

Internet Services 101

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The second in a series of three articles reviewed the basic structure of the Internet.¹ The purpose of this piece is to describe what the Internet is known and famous for: its services. These services range from simple exchange of messages (e-mail) to sophisticated tools of information retrieval.

Access to Internet Services

A user can access Internet services in several ways. The most direct access is through an Internet Access Provider (IAP). These providers range from local "mom-and-pop" shops to national and international telecommunications giants (e.g. Sprint, MCI, Netcom, PSI). Most IAPs will supply their users with a basic Internet software package containing programs similar to those described below. A typical example of a basic package is the "Internet in a Box," including a configuration utility, a web browser (AIR Mosaic), a newsreader (AIR News), an e-mail program (AIR Mail), a dialer, a telnet program (AIR Telnet) and more. We will describe these types of programs later in this article.

During the last year, all major on-line services started proving their users with access to the Internet services. In addition to their proprietary software, the on-line services are evolving toward the use of standard tools (also described in this article) in providing access to the Net.

Communicating Over the Net: E-mail

An early and strong motivating force in the development of the Internet was a need to provide an independent universal communication medium. Electronic mail has always been one of the most important and widely used Internet Services.

Basic electronic mail provides for exchanges of text messages among Internet users. To use e-mail, a person has to establish an account on one of the Internet hosts—a computer directly connected to the Internet with its own Internet or IP address. Symbolic

names of Internet hosts are universally used to represent IP addresses because they are much easier to memorize. The user login and the computer constitute the Internet e-mail address for that user. For example, the Internet address of the user "Sudit" of the computer "andromeda.rutgers.edu" is `sudit@andromeda.rutgers.edu`, which is much easier to remember than `sudit@128.6.10.4`. It also is much more informative because it shows that Sudit resides at Rutgers which is an institute of higher education (signified by .edu).

Most early Internet hosts were UNIX² computers, and for that reason, most of the early Internet e-mail programs were UNIX-based. Lately, an increasing number of Internet users do their e-mailing on a PC or a Mac. The new generation of Internet e-mail programs are usually front-ends for the user's Internet mailbox which remains located on a UNIX computer. Interestingly, some of the best e-mail programs for Microsoft Windows[®] have a freeware or shareware status. One of the most popular e-mail programs is Eudora by QUALCOMM. Figure 1 shows how the Rutgers Accounting Web (RAW) webmaster `kogan@andromeda.rutgers.edu` reads an e-mail message using Eudora on his PC named `cadet.rutgers.edu`.

A typical Internet e-mail message consists of two parts: the header and the body. The header contains information about the recipient of the

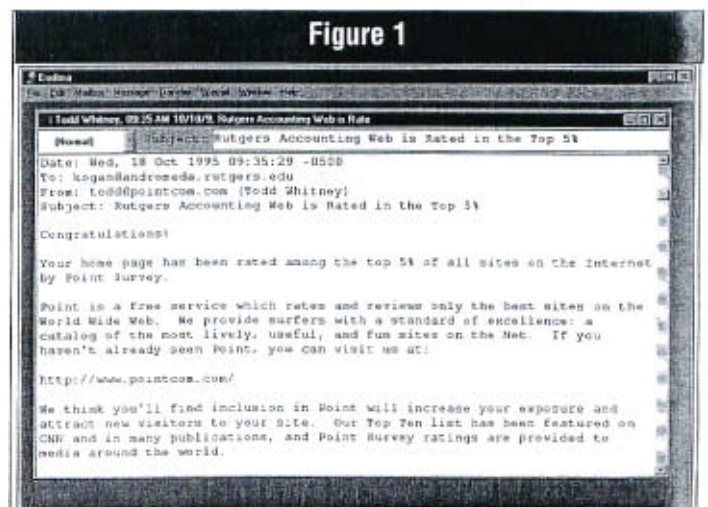


Figure 2

Prodigy Chat Room

SYSTEM Greeter: You are now in room "Investing in Stocks"

SYSTEM Greeter: You have READ/WRITE Access

rawmaster: hi, this seems to be a quiet day

questionk: hi rawmaster

The Big Tuna: sure guess see another 1/2 down on rates

questionk: when was the last time rates were that low?

rawmaster: what do you think of the astronomical rates that Netscape is still selling?

The Big Tuna: so another few months then what? short it

questionk: Sell off in the late fall

Kopella: My guess is - after elections - more borrowing will be needed nationally and internationally - to finance all government deficits and definitely rates will have to surge increasing inflation

The Big Tuna: so guess if rates keep it going another few months then what?

rawmaster: i agree, the microsoft fine (so so) hosting offer will hurt them, why late fall?

The Big Tuna: I prefer to buy quality when prices and pe's are low and wait it out

questionk: the Firms will have most of there clients in a profit situation, and the sell off will begin...They will tell they clients the top is near and should sell for that profit for a number of reason...

rawmaster: all pe's are crazed at this point.

The Big Tuna: not semi conductors

The Big Tuna: the sax is down over 120 pts since its peak

questionk: Tuna, why do you like the PE of Semi's

The Big Tuna: there are some excellent company selling pretty cheap

questionk: and there profit growth potential?

rawmaster: is there overcapacity in semi-conductor plants?? or maybe some major technological change? Sims have been kept artificially high for many years, is it possible that an adjustment is coming?

The Big Tuna: coming? its come and gone

rawmaster: the market was at 2700 in 87 now is at 5600, this is not an adjustment

The Big Tuna: MU 94 to 30 I would say that it is a correction

questionk: Every one would like to be in the next Micro-soft or Intel, But the bottom line is always can they make money. Remember when MU was at 93 were is it now and why?

The Big Tuna: at 9 times earnings its cheap even if earnings expectations are to high

rawmaster: stery about my ignorance MU????

The Big Tuna: micron technology

questionk: Micron Tech.

Kopella: What's your annual average return on your investments?

SYSTEM Greeter: "USAirJB" has entered the room.

rawmaster: thanks, they are having manufacturing quality problems.

The Big Tuna: maybe semis won't grow 30-50% this year or next but 20 is realistic now and long term this situation is good

questionk: Tuna, i agree, you have a little room for gain in Mu, but keep a watchful eye on it

USAirJB: Guys I'm new in this computing system.

The Big Tuna: I have a watchful eye on everything guys

USAirJB: please need on where to invest some money

USAirJB: stocks or mutual funds?

The Big Tuna: Air is what your knowledge of the markets inexperienced-expert?

programs can filter the incoming messages by size, origin, etc.

Internet Relay Chat

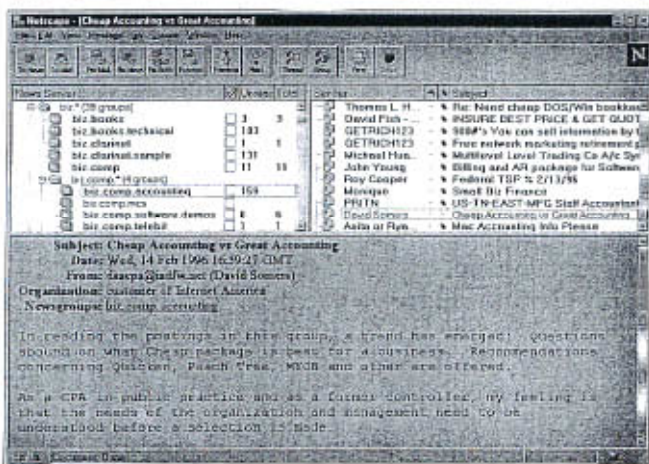
Another mode of communication over the Net is the Internet Relay Chat (IRC). Chat rooms are tremendously popular on on-line services as a forum for special interests, for meeting people and for sheer entertainment. Chat rooms provide a live medium for exchanging opinions without the delays associated with e-mail. Chat is being progressively used in intranets³ to replace expensive conference calling and to keep records of group meetings. Figure 2 illustrates a chat session of a Prodigy[®] finance room exploring investment alternatives.

Internet Bulletin Boards

Internet Bulletin Boards serve exactly the same purpose as regular bulletin boards: users can post messages and read postings from others. The system of Internet bulletin boards is called Usenet (or netnews), and individual bulletin boards are called newsgroups. Newsgroups are hierarchically classified by topic and their distribution ranges from local to regional to global.

Consider *biz.comp.accounting* (figure 3) as an example of a global newsgroup. The general category of this newsgroup is business news, the subcategory is computer-related and sub-sub-category is accounting. This newsgroup was read using a newsreader built into Netscape 2.0. This is an example of software integration: a Web browser (Netscape) incorporates other services (e.g. netnews, e-mail).

Figure 3



Internet Remote Controls

The telnet and rlogin protocols allow users to access and control remote computers without having a direct physical connection to them. For example, it is possible to connect to the Internet through dialups of Columbia University in New York City and run programs on one the University of Illinois' Supercomputer Center machines. Most organization require proper clearance for remote access to their computers. Some public organizations, however, allow any anonymous user to access their computers for certain well-defined purposes. For example, the New York Public Library permits anonymous users to access its on-line catalogs using telnet to *nyplgate.nypl.org* and logging in as *nypl*. (See figure 4.)

Essentially, telnet provides distributed access to computing power, enhancing the limited computing capabilities of the desktop machines.

Moving Things Around

The file transfer protocol (ftp) was the first Internet service which allowed the users to move information (files) over the Internet. In the ftp the user connects to a remote computer, navigates the file system, locates and transfers the desired files back to the originator of the ftp program. This procedure is illustrated in Figure 5 by a remote connection between a local machine and a Microsoft ftp site (*ftp.microsoft.com*).

Early ftp programs used a character-based interface. More recent Windows ftp programs give the users a File Manager-style interface. A highlighted file(s) can be transferred from one computer to the other by simply clicking on the arrow button.

Many ftp sites allow anyone to access their files by logging

message (To:), the sender of the message (From:), the subject (Subject:), etc. The body of the message may contain any text. New e-mail programs, like Eudora, make it possible to send by e-mail various non-textual information, such as images, sound, movies and computer programs, by encoding them and attaching them to a regular e-mail message.

Most e-mail programs have cataloging capabilities, making it possible for users to save incoming and outgoing messages in various folders. It is also possible to simultaneously send or forward the same message to numerous recipients. All e-mail systems inform the sender of delivery failure. Some e-mail systems support confirmations or receipt. Sophisticated e-mail

Figure 4

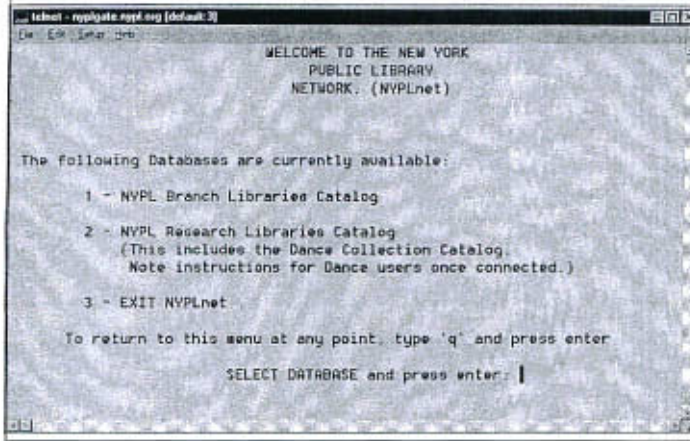


Figure 5

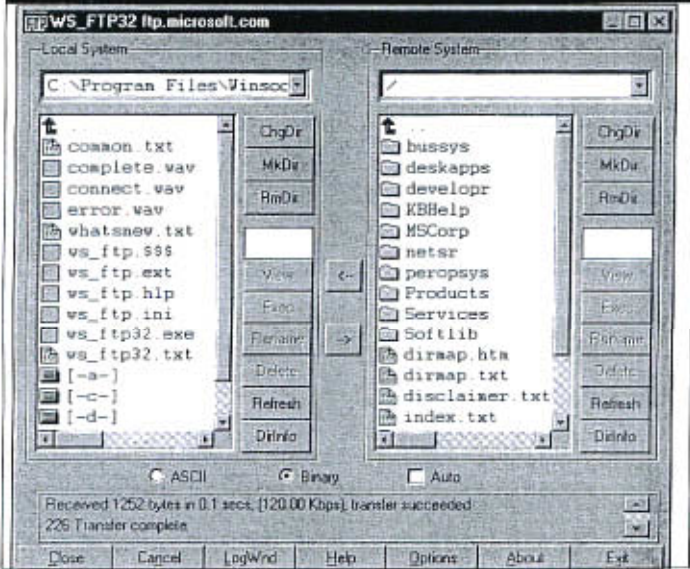
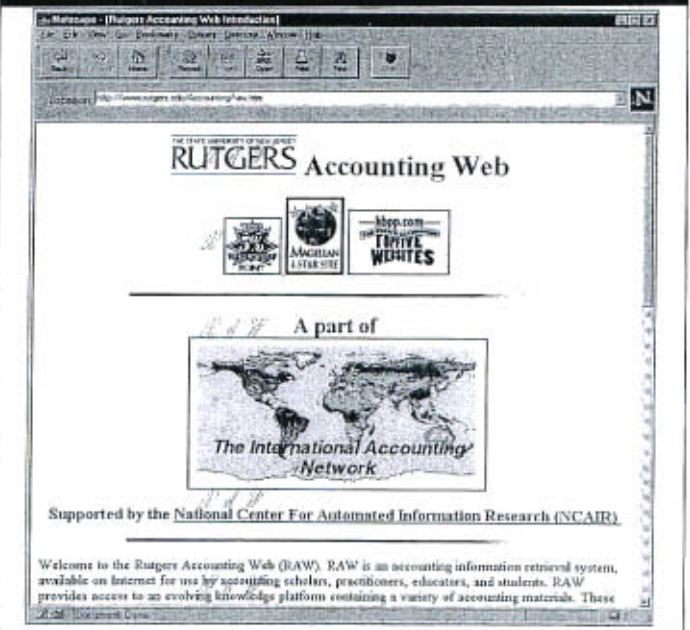


Figure 6



in as anonymous and using ident and the e-mail password. These sites are called anonymous ftp sites and many of them serve as huge repositories of freeware and shareware programs.

Browsing for Everything

The World Wide Web (WWW) enabled the Internet to leap almost overnight from a technologically esoteric tool to a widely usable medium. Its basic hypertext-oriented design and multimedia capabilities make it both rich in features and easy to use. Hypertext, including pointers (links) to other documents, made it possible to browse the Internet with the ease of clicking a mouse.⁴ The initial concept of the WWW was developed at CERN⁵ located near Geneva, Switzerland, and the first graphical browser for the Web (called Mosaic) was developed in 1993 in the University of Illinois National Center for Supercomputer Application (NCSA). It was Mosaic that brought forward the multimedia glory of the Web. Multimedia incorporates images, sounds and video into WWW documents and decorates the Web with color and animation.

A user can access a document on the WWW following a link from another document, or, alternatively, by directly telling the browser where the document is located. The latter requires the specification of the Internet address of the document in the form of the so-called Uniform Resource Locator (URL). Any URL consists of three parts:

protocol://computer/path

The *protocol* is usually http (hypertext transfer protocol). *Computer* is a legitimate Internet computer name (e.g. www.rutgers.edu). And, the *path* is a sequence of directors and sub-directories leading to the file, e.g. accounting/raw.htm, which is the homepage of the Rutgers Accounting Web (RAW).

The homepage shown in Figure 6 contains textual material, pictures and sound. By clicking on the International Accounting Network emblem, the user makes the computer play the first sounds of the triumphal march of Radames in Verdi's *Aida*. Hypertext links usually appear in blue and are underlined. Clicking on such a link will bring up a document pointed to by this link. For example, clicking on NCAIR in Figure 6 will have the browser request and display the screen on the RAW homepage describing the National Center for Automated Information Research. Links may be to other parts of the current document or to other pages elsewhere in the world or another computer.

The Internet address of the homepage of an organization (e.g. the US Securities and Exchange Commission: http://www.sec.gov) usually does not contain the path part. If a path to a specific SEC document is not known, the user can browse for it by following the hierarchy of hypertext links starting from the homepage. Whenever the user encounters a document of special interest, he or she can "bookmark" the document by adding its URL to a special list of bookmarks maintained by most browsers. The user then can easily visit that page in the future by simply choosing it from the bookmark list.

Most of the WWW browsers can give the users access not only to the Web, but also to other Internet services. One important example is the University of Minnesota's *Gopher*, which can be described as an early-generation Internet information browsing system. This system allows browsing through either

(continued on page 50)

simple menu screens or plain text documents. An example of a URL for a gopher site is:

`gopher://gopher.ebone.net/`

Gopher is almost extinct today, and the last gopher sites soon will join the ranks of the dinosaurs of the WWW age of the Internet, which is barely three years old.

The attractive graphical user interface and multimedia readily lend themselves to browsing for entertainment. If the user visits <http://www.hal.com/~nathan/Sumo>, she or he can view and download pictures of Sumo wrestlers, the results of recent tournaments or a QuickTime video of a particular contest. (It will probably take over 10 minutes of download 40 seconds of QuickTime footage.)

It must be noted, however, that to be able to view some of the multimedia documents, the user may need to install some special software that is not distributed with a browser and has to be acquired separately (e.g. by ftp from the Net).

Conclusions

This article has provided an overview of the main Internet services. These services can bring immediate benefits to most organizations and professionals. It should be noted that the Internet is still in its infancy. Many additional services and capabilities of the Net are likely to emerge several years from now.

The Internet, like the PC, is here to stay—and to continue to grow. It will substantially change the way we do business. Ten years from now, it will be difficult to conceive doing business without the Internet as it is conceivable today to do business without a fax.

Endnotes

¹ Kogan, A., Sudit, E. & Vasarhelyi, M. "Untangling the Web" *IS Audit & Control Journal* 1995(VI), pp. 6-8

² A computer operating systems developed at Bell Labs in the early 1970s.

³ Intranets are private computer networks using the Internet

technology. They are sealed off from the world by firewalls. *Business Week* ("Here Comes the Intranet," pp. 74-84, February 26, 1996) described some of these new efforts at Federal Express, Levi Strauss, AT&T and others.

⁴ Those who think we refer to a rodent should discontinue reading.

⁵ European Laboratory for Particle Physics

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