



## What is the Internet?

The conceptual foundation for creation of the Internet was developed by many individuals but Vanevar Bush wrote the first visionary description of the potential uses for information technology with his description of the “memex” automated library system. His 1945 article in *The Atlantic Monthly*, “As We May Think,” accurately predicted the future that changed the way people thought about technology.

The Internet is a world-wide system of publicly accessible interconnected computer networks. It is a network of networks linking computers to computers connected by copper wires, fiber optic cables, etc. Each runs software to provide or “serve” information for clients (users) to access and view. The Internet is the transport vehicle for the information stored in files or documents on another computer. It can be compared to an international communications utility servicing computers or it can be compared to a giant international plumbing system. The Internet itself does not contain information; documents are not found on the Internet; they are found through or by using the Internet. The documents found are on one of the computers linked to the Internet.

No one person or entity controls the Internet; there is no central controlling unit. An international organization comprised of universities and members of private industry known as the World Wide Web Consortium (W3C) (<http://www.w3c.org>) makes recommendations on technical developments and standards needed for the evolution and maintenance of the Internet. The Internet is a collection of interconnected computer networks linked by copper wires, fiber optic cables, etc.

Computers on the Internet may use one or all of the following Internet services:

- **Electronic Mail (e-mail).** Permits people to send and receive mail. Provides access to discussion groups often called Listservs which is named after the software they operate under. The first e-mail message sent to another computer occurred in 1972.

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- **Remote Login.** Permits people on a computer to log onto another computer and use it as if they were there.
- **FTP or File Transfer Protocol.** A commonly used protocol for exchanging files over the Internet or other networks that use Transmission Control Protocol (TCP/IP) Allows people to rapidly send (upload), retrieve (download), delete, rename, etc. files once their computer and another computer are connected. The first computer is an FTP servers that listens on the network for requests from other computers to connect. (A server is a computer that provides services to other computers. The other computer (called the client) makes its connection to the FTP server using FTP client software (often available for free). Once connected, file exchanges can occur.
- **USENET.** Usenet was the first peer-to-peer technology that was originally developed just to share files between computers. Users joins ‘newsgroups’, categories similar to bulletin board systems, to read and post messages (called “articles” in an email-like list) to the members of their newsgroup. Servers store and forward messages. It’s cultural significance is that it gave rise to or made popular lots of widely recognized concepts and terms such as “FAQ” and “spam.”
- **The World Wide Web (WWW or “the Web”).** The Web is not the same as the Internet. It is a collection of interconnected documents linked by hyperlinks and URLs (uniform resource locators—web addresses starting with <http://>) and is accessible using the Internet. The largest, fastest growing activity on the Internet.

## What Is the World Wide Web and What Makes It Work?

The part of the Internet most people are most familiar with is the World Wide Web which was developed by Tim Berners-Lee in 1989. Berners-Lee, a British physicist working at CERN, the European Particle Physics Laboratory, was seeking a way for physicists to share information about their research. Berners-Lee’s World Wide Web proposal was in response to CERN’s problem of losing information. CERN scien-

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tists came from all over the world to conduct research at the lab for a year or two. When they left, their research would often be lost among the large amount of other research being conducted. Berners-Lee summarized the problem by stating:

“A problem is the high turnover of people. When two years is typical of length of stay, information is constantly being lost. The technical details of past projects are sometimes lost forever, or only recovered after a detective investigation in an emergency. Often the information has been recorded, it just cannot be found.”

To solve this problem Berners-Lee wanted to create a system where, “There is a potential large benefit from the integration of a variety of systems, in a way which allows a user to follow links pointing from one piece of information to another one.” These pieces of information would be “linked together in a way that one can go from one concept to another to find the information one wants.” Taken together these associated links would be called webs, thus the name World Wide Web for an international network of associated webs.

Berners-Lee made his ideas a reality in 1990 with the development of the Hypertext Transfer Protocol (HTTP), which takes advantage of the Internet to allow for the exchange of documents regardless of location or platform. To view this information he developed a simple line mode browser that allowed users to read the text of documents and follow hypertext links to other documents. In March 1991, the HTTP protocol was implemented at CERN and the World Wide Web had officially begun. In 1992, the HTTP protocol along with the CERN browser were made available to the public, and by the end of 1993, over 500 web servers were in operation throughout the world.

The Web incorporates all of the Internet services above and much more. Users can retrieve documents, view images, animation, and video, listen to sound files, speak and hear voice, and view programs that run on practically any software in the world, providing your computer has the hardware and software to do these things.

When someone logs onto the Internet using Netscape or Microsoft’s Internet Explorer or some other browser, they are viewing documents on the World Wide

Web. The current foundation on which the WWW functions is the programming language called HTML. It is HTML and other programming imbedded within HTML that make possible Hypertext. Hypertext gives web pages the ability to contain links, which are areas in a page or buttons or graphics on which someone can click the mouse button to retrieve another document into their computer. *This linking using Hypertext is the feature which is unique and revolutionary about the Web.*

How do hypertext links work? Every document or file or site or movie or soundfile or anything you find on the Web has a unique URL (uniform resource locator) that identifies what computer the thing is on, where it is within that computer, and its specific file name. The URL syntax is: scheme://host.topleveldomain/pathfilename. (The scheme part, for example, in the URL is commonly http, ftp, mailto, etc. The host mentioned in the URL is the computer server which you want to access. Top level domain (also called TLD) refers to the last part of the Internet domain name—the letters after the last ‘dot’ such as org, edu, com. And finally, path refers to the complete file or directory name that locates the file/Web page you need.)

Every Hypertext link on every web page in the world contains one of the URLs. When someone clicks on a link on a Web page, a request is sent to retrieve the unique document on some computer in the world that is uniquely identified by that URL. URLs are like addresses of web pages. A whole cluster of internationally accepted standards (such as TCP/IP and HTML) make possible this global information retrieval phenomenon that transcends all political and language boundaries.

The Internet’s domain-name system (DNS) allows users to refer to web sites and other resources using easier-to-remember domain names (such as “www.wvpt4learning.org”) rather than the all-numeric IP addresses (such as “192.0.34.65”) assigned to each computer on the Internet.

There are several types of top level domains TLDs with two letters (such as .us .de, .mx, and .jp) have been established for over 240 countries and external territories .A list of the country codes is available at: <http://www.iana.org/cctld/cctld-whois.htm>

In the 1980s, seven generic TLDs (.com, .edu, .gov, .int, .mil, .net, and .org) were created. Over the next twelve years, various discussions occurred concerning additional TLDs, leading to the selection in November 2000 of seven new TLDs (.biz, .info, .name, .pro, .aero, .coop, and .museum).

## **What Is a Browser? What Are Safari, Mozilla, and Internet Explorer?**

A browser is a computer program that resides on your computer enabling you to use the computer to view WWW documents and access the Internet taking advantage of text formatting, hypertext links, images, sounds, motion, and other features. Microsoft Internet Explorer is currently the leading “graphical browser” in the world but there are other browsers (e.g., Mozilla, Foxfire, Opera). All offer many of the same features and can be successfully used to retrieve documents and activate many kinds of programs.

Browsers all rely on “plug-ins” to handle the fancier files found on the Web. Plug-ins are sub-programs stored within a browser or elsewhere in a computer especially to support special types of files. If someone clicks on a link, and their computer does not currently have the plug-in needed for the file clicked on, they are prompted with an opportunity to get the plug-in. Most plug-ins are free, and easy and safe to install on a computer by following the instructions.

## **What Is in the Future?**

The next iteration of the Web is the Semantic Web. The Semantic Web project is under the direction of Tim Berners-Lee, the inventor of the World Wide Web, URLs, HTTP, HTML, and now the Semantic Web. It is a collaborative effort led by W3C with participation from a large number of researchers and industrial partners. What’s the rationale for this project? As Wikipedia, explains, it is a project that intends to standardize information exchange by creating a universal medium (to extend the World Wide Web by employing standards, markup languages, and processing tools) that will allow the documents on the Web to have meaning (semantics) to machines. Data that is generally hidden away in HTML files is often

useful in some contexts, but not in others. The problem with the majority of data on the Web that is in this form at the moment is that it is difficult to use on a large scale, because there is no global system for publishing data in such a way as it can be easily processed by anyone. For example, just think of information about local sports events, weather information, and statistics presented by numerous sites, but all in HTML. The problem is that, in some contexts, it is difficult to use this data in the ways that one might want to do so.

The Semantic Web addresses this problem in two ways. First, it will enable communities to expose their data so that a program does not have to strip the formatting, pictures and ads from a Web page to guess at the relevant bits of information. Secondly, it will allow people to write (or generate) files which explain—to a machine—the relationship between different sets of data. For example, one will be able to make a ‘semantic link’ between a database with a ‘zip-code’ column and a form with a ‘zip’ field that they actually mean the same thing. This will allow machines to follow links and facilitate the integration of data from many different sources.

This notion of being able to semantically link various resources (documents, images, people, and concepts) is an important one. With this we can begin to move from the current Web of simple hyperlinks to a more expressive semantically rich Web, a Web where people can incrementally add meaning and express a whole new set of relationships (hasLocation, worksFor, isAuthorOf, hasSubjectOf, dependsOn,) among resources, making explicit the particular contextual relationships that are implicit in the current Web. This will open new doors for effective information integration, management and automated services.

The potential benefits are that computers can harness the enormous network of information and services on the web. Your computer could, for example, automatically find the nearest dentist to where you live and book an appointment for you that fits in with your schedule.

A lot of the things that could be done with the Semantic Web could also be done without it, and indeed already are done in some cases. But the Semantic Web provides a standard which makes

such services far easier to implement. (Semantic Web. From Wikipedia, the free encyclopedia. (Accessed on Feb. 15, 2006 from [http://en.wikipedia.org/wiki/Semantic\\_web](http://en.wikipedia.org/wiki/Semantic_web).)

## **History of the Internet**

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