives on a machine but which should be forwarded to another machine.

Alias Expansion And Mail Forwarding

Most systems provide mail forwarding software that includes a mail alias expansion mechanism. A mail forwarder allows the local site to map identifiers used in mail addresses to a set of one or more new mail addresses.

Recipients for which the mapping has been specified remain unchanged. Similarly, the underlying mail system uses the mail aliases to map incoming recipient addresses.

The Relationship Of Internet Working And Mail

Many commercial computer systems can forward electronic mail from sites that do not connect to the Internet. How do such systems differ from the mail system described here? There are two crucial differences. First, a TCP/IP internet makes possible universal delivery service. Second, electronic mail systems built on TCP/IP are inherently more reliable than those built from arbitrary networks. The first idea is easy to understand. TCP/IP makes possible universal mail delivery because it provides universal interconnection among machines.

Mail systems that use end-to-end delivery can guarantee that each mail message remains in the sender's machine until it has been successfully copied to the recipient's machine.

TCP/IP Standards For Electronic Mail Service

Recall that the goal of the TCP/IP protocol efforts is to provide for interoperability across the widest range of computer systems and networks. To extend the interoperability of electronic mail, TCP/IP divides its mail standards into two sets. One standard specifies the format for mail messages. The other specifies the details of electronic mail exchange between two computers. Keeping the two standards for electronic mail separate makes it possible to build mail gateways that connect TCP/IP internets to some other vendor's mail delivery system, while still using the same message format for both.

The TCP/IP standard for mail messages specifies the exact format of mail headers as well as semantic interpretation of each header field ; it leaves the format of the body up to the sender. In particular, the standard specifies that headers contain readable text, divided into lines that consist of a keyword followed by a colon readable text, divided into lines that consist of a keyword followed by a colon followed by a value.

Electronic Mail Addresses

A user familiar with electronic mail knows that mail address formats vary among e-mail systems. Thus, it can be difficult to determine a correct electronic mail address, or even to understand the sender's intentions. Within the global Internet, addresses have a simple, easy to remember form :

Local-part @ domain-name.

comer@purdue.edu

comer%purdue.edu@relay.cs.net

user%domain-name

comer%purdue.edu@relay.cs.net

(comer%purdue.edu@(relay.cs.net)

(comer)%(purdue.edu@relay.cs.net)

Because each mail gateway determines the exact details of how it interprets and maps electronic mail address, there is no standard for addresses that cross mail gateway boundaries to networks outside the Internet.

CHAPTER - XII

BULLETIN NEWS

Introduction

This chapter describes an Internet service that extends the use of memos to allow an individual to join one or more discussions with other members of the group. Electronic bulletin boards are among the most well-known services available on the Internet, and the discussions encompass a wide variety of topics.

General Idea :

- ❖ An electronic bulletin board allows anyone to post a message for others to see.
- ❖ Distributes each message to many subscribers.
- ❖ The messages posted to a given electronic bulletin board focus on a single topic of interest.
- ❖ Propagates copies of each message quickly.

Many Bulletin Boards With Diverse Topics

Because a new electronic bulletin board can be created easily and dividing discussions by topics helps focus the discussion on each bulletin board, many bulletin boards have been created.

Network News

The major electronic bulletin board service available on the Internet is called network news, often abbreviated netnews. The netnews system uses the term newsgroup to refer to each individual bulletin board (ie each discussion group), and article to refer to a message that has been sent to the newsgroup for everyone to see.

The term USENET now refers collectively to all sites that participate in the exchange of network news, regardless of the type of network they use.

Subscribing And Unsubscribing To Newsgroups

Netnews software handles newsgroup subscriptions locally ; the software keeps information about the newsgroups a user has joined and the articles the user has read in a file on the user's disk.

Size of Network News

Because netnews contains thousands of newsgroups and the articles submitted to them each day often exceed 20 million characters, no individual can participate in all newsgroup.

How Network News Works

To understand how the optimization works, imagine what would happen if the system obtained a copy of an article each time a user wanted to read the article. Because many users at a given location read the same article, the software would transfer many copies across the Internet. For example, if 100 people in England each requested an article that was stored on a computer in the U.S. their computers would each transfer a copy of the article across the Internet. The problem is significant because more than a million people read network news each day.

Impact And Significance Of Network News And Mailing Lists

The impact of bulletin and public mailing lists is difficult to appreciate. Internet technologies enable over a million people to participate in an electronic discussion. With that many people involved, it is difficult to imagine the diversity of topics that arise.

Internet electronic mailing lists and bulletin board services have an interesting social effect : they provide an opportunity for people around the world to exchange views. In the past, such interaction have been limited either to people who live close enough so they can meet and talk face-to-face (e.g. a backyard discussion among neighbours), or to a few individuals who write opinions columns and editorials that appear in newspapers and magazines, Interestingly, because the Internet crosses geographic and political boundaries, it can extend discussion to a diverse set of people from many countries.

CHAPTER - XIII

AUDIO & VIDEO COMMUNICATION

Introduction

This chapter examines Internet services that allow people to communicate directly. It describes services that permit a user to send text, sound, video, and images directly to other without recording the information.

Description of Functionality

Internet audio and video services make it possible to :

- ❖ Send voice to another person or a group of people.
- ❖ Send a live television image to a single person or to a group of people.
- ❖ Broadcast audio or video information throughout the Internet.
- ❖ Allow a group of people to see and edit a document.

Audio and Video Require Special Hardware

In addition to a high-bandwidth Internet connection, audio and video services require a computer with.

- ❖ A microphone to capture sounds. A typical microphone is about one-half as large as a credit card and thinner than a person's finger.
- ❖ A speaker to reproduce sounds : two speakers are required to reproduce stereo, Speakers can be integrated inside a computer or can be separated.
- ❖ A camera to record images. A camera, which resembles a small flashlight, is usually mounted on the top of the computer and pointed toward the user's face.
- ❖ A high-speed processor to manipulate video and audio without introducing delay.

Radio Programs On The Internet

The programs from many commercial radio stations are available on the Internet. Usually, each station transmits the same programs on the Internet that it broadcasts over radio waves. In addition to its normal operation, it converts audio signal to digital form, places the result in packet, and sends the packets across the Internet.

Audio Teleconferencing

To join a teleconference, a user must run a program that handles audio reception and transmission. The program monitors the user's microphone, converts the signal to digital form, and sends a copy to other users in the teleconference. The program also receives messages, converts the messages back into sound, and plays the results for the user to hear. All participants hear the conversation similar to a conference telephone call.

Video Teleconferencing

To enable face-to-face interaction, the Internet offers video teleconferencing services. A video teleconference begins the same as a whiteboard session ; a user runs a program that starts a video session. The software allows the user to enter information about other participants, and contacts each of them. When a new participant joins the teleconference, an image from the camera on their computer appears in a small window on everyone's screen. The pictures are similar to an ordinary television picture. When a participant smiles or frowns, everyone sees their expression.

A Combined Audio, Video And Whiteboard Service

The combination of audio, and whiteboard makes it possible for everyone to see and hear one another as well as view a common document. When they need to specify a precise document modification, they can rely on whiteboard communication. When the participants need to discuss an idea, they can use audio and video communication.

CHAPTER - XIV

AUTOMATED WEB SEARCH

Introduction

This chapter considers an alternative to finding information by following links ; automated search services that do not require human interaction during the search. Such services can find information on remote computers without requiring a user to look through Web pages.

Description Of Functionality

An automated search service allows an individual to find information that resides on remote computers.

A Search Tool Helps Users Get Started

Because the Internet is vast, finding information on a given topic can be difficult. Automated search tools help users by finding a set of pages that contain information related to the topic.

A Search Tool Can Help Recover From Loss

Automated search tools can help users by automatically recovering the location of an item after loss.

How An Automated Search Service Operates

The Internet's automated search mechanisms use trick to enable them to reply quickly. Before any user invokes the search mechanism, a computer program contacts computers on the Internet, gathers a list of available information, sorts the list, and then stores the result on a local disk on the computer that runs a search server. When a user invokes a search, the user runs a client program that contacts the server. The client sends a request that contains the name the user entered.

Most Systems Search Web Page Contents

Unless an automated search system announces otherwise, users can assume the search will look for Web pages that match the topic the user specifies.

Automated Search Services Use String Matching

When a user enters a topic in the dialog box of an automated search service, the user is requesting the service to find Web pages tht contain the topic string.

The Advantages And Disadvantages of String Matching

Consider the following sentence :

This sentence does not contain any information about biology, money, or foods like butter and milk, and certainly is not about automobile pictures, airline fares, lawyer jokes, opera singers, or library books although the sentence is truthful it would confuse a string matching program which would match this sentence to request for information about such diverse topics as money, automobile, jokes, opera or law.

Examples Of Automated Search Services

<http://www.alber2.com>

<http://www.altavista.digital.com>

<http://www.bigbook.com>

<http://www.bigfoot.com>

<http://www.dejanews.com>

<http://www.elibrary.com>

<http://www.excite.com>

<http://www.hotbot.com>

<http://infoseek.com>

Significance Of Automated Web Search

Without such tools, a user must browse through pages manually. A search service can help a user find initial pages on which to start browsing, and can limit the search to a reasonable number of pages.

PART - IV

INTERNET SECURITY AND FIREWALL DESIGN

CHAPTER - XV

INTERNET SECURITY & FIREWALL DESIGN

Introduction

The security of an entire network can be compromised by a single computer. More important, because TCP/IP supports a wide diversity of users, services, and networks, and because an internet can span many political and organizational boundaries, participating individuals and organizations may not agree on a level of trust or policies for handling data.

Protecting Resources

The terms network security and information security refer in a broad sense to confidence that information and services available on a network cannot be accessed by unauthorized users. Security implies, safety, including assurance of data integrity, freedom from unauthorized access of computation resources freedom from snooping or wire tapping , and freedom from disruption of service. Of course, just as no physical property is absolutely secure against crime, no network is absolutely secure. Organizations make an effort to secure networks for the same reason they make an effort to secure buildings and offices ; although an organization cannot completely prevent crime, basic security measures can discourage crime by making it significantly more difficult.

The Need For an Information Policy

Although the need for a policy seems obvious many organizations attempt to make their network secure without first deciding what security means. In organizations that have adopted a general information policy, employees may be unaware of the policy, the motivations for adopting the policy, or the consequences of violating the policy, Establishing an information policy and educating employees is crucial because.

Humans are usually the most susceptible point in any security scheme A worker who is malicious, careless, or unaware of an organization's information policy can compromise the best security.

Communication, Cooperation And Mutual Mistrust

An organization cannot know the effect of communicating and interacting with another unless the two organizations agree on a level of mutual trust.

Mechanisms For Internet Security

Internet security problems and the software mechanisms that help make internet communication secure can be divided into three broad sets. The first set focuses on the problems of authorization, authentication, and integrity. The second focuses on the problem of privacy, and the third set focus on the problem of availability by controlling access.

Authentication Mechanisms

An authorization scheme that uses a remote machines IP address to authenticate its identity does not prevent attacks by imposters across an unsecure internet because an imposter who gains control of an intermediate router can impersonate an authorized client.

Privacy Mechanisms

Mechanisms such as public key encryption can be used to help solve the problems of authentication, authorization, and privacy. Both client and server software must be modified to use such mechanisms.

Firewalls and Internet Access

A single technique has emerged as the basis for internet access control. The technique places a block known as an internet firewall at the entrance to the part of the internet to be protected. For example, an organization can place a firewall at its connection to the global internet to protect it from unwanted access. A firewall partitions an internet into two regions, referred to informally as the inside and outside.

PART - V

**ADVANCE WEB
TECHNOLOGIES
(FORMS, FRAMES, PLUGINS
CGI PROGRAMS, JAVA)**

CHAPTER - XVI

ADVANCE WEB TECHNOLOGIES

Introduction

This chapter describes advanced Web technologies that make it possible for a Web document to interact with a person who views it. In particular, advanced technologies allow a Web document to contain animation and to provide for direct dialog with a user. The chapter begins by describing how a browser loads a conventional Web page, and goes on to explain how advanced services operate.

How A Server Stores Static Web Pages

Corporations or individuals can make information available on the World Wide Web. Doing so requires three basic items :

- ⊗ A conventional computer with a disk.
- ⊗ A permanent connection from the computer to the Internet
- ⊗ Web server software.

The Web, Advertising And Frames

A Company does not need to use one style of advertising exclusively because frame technology can be combined with other advertising schemes. For example, a company can place its most important ads in a frame, but allow individual Web pages to mention other products. Or other company can choose to restrict the advertisement to a small frame that invites the user to find out more about the company's products. Thus, the frame reserved for advertisement might contain a simple message such as :

Click here to view this month's featured product.

Placing a simple message in a frame instead of a full advertisement leaves more space on the screen for other pages.

CGI And Advertising

A CGI program can store information about previous contacts from a given browser, and use the information when selecting an advertisement.

CGI programs can also keep a record of which corporate Web pages a user visits, and choose advertisements that suit the user. If the user has browsed pages about furniture and appliances, the CGI program might choose to include ads appropriate for someone who is

furnishing a house. If a user browses pages of popular music, the CGI program might choose to include advertisement about events such as upcoming rock concerts.

Web Pages Can Interact

Although the CGI technology discussed above can be used to create Web pages that change, CGI programs run only at the server. Thus, a CGI program cannot interact directly with a user. To make it possible for a user to enter data, another technology was invented.

Active Documents Are More Powerful

Why is active document technology so powerful? There are two reasons. First because active document technology performs computation on the user's computer, there is no delay between the time an image is produced and the time the image appears on the user's delay. Thus, it does not matter if the browser is located arbitrarily far from the Web server or delays change on the Internet -output does not start until the active document has been loaded, and then the document can control the screen without using the Internet. Second, active document technology scales well because it does not depend on a Web server to perform computation.

Java Is An Active Document Technology

Sun Microsystems, Incorporated has developed a popular active document technology. Called Java the technology can be used to create animated Web pages, pages that interact with the user, or pages that use the screen in unexpected ways. Java calls an active Web page an applet ; the terminology is so widespread that most other vendors have either adopted it or chosen to use a minor variation.

Java became popular for four reasons. First, the designers chose to make the Java language similar to a widely-used programming language, meaning that professional programmers could learn to write Java applets easily. Second, no other active document technology was available. Third because the Java system includes software to handle common tasks. Fourth, Java is so powerful that it provides more functionality than most other technologies.

The Importance Of Advanced Web Technologies

Active document technologies like Java are gaining popularity and are replacing other advanced technologies. There are two reasons. The first is economic, Second is function. Most experts agree that providing smooth animation is essential, and expect that most Web pages will contain animated graphics.

PART - VI

BROWSING THE WORLD WIDE WEB

CHAPTER - XVII

BROWSING THE WORLD WIDE WEB

Introduction

Previous chapters discuss basic Internet services used to transfer files and log into a remote computer. This chapter explores dynamic services that allow a user to browse information that resides on remote computers. It explains that a browsing service can display graphic images as well as text, illustrates how menu items can be integrated with information, and shows how a single browsing service can provide uniform access to many sources of information.

Description of Functionality

An information browsing service allows an individual to obtain and display information that is stored on a remote computer. Most information browsing services operate interactively - a user enters a request, and the browsing system responds by obtaining a copy of the specified item. If a retrieved item contains information in a form suitable for a human, the browsing system automatically displays the information on the user's screen.

Browsing Vs. Information Retrieval

A browsing service permit users to view information from remote computers without knowing the names of files. After obtaining a copy of document from a remote computer, the browsing service automatically displays the contents, and allows the user to select related documents.

Early Browsing Services used Menus

Several browsing services have been invented for user on the Internet. One of the earliest services was known as gopher.

A menu - driven browsing system displays a menu of choices for a user. By selecting an item from the menu, the user can request the browsing service to retrieve information from a file or retrieve another menu.

A Menu Item Can Point To Another Computer

A menu-driven browsing system hides computer boundaries completely, and makes information on a large set of computers appear to the part of a single, integrated system of menus. A user can jump from one computer to another without knowing or caring about which computers are being used.

The Importance Of Integrated Menus

Although the example paragraph is brief, it illustrates that menu items can be embedded in other information. An integrated menu system helps a user in two ways.

- ✘ First, displaying information and menu items on the screen simultaneously explains a topic in more detail and makes it easier to understand highlighted items. Often, for example, the context around a menu item helps clarify its purpose and eliminates ambiguities.

- ✘ Second, having menu items embedded in information encourages a user to explore items as they are encountered. The browsing service helps further because it remembers where a user was reading when an item was selected, and can return to the same place after the user finishes reading about the item.

Multimedia

To understand how Internet browsing services extend hypertext, it is necessary to understand the capabilities of modern computer systems. Although early computers could only display output using alphanumeric characters that each occupy the same width, modern computer systems have sophisticated hardware that can display graphic

images or play sounds. Such computers use the graphics hardware to display text using proportional spacing - the space allocated for each character's width.

The World Wide Web

The Internet includes a browsing service that extends the concept of hypermedia to include many computers. Known as the World Wide Web (WWW) the service is a mechanism that links together information stored on many computers.

In addition to containing textual information, World Wide Web documents can contain sounds and graphical images. To display nontextual information, a computer must have multimedia hardware.

Bookmarks

To make it convenient for a user to move directly to a frequently- accessed page, browsers include a special mechanism.

The chief advantage of bookmarks arises because they are both convenient and fast. Once a bookmark list has been constructed, a user can select any of the bookmarks by using a pull-down menu (the menu labeled Bookmarks). When the user clicks on the Bookmarks label the list of the user's bookmarks appears in the menu. If the user clicks on one of the entries in the list, the browser obtains and displays the Web page for the entry. Bookmarks are permanent.

PART - VII

EXAMPLE INTERNET SERVICES.

CHAPTER XVIII

EXAMPLE INTERNET SERVICES

Introduction

This appendix takes a different approach. Instead of explaining one concept or one service, it describes several Internet services and facilities without giving details.

InterNIC

InterNIC stands for Internet Network Information Center. The InterNIC is a group of people and computers that provide information about the Internet, the software and services available, and the groups who supply services.

Astra

Another document retrieval service, astra consists of servers that accept database queries expressed in a form defined by astra. Each astra server knows about one or more database and the specific query language required to access each database. When it receives a request, an astra server translates the request into the appropriate query language before sending it to an underlying database. Thus, users can access a variety of database systems without learning multiple query languages.

Finger

The finger program contacts a server on a remote machine to obtain information about a specific user or all users on that machine. Usually, when someone invokes finger, they supply the identifier of a user : `finger userid@computername`.

Internet Relay Chat

The Internet Relay Chat (IRC) service provides a way for many users to communicate about a given topic. Each communication occurs on a separate "Channel". A user who creates a channel chooses a topic and specifies whether the channel is open to anyone restricted to the set of people specified by the channel creator. A user can request a list of the IRC channels currently in progress, and can choose to join one of the channels.

Mud

Mud stands for Multi-User Dungeon. Mud allows a group of users to establish a game-playing session analogous to the way a group can establish a teleconference. After a user joins a mud game, they explore a large labyrinth, and possibly, encounter other users. Mud uses text, not graphics.

Netfind

Netfind is a simple service that uses finger and e-mail to locate a person. A user enters the name of an individual and information about the organization for which the individual works.

Ping

When one makes a telephone call, the phone system plays tones to tell the caller whether the call is proceeding, the remote phone is ringing, or the line is busy. By contrast, the Internet does not inform a sender immediately about the status of communication. If a destination machine cannot be reached, a program may try for several minutes before reporting the problem.

Ph or Cso

The ph program originated at the computing services organisation of the university of Illinois as a way to find the telephone number and e-mail address of a student or faculty member. Several client programs exist. Each requires a user to enter a person's name, and then ph looks up that name in the university's database.

Prospero

Prospero is the name of a facility that can be used to provide the appearance of a global file system that spans many computers. Using prospero, a user can establish folders (sometimes called directories) that contain references to files that reside on several computers. Thus, prospero can be used to organize files from many computers.

Talk

Talk provides interaction between a pair of users. After two users agree to communicate, the talk service establishes a connection between their computers, and divides their displays screens in half. Everything a user types on the keyboard appears in the upper half of the remote screen.

Traceroute

A user who is interested in the structure of the Internet can run the traceroute program. Given the name of a remote computer, traceroute, prints the list of Internet routers along the path from the local computer to the remote computer.

Trickle

The trickle service provides access to FTP files through e-mail. A user places a request for a file in an electronic mail messages and sends the messages to :

tickle@computer

A SELECT BIBLIOGRAPHY

I REFERENCE BOOKS

- 1) **COMER .E.DOUGLAS** : “**THE INTERNET**” : PRENTICE HALL OF INDIA PRIVATE LIMITED, NEW DELHI : - 1999.
2. **BACZOWKI. PHILIP, CALLAS JON** : “**TRICKS OF THE INTERNET I**” : BPB PUBLICATION, NEW DELHI : 1996.
3. **MULLET WAX, METRAL KEVIN** : “**TRICKS OF THE INTERNET II**” : BPB PUBLICATIONS, NEW DELHI : 1998.
4. **ROSE.T. MARSHALL**: “**THE GROWING WEB**” : COMDEX COMPUTER PUBLISHING LTD, BANGALORE : 1996.
5. **LYUNCH.C. DANIEL** : “**INTERNET SURFING MADE EXCITING**” : CANTERBURY PUBLICATIONS, AUSTRALIA : 1995.

II WEBSITES

1. <http://www.internic.net>.
2. <http://www.yahoo.com>.
3. <http://www.askjeeves.com>.
4. <http://www.infoseek.com>.
5. <http://www.library.com>