# The Making of Netscape

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Marc Andreessen started working on the Mosaic web browser in 1992. He was a computer science student at the University of Illinois, but he spent a lot more time at the NCSA, the University's supercomputing center, than he did in the classroom. "Working at NCSA was fascinating," says Andreessen. "The super-computing program in the mid-1980's originated because the government thought it was crucial that a powerful computing infrastructure be provided for scientists. An interesting thing happened around 1990: all the supercomputing centers essentially stopped running supercomputers. They shut down the Crays. They could no longer afford to keep them running, especially with the advent of more cost efficient microprocessors. Since it no longer made sense to run a supercomputer, what do you do? And so networking quickly became a very big part of NCSA, the theory being that the next stage would be to link together everything -- especially scientists and educators who up until that point had been using the Crays. Networking had arrived so fast, and everything was happening so rapidly, that people just hadn't yet gotten around to making it accessible."

The Internet phenomenon had been gaining momentum for a decade, but its use was still limited to a small group of skilled programmers. "People had also been talking about hypertext for a long time, and it finally happened at NCSA," says Andreessen. But he thought that the full potential of the Internet was still not being tapped. "The Internet worked fine as infrastructural device, but wasn't friendly enough for people who wanted to do interesting things. So it was primed for someone to come along and try to take all this information and this great networking and pull it together with a graphical interface for the desktop PC."

"I thought that multi-media should be a key part of the Internet. Everyone knew desktop computers and the network were perfectly capable of handling images. The new part was simply combining this idea with the ability to link together resources across the globe. I figured out that this was something that we should do and it was the right time and place to do it, and then it was a fairly simple application of just pulling the two halves together. The networking works great. The desktop user interface works great. All we really tried to do was to pull them together. We wanted to make Mosaic friendly for people to use."

Andreessen started writing the code for his Mosaic program with a friend, Eric Bina. They spent about three months hammering it out. "We just tried to hurry and get it out there - initially to a limited group of ten or twelve alpha and beta testers." At first many didn't understand it; but after spending ten minutes or so playing around with the interface, something clicked and they were off. "Focusing on that process was really important to us," says Andreessen.
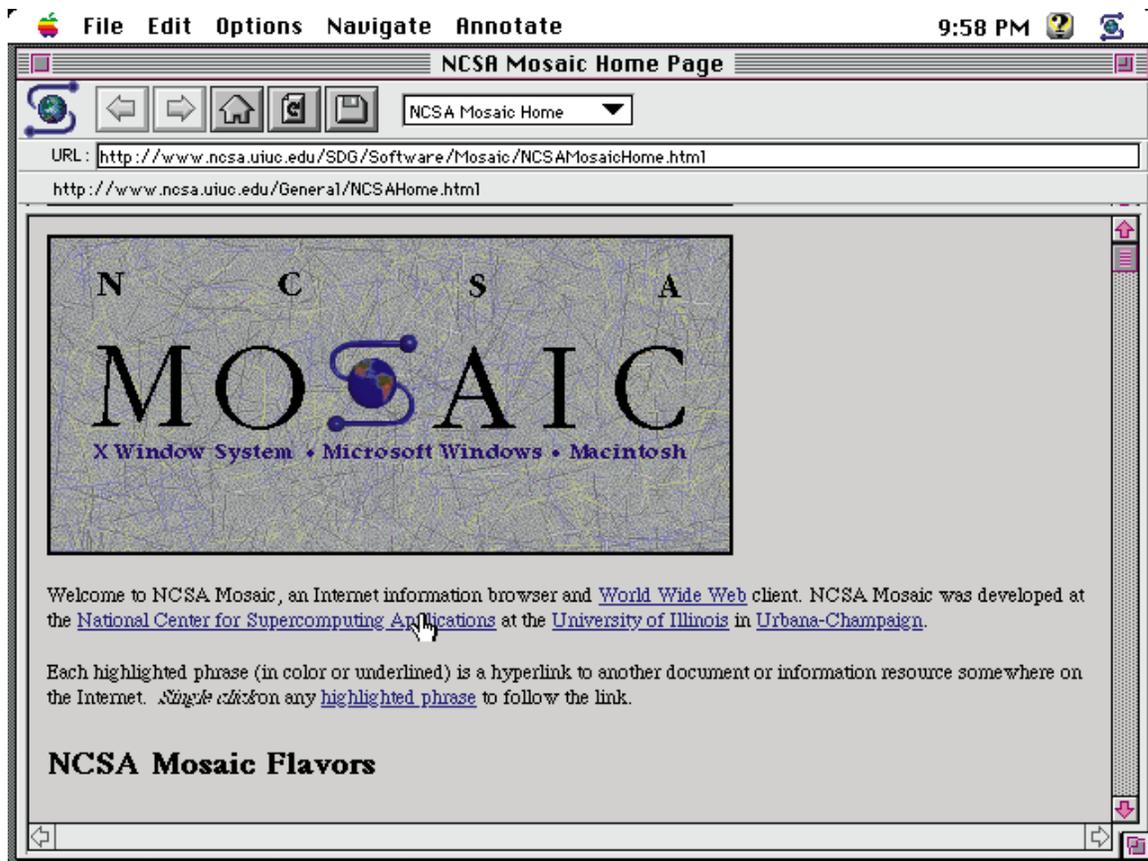
Mosaic was introduced in March 1993. It rapidly gained users. "It was just something else," says Andreessen. "The surprising thing was that every time you expected it to calm down and level off it just kept increasing." Some programmers active in the World Wide Web community resented all the attention Mosaic received. They knew that the real heart of the World Wide Web is the data standard and the addressing system, and argued that any bozo - or at least any sufficiently talented bozo - can write a browser. "A guy on our project wrote a browser in a week," said one unimpressed programmer at the Massachusetts Institute of Technology. Other Web wizards agreed.

"Mosaic is about to get a boot up the backside," said an experienced developer at CERN in Geneva. "There are an awful lot of good browsers coming out. Mosaic isn't the only one." Still, it was Mosaic that brought about an explosion of interest in the World Wide Web. There were 50 known Web servers in January 1993, more than 500 by October, and 1500 by June 1994. "A lot of companies just started coming to us, wanting to commercialize the product," says Andreessen. "It was pretty amazing. We'd say `Okay' and then we'd try to figure out how to charge them."

By this time everyone at NCSA knew what this undergraduate student had achieved. "First of all they realized that this was going to be significant, and that this potentially allowed the supercomputing center to not only continue but to flourish; and they also realized that there was money in it, says Andreessen. "They started taking a keen interest in it all. So after a while it was sort of taken out of our hands. There were many companies that came to the university and said "We would like to take this, we would like to commercialize this. " It was interesting to watch the university try to deal with that." But NCSA was a research organization, not a business. "You're starting to run the research project like a business, but it's not a business," says Andreessen. "It does not have any of the required people, skills or foundation. It was actually fairly stressful because it wasn't clear what to do, how to carry it forward, or how to keep it going. It was not clear that, past a certain point, a research center should let go of a product and let it takes its natural course."

As graduation approached, Andreessen wondered if he should stay on at the NCSA to develop Mosaic or leave to find a job elsewhere. He decided to leave. "There was no reason to stay there. The environment was falling to pieces compared to what it had been, simply because there was this influx of money. The project grew from two people to twenty. It was completely different," says Andreessen. "I decided that to finish my degree and also enter a commercial agreement with the university; then I realized that wasn't going to work out. I left and a number of other people on the project left at about the same time. I tried to sift through and figure out where to go, what to do. I talked to a lot of companies about different things. I came out to Silicon Valley to visit in October and really liked the area a lot. I liked the fact that there were all these high tech companies out here. I interviewed with a number of companies and eventually accepted an offer with a small company in Palo Alto called Enterprise Integration Technologies -- an impressive name. I lasted about three months. And then I met Jim Clark."

A meeting of minds

Jim Clarke was packing in his office at Silicon Graphics. He had founded the company twelve years ago to build computers using the "geometry engine" he had developed as an associate professor at Stanford University. Now he was resigning from the board of directors. He was also leaving behind stock options valued at $16 million.

Bill Foss, a colleague, stopped by; Clarke asked him if he knew Marc Andreessen. "He wrote Mosaic," said Foss. "He's out here now, working for some small company in the Valley." Then Foss realized Clarke had no idea of what Mosaic was. Without saying a word, he downloaded a copy of the web browser, started it up, and walked out of Clarke's office. "You'll figure it out," he said. A little while later, Clarke sent Andreessen an email.

> *Marc: You may not know me, but I'm the founder and former chairman of Silicon Graphics. As you may have read in the press lately, I'm leaving SGI. I plan to form a new company. I would like to discuss the possibility of your joining me.*
> *Jim Clarke.*

A reply came back in about ten minutes.

> *Jim: Sure. When would you like to meet?*
> *Marc.*

They met for breakfast next morning at Cafe Verona. Clarke's first impression was that Andreessen was very quiet; later he realized that Andreessen's subdued style had more to do with sleep deprivation than personality. "The fact is, seven-thirty must have seemed far earlier than the crack of dawn to him," says Clarke. "I discovered later that it was Marc's habit to work late into the night, then sleep late the next day. This is a typical pattern for programmers, probably established in the days when accessing university computers was impossible during the day, and carried over into the PC age because there was less distraction after midnight."

Intuitively, Clarke liked Andreessen. He seemed the kind of person needed for another start-up. "Without any ceremony, as we finished our last coffee, we decided that we'd begin to meet at my house for a kind of `kitchen cabinet' I'd form to try to figure out what our new company would actually do," says Clarke. "Marc had only one condition, not about what we ought to do, but what he adamantly didn't want to do:

"I'm finished with all that Mosaic shit."

Andreessen and Clarke met several times a week, often joined by Clarke's former SGI colleagues. Whatever they did would involve the Internet in some way. But they made little progress. Clarke thought they might involve Nintendo. He met Howard Lincoln, president of Nintendo, in Seattle. He showed Lincoln a business-and-technology plan describing how Nintendo could set up an online service. But Lincoln was not a technology man; he was interested but Clarke felt he didn't quite know what to make of the plan.

After some time, Andreessen reminded Clarke that his friends at the University of Illinois were graduating and that they would have to come up with something quick if they wanted to hire any of them. "Since I'd met Marc," recalls Clarke, "the main objective had always been that we bring together the core group that had developed Mosaic. People who have worked together in the past make all the difference in a startup, where time can't be wasted getting people acquainted, integrating dissimilar personalities into a team. … If I wanted to get going with any kind of momentum, I needed to keep the boys from Illinois together as a team."

Time was running out. Clarke recalls: "Then at about one in the morning on a Thursday late in March, as we sat in my living room working our way through yet another bottle of burgundy, out of frustration I said to Marc, `You come up with something to do and I'll invest in it.' Marc leaned back in his chair, thought for a few minutes, then said -- as if all he'd ever really needed was a kind of friendly ultimatum –

`Well, we could always build a Mosaic killer.'

`A what,' I asked.

`You know, he said, `build a browser that's better than Mosaic, put it out there, let it take over instead of Mosaic. Right now, the university is spreading a copy of this program that my friends and I worked our butts off writing, and they're trying to make a business of it. We need to take it over. We gotta kill it.'

`If you can hire the entire Mosaic team to do this,' I told Marc excitedly, `I'll invest in it. Screw the business plan and the conventional investors.'

Just like that, we knew what we had to do."

A Company Formed

Clarke and Andreessen got on a plane to Urbana-Champaign. It was late evening when they arrived. Clarke went to bed. Andreessen went to meet his friends and told them how he wanted them to make a Mosaic killer. Next morning, Clarke met the group. They spent the day talking about how Mosaic could be improved. "Everybody was tremendously enthusiastic," recalls Clarke, "in part, I think, because the idea appealed to their need to say a resounding "Screw you!" to the University that had so totally undervalued them. It's amazing what you can gain merely by recognizing talent, and how much you can lose by taking it for granted. I had a really good feeling about this reunion, and my place in it. I hadn't made any job offers, but my "magnificent seven" were assembled and, I was pretty sure, ready to go."

In the evening, Andreessen took seven contracts to Gully's, a college hangout. That night he brought Clarke seven signed contracts, each promising a $65,000 salary and 100,000 shares of the still-to-be-named startup. These shares, Clarke said to the team, would be worth at least a million in a few years, but he hoped to make them worth several millions in five years. It would in fact take less than a year and a half.

On April 4, 1994, Jim Clarke incorporated Mosaic Communications.

The need for speed

Andreessen and Clarke had to work quickly. Much had happened since Andreessen had left the University of Illinois. NCSA was already discussing licensing deals with companies. It encouraged licensees to enhance Mosaic and resell it to consumers. Some of these new companies played with the Mosaic code to try to avoid the crashes. Some added simple security features and reply forms. By July 1994, NCSA began charging an initial licensing fee of $100,000 plus $5 each for each copy sold by a licensee.

Several companies were selling their versions of Mosaic directly to computer manufacturers. Santa Cruz Operation of Santa Cruz, Calif., began shipping a version that ran on powerful workstations. Its customers included Wells Fargo Bank in San Francisco, whose employees used it for searching financial databases. A Mosaic for home computers was also in the works. Spry Inc. of Seattle teamed with O'Reilly & Associates of Sebastopol, Calif., to offer a refinement of Mosaic for personal computers, in a package called Internet in a Box. David Pool, Spry's president, hoped to win 70,000 to 100,000 customers in the first year. "If you don't have a home page next year," he predicted, "it's going to be like not having a fax."

Quadralay Corporation, a Mosaic licensee in Austin, Texas, announced that it was retooling the browser slightly and repackaging it as an online customer support and service system. Quadralay also announced a consumer version of Mosaic for Windows, officially priced at $249.

Digital Equipment Corporation announced plans to ship a version of Mosaic (enhanced by Spyglass Inc.) with every machine it sold. The Japanese electronics giant Fujitsu Ltd., licensed Mosaic from the University of Illinois, and in June 1994 announced a Japanese Mosaic priced at 5,000 Yen (about $50).

Amdahl planned to offer corporate customers everything they need to get on-line, in the form of a $2,500 package of hardware, software, and consulting services—and Mosaic. "We're hoping it's a $20 million to $60 million opportunity for us," said Joe Civello, marketing manager at Amdahl Corp.

There were also rumors that Microsoft was secretly licensing Mosaic to incorporate it into Windows. Microsoft said only that it was "considering" a Mosaic license.

Meanwhile, Clarke's team had just begun to assemble in California. "Basically we all sat in a room; this was in May, June, July of 1994," says Andreessen. "The company was between ten and twenty people then. I knew for a fact that we didn't want to use any of the code that we had written at the university. It wasn't going to stand up as commercial software. I knew that we had to completely re-write it. We had to do cross-platform support. We needed to make it a lot faster and add security."

Andreessen and Clark differed on how to market the software. Andreessen wanted to give away the software for free. Clarke thought he was crazy. "But we would give it away under specific terms, and to educational and for evaluation use," says Andreessen. He thought that companies who used it were going to pay for it, "because among other things they want to pay for it." Besides, his view was that the company would develop several products anyway, and they could make money off these. Clarke was not quite sure. Where would they make money if they gave away the browser? The $2 million he had invested would soon start burning away; already there was rent to pay on an office in Mountain View. A business model had to be developed.

Later, Clark would say, "Most of the world probably thinks I had some great master plan that, meticulously followed, created Netscape, changed the nature of business, and made a bunch of

us rich. After all, I was presumably a seasoned businessman. The temptation to claim a personal relationship with the muse of business is powerful. But there were other people there from the beginning, witnesses to those early days, so I have to confess that the company Marc and I agreed to form that morning at Café Verona had no name, no mission, no business plan, and definitely no business. In May of 1994, the *San Jose Mercury News* quoted Allan Schiffman, chief technical officer at Enterprise Integration technologies, where Marc had been working, saying that Andreessen was `eager to build upon his success with Mosaic.' If only it had been that clear."

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APPENDIX
A REVIEW OF WEB BROWSERS IN 1995

BROWSER SHOOTOUT

WE ROUND UP AND RATE EVERY MAJOR WEB SURF TOOL ON THE PLANET.

by Peter Kent

http://www.internetworld.com/print/monthly/1995/04/feat46.htm

There's a lot of confusion about the World-Wide Web. Those in the know talk about the Web as if everyone's been there, and certainly the amount of Web traffic is growing rapidly. But the fact is that relatively few Internet users have visited the Web, and fewer still have seen it through a graphical browser like Netscape or the granddaddy of them all, Mosaic.

If your only contact with the Web has been through the misinformed ramblings of the mainstream press, you may be under the impression that Mosaic is the Web--that the two are synonymous. Nothing could be further from the truth.

The World-Wide Web is a giant hypertext system overlaid on the Internet--it's a collection of documents with links interwoven among them. For example, a document on a computer in New York can contain a link to one in London, which might be linked to one in Vienna, which could be linked to one in Podunk, Ark.

How do you peruse these links? You need a browser--a program that lets you view Web documents and navigate through the Web's intricate link structure.

That's where Mosaic comes in. But Mosaic is over two years old--a lifetime on the Internet. Newer products that offer easier navigation, faster processing, and a host of other features have entered the market. Many are share- or freeware, and some come bundled in suites of applications like Spry's Internet in a Box. Many browsers come in Windows and Macintosh versions, while some are only available for one platform. And one works with DOS, believe it or not. You need a SLIP, PPP, or direct connection to use most graphical browsers, but the sidebar "The Non-SLIP Connection" offers suggestions for getting around this.

For this review, we rounded up 24 Web browsers. Most are available at the time of this writing, and a few will be shipping shortly. We've limited the review to the PC and Mac platforms because they are the most widely used. You will likely find, as we did, that no one browser does it all; each has its strengths and weaknesses.

Stand-Alone Browsers

These browsers come as single programs, rather than as part of other products or suites. Most are freeware, some are shareware, and a few are commercial products. They all work with TCP/IP connections, either with dial-up SLIP or PPP or through a direct line.

Air Mosaic (Windows)

Originally part of Spry's Internet in a Box and Air Series products, Air Mosaic is now available as a standalone application: Mosaic in a Box.

Air Mosaic is a commercial modification to NCSA Mosaic, and it's a genuine improvement. It has a much enhanced hotlist system, letting you create a hierarchical system of hotlists, folders, and bookmarks, and it comes with several hotlists already set up. You can also add hotlist items to a menu with just a click on a check box, which is easier than Mosaic's system. If you've been working with Mosaic, you can even import the menus you created as Air Mosaic hotlists.

The browser has a good history list, too, which shows URLs and document titles from previous sessions. General configuration also is easier in Air Mosaic than in NCSA Mosaic, with everything being done in dialog boxes. And Air Mosaic's kiosk mode is better: Press Ctrl-K to remove all controls, displaying the document full screen, and press it again to replace them.

One of the nicest features of Mosaic in a Box is its built-in dialer. You don't need to establish the SLIP or PPP connection first. This makes it perfect for people who are only interested in one aspect of the Internet: the Web.

Cello (Windows)

Cello is a Windows browser that was--for a short while at least--NCSA Mosaic's only real competition. That's not the case anymore, and the original Cello seems to have fallen behind, although that may be remedied by version 2.0.

Cello is easier to configure than Mosaic: There's no need to mess around with the Windows INI file; it's all done within the program. And Cello has some useful features that most other browsers don't possess. Most significant, perhaps, is the ability to save HTML documents with the tags removed. Most Windows browsers only let you save documents as HTML (Mac browsers are better in this respect). Cello also lets you save the URL from a link by clicking on it with the right mouse button--you'll see a dialog box showing the URL and can copy it to the Clipboard by clicking on a button. This is a handy feature, and one that other browsers such as InternetWorks have started to include.

Cello's look and feel is clunky, and it lacks in other areas as well. The URL isn't displayed in the status line when you point at a link, there's very little on the toolbar (only a Back, Stop, and Forward button), and it's hard to load a file from your hard disk (you have to load it as the home page). Cello is useful, however, for converting an HTML file to plain text.

The upgraded Cello 2.0 is on the way. There was no copy available for this review (we were able to get a look at the screen), but a beta version should be out soon. The program has been completely rewritten and its creator--Thomas R. Bruce at the Cornell Law School--promises a lot of new features. It will have a new non-clunky look and will let you open multiple windows (allowing you to display search results, for example, in a separate window).

Cello 2.0 will support more file formats so you won't need to configure various viewers (for GIF, JPEG, PCX, TIFF, and other formats). It will have a "trace window" that shows what's going on in the background and a right-mouse-click menu that works on links to gather information about the link or copy the linked item to a file. You'll also be able to cut and paste text and images from a document.

Expect to see improved bookmarks, easier program configuration, and an unusual table of contents feature that displays all the headers in the current document so you can jump to exactly what you need. You'll also be able to tell Cello 2.0 to get only the small inline graphics; most browsers let you turn graphics on or off-- there's no in between.

Web power users should be interested in a neat trick planned for saving HTML files. If a link in the document you are saving is a relative link, Cello will convert it to an absolute link so that the link will work correctly when you use the document on your system. The addition of OLE (Object Linking and Embedding) will give you the ability to paste active links into OLE clients. There are many other features planned, and if Cello hits the Net with all these new goodies it will become a real competitor again.

DOSLynx (DOS)

If you have a PC but aren't running Windows (believe it or not, there are such people), your only options are to run DOSLynx or use your service provider's Web browser (see "The Non-SLIP Connection"). DOSLynx is an easy-to-use, text-based browser from the University of Kansas, but there are no pretty pictures here.

You'll need DOS TCP/IP software to run the browser, which isn't that common (See the Browser Profile table). You can select links by double-clicking on them or by using the keyboard. You can also open multiple windows, so you're able to run multiple Web sessions at once, something only a few other browsers allow.

DOSLynx has all the usual browser features. You can define a home page, open an HTML document that's on your hard disk, print a document, and search the current document. Unlike most browsers, which automatically display the URL in some kind of status bar, DOSLynx uses a menu command. A surprising feature of DOSLynx is its ability to save rendered text, stripping out all the HTML tags so you are left with plain ASCII. Although this is not that difficult technically, most PC browsers can't do it.

DOSLynx doesn't have a history list, but it has a hotlist; your entries are placed into a special document that you can view by pressing F1. This provides a quick way to create your own home page, too. The easy-to-use DOSLynx can do most of what you need. However, few people have TCP/IP connections in DOS, and most users want the pictures and colors that graphical browsers display.

Enhanced NCSA Mosaic (Windows, Macintosh)

Enhanced NCSA Mosaic is a modified version of NCSA Mosaic, available for both the PC and Mac. However, Savoy, Ill.-based Spyglass has not made it available directly to the public. Rather, it's being sold to companies to be bundled with their computers or software; you might see it as Super Mosaic or Luckman Interactive's Enhanced Mosaic.

It certainly has been enhanced, at least in some ways. In others, the changes are dubious. Most of the toolbar buttons are gone, for one. And the file-download tool seems to have been hidden in this program; in NCSA Mosaic you select Options/Load to Disk and then click on the link connected to the file you want to download. With Enhanced NCSA Mosaic there's no command; you just have to remember to press Ctrl when you double-click the link.

The improvements are significant. The Windows version can save documents as text files, while NCSA Mosaic for Windows only lets you save HTML format. You can even save to the Clipboard. However, it's all or nothing. Unlike Netscape and Web Navigator, which let you save selected text, with Enhanced Mosaic you must save the entire document.

You can open multiple windows for multiple Web sessions, and it has a much simpler hotlist system--although you can't place hotlists onto the menu bar. You can't directly change all the browser fonts, either. You can select from several overall styles within the program, but if you want to change a single font you have to edit the SMOSAIC.INI file.

InternetWorks (Windows)

Simply put, InternnetWorks is a top-notch browser and one of the two best Windows browsers available. (Unfortunately there is no Mac version.) It's certainly better than Mosaic and perhaps even better than Netscape.

InternetWorks is not really part of a suite of software, although it comes with e-mail and newsgroup programs. BookLink, which makes InternetWorks, was recently acquired by America Online, and it's unclear how AOL plans to distribute the program.

What's so special about InternetWorks? First, it's very fast. You can begin reading the first part of a document while the program continues transferring the rest of the text along with any inline images in the background. You also can initiate multiple sessions. In fact, you can split the window into two panes, hold down the Ctrl key, and click on several links to grab multiple documents simultaneously.

There's also drag-and-drop OLE support. You can drag a document into Word for Windows and turn the word processor into a Web browser, for example. In addition, a Web-like hyperlinked e-mail message can also become a Web browser. You probably won't want to browse the Web from within Word or e-mail, but you could use OLE to store Web documents inside Word documents and launch InternetWorks from within Word.

InternetWorks has an unusual caching system that stores every document it can (as much as disk space and memory will allow). It makes the documents available through tabs at the bottom of a window and in its Card Catalog system. By splitting the display, you can view a current document as well as one you viewed half an hour ago.

Not only does InternetWorks provide a sort of history list, its Card Catalog is used to create hotlists. You can drag entries from the "history" Card Catalog onto another Card Catalog, then save the new one. In this way, you can create catalogs for different subjects--for music, politics, books, and the like. You can save any sessions' Card Catalog for future use.

Web documents can be saved as HTML (but not as plain text) as well as in a "hypermedia" format with graphics and all. Thus, you can save a document on your hard disk and view it in the future in all its graphical glory. Other neat tricks can be performed via a pop-up menu that lets you save a URL from a link, remove documents from cache, reload a document, and find information about a linked file. It has built-in viewing capability for a number of common file formats as well as a simple external-viewer configuration. An electronic copy of the New Riders' Official Internet Yellow Pages is also included.

MacWeb/WinWeb (Macintosh, Windows)

MacWeb and WinWeb are EINet's sister-product Web browsers. The Mac version is more mature and includes a few more features.

For a few months in the leapfrog world of Web browsers it looked like WinWeb was the browser to watch--it was easier to use and seemed more stable than Mosaic. That was before Netscape came on the scene.

14

Perhaps WinWeb's biggest improvement over Mosaic is that more of the configuration is done in a dialog box; Mosaic is still mired in lots of INI-file editing. WinWeb also has a progress display feature that shows how much longer it will take to get the rest of the document during transfers. Another plus is WinWeb's history list, which displays document titles instead of URLs, making it much easier to use than Mosaic.

However, in the last few months these features have become de rigueur for new browsers, and WinWeb is still missing a few things. There is no way to save an HTML file or even view the source; MacWeb, on the other hand, allows both.

WinWeb has no Forward button; and the Find command doesn't yet work. And unlike the browsers that have leapfrogged ahead (Netscape and InternetWorks), it uses the old form of document transfer--the "twiddle your thumbs until it arrives" form, rather than allowing you to view documents as they load. WinWeb requires that you set up viewers in the WINWEB.INI file, whereas the Mac version lets you do it from a dialog box, like most of the newer browsers. MacWeb's history list also appears in a submenu rather than in a dialog box like WinWeb.

NCSA Mosaic (Windows, Macintosh)

NCSA Mosaic was the first and is still the best known browser. Thus, it is often used as a benchmark against which to compare other browsers. While that's changing quickly, Mosaic still remains an important program. There are a number of versions available, including those for Macintosh, Microsoft Windows, and Unix X/Window systems. There are even versions for Amiga and VMS systems, although these are modifications of the code and not directly from the National Center for Supercomputer Applications.

You'll also find different versions available within platforms. There's the Windows "released" version (v1.0), a 16-bit alpha version (v2.0alpha2), and a 32-bit alpha version (v2.0alpha8). The most up-to-date is the 32-bit alpha version, but it's designed to run on Windows NT or Windows 95. If you have a 16-bit version of Windows you have to install Win32s before you can run 32-bit Mosaic (see the Browser Profile table). For the Mac world, there are two versions: one for any Macintosh running System 7 and another for the PowerBook.

Unfortunately Mosaic is showing its age. It's not old in human terms, but things move fast on the Internet--and on the Web in particular. The NCSA programmers did a great job, and their handiwork has found its way into the commercial world in the form of licensed versions of Mosaic (see Enhanced Mosaic, above). But big business has taken over, and the NCSA can't keep up. Many of the original Mosaic programmers have left to find places in the for-profit world, mainly at Netscape Communications Corp., where Netscape was born.

What's wrong with Mosaic? The original Windows version was hard to configure, although that's no longer completely true. Late in December 1994 NCSA released v2.0alpha8, which now lets you configure most options in a Preferences dialog box, rather than with the MOSAIC.INI file. But you still have to edit the INI file if you want to configure external viewers, so the job's not yet finished. The Mosaic developers also moved the Display Inline Images command from a menu into the dialog box--convenient for stopping and starting the automatic transfer of inline pictures.

The Mosaic history list leaves much to be desired: It displays URLs instead of document titles, which makes it hard to find a document to which you want to return. Mosaic has a flexible hotlist system that allows you to create your own menus of Web documents that you'd like to visit again and to add them to a list box accessed from the Open URL dialog box. But overall, this system is rather awkward to set up. Mosaic for Windows is slow.

It doesn't let you work with a document immediately; you have to wait until the entire thing has arrived--something many newer browsers (including its own Mac version) don't force you to put up with.

Mosaic does have two features that haven't caught on with most other browser developers: annotations and kiosk mode--a hidden feature. If you start the program with the -k parameter, it opens with many of the toolbar buttons and menu options removed. The first lets you add notes to documents you find on the Web. (You are actually adding the notes to a file on your hard disk, but whenever you return to the document you'll see a link to those notes.)

The Mac version of Mosaic is a little better than the Windows version. You can save documents as text--rather than HTML only--and configuration is easier. There are a lot more configuration options, too. The program can change the color of a link once you've used it and keep history lists for as long as you like. You can change the size of different types of text at once--a sort of "stylesheet" feature that now appears on some other browsers. And you can create superscript and subscript in different types of text.

The Mac Mosaic hotlist is both simpler to use and easier to configure than that of the Windows version. And the annotation system is better: You can add text notes as well as record your voice, in true Mac fashion, and attach it to an annotated document.

Overall, Mosaic is a nice browser, and the changes in the Windows version are a great improvement. But it is by no means the best of the bunch.

Netscape Navigator (Windows, Macintosh)

This browser originally was called Mosaic Netscape, from Mosaic Communications Inc. Now it's Netscape Navigator, from Netscape Communications Corp., nicknamed "Mozilla," the Mosaic killer. It was created by some of the original NCSA Mosaic programmers who joined James Clark (founder of Silicon Graphics) in a new commercial venture.

Netscape is shareware, with a $39 registration fee (it's free for academic and non-profit use). Whatever its name, it's a very good program and is one of the two best browsers currently available. It comes in Windows, Mac, and Unix flavors, and all three versions are virtually identical.

Netscape is much faster than Mosaic. It speeds up your work by letting you view part of the document while it transfers the rest, including the pictures (you can see them appear as they are retrieved). Virtually all configuration is done through dialog boxes; there's no more playing around in INI files.

Netscape also differentiates links that you've used: Once you've accessed a particular document, the link is shown in a different color that will remain for as long as you want--just set your preference. You can clear the marking at any time.

Another Netscape breakthrough, at least for Windows browsers, is that it lets you select and copy text from a document into the Clipboard--something only one other Windows browser (Web Navigator) can perform.

Netscape also has a New Window command that lets you run multiple Web sessions at once. An optional Directory Button bar offers buttons to go to Web pages at Netscape Communications including What's New, What's Cool, a Netscape FAQ document, and other useful things.

The latest version of Netscape (version 1.0) includes a security feature that most Web users won't employ right away, but it provides a glimpse of things to come. It enables Netscape to display encrypted documents sent by a secure Web server (an https:// server) and to send data back to the server in encrypted form for secure transmission of credit cards.

Right now there are few https:// servers on the Net other than Netscape Communications' own, but this is likely to change as more transactions begin to be conducted via the World-WideWeb. All in all, Netscape is a top-of-the-line browser.

Samba (Macintosh)

Samba is a simple, text-only Macintosh browser from CERN, the European physics laboratory where the World-Wide Web was born. However, development of Samba stopped late in 1993, and although you can still get the program, don't expect updates.

Samba has most of the basics, but no history list and nothing fancy. There is one unusual feature, however--something I haven't seen in any other browser. It's a Trace command that lets you watch as the program "renders" the document--converting the original HTML source document to the text you see on your screen. Although this is an interesting operation, for most users it won't be worth the bother of finding and installing the program.

Samba also lets you run multiple sessions, save documents as plain text, save them in "Samba" format (although I never could figure out how to use these files), and copy to the Clipboard.

WebWorks Mosaic (Windows)

WebWorks Mosaic, once part of Quadralay Corp.'s WebWorks suite (formerly GWHIS), is one of a group of programs aimed at companies that want to create online documentation systems. There's not much to say about the browser, though. It's way behind others, being based on the Mosaic 1.0 set of features although, for some reason, that didn't stop Quadralay from giving it a $249 price tag.

Available for Windows, a Mac version is expected soon. Nonetheless, if you run into this browser, don't bother using it. Rather, download Netscape or InternetWorks instead.

Suite Deals

These browsers come as part of a suite of Internet tools, as opposed to the stand-alone products.

Also unlike the stand-alones, these are all commercial packages costing, in some cases, over $100. Some of the products, however, like the Windows-based Air Mosaic (Internet in a Box/Air Series) described above, are available by themselves.

TCP/Connect II (Macintosh)

We weren't able to obtain a copy of InterCon Systems' new Macintosh Web browser in time for review, but according to a spokesperson for the company, the browser (which doesn't have a separate name) supports a

hotlist, can import Mosaic and Netscape hotlists, and can save but not view a Web page's HTML source. Users can try the software for 30 days; it is now available at InterCon's FTP site (see Browser Profiles).

Web Navigator (Windows)

Web Navigator, part of California Software's InterAp suite, is actually a commercial version of Cello 1.0 but with a face-lift. There are many similarities in the way it works. If you've used Cello 1.0, you'll be right at home with Web Navigator. Its different look is probably evidence that the California software programmers didn't like Cello's clunky interface, either.

Like its sibling, Web Navigator lets you save documents as text and copy selected text directly to the Clipboard from the browser window. It also makes opening files on your hard disk much easier. (Cello lets you copy to the Clipboard, but you have to use the Edit/View source command first.) Web Navigator sports two history lists, one each for the current and previous session. Unfortunately, it takes a double-click to operate a link.

InterAp has added two features to Web Navigator that it believes will make the overall package worthwhile. There's NetScript Manager, which lets you write Internet macros to automatically retrieve information at preset times. And the program has OLE functions, which let you drag Web documents onto OLE client applications such as Word for Windows much the way InterNetworks does. However, neither of these features were working in the beta version we reviewed.

OS/2 Warp: WebExplorer (OS/2)

WebExplorer is an excellent browser. Its only problem is that it just runs under Warp--OS/2 version 3. If you're a dedicated OS/2 user, you'll want to use this browser. If you're not running OS/2, you probably won't want to convert operating systems just to get a set of Internet tools, however good they may be. WebExplorer's history list, Web Map, is great. You don't just get a list of document titles, rather you see a Web document showing (via indented folder icons) the path you took to get to each visited document. It really is a map rather than just a list.

The browser also shows you which links you've accessed. If you return to a document visited earlier, not only will the links you selected at that time have changed color, but the document will also have changed, showing the path you took from that document by inserting links from the other documents below the first link.

There's an excellent kiosk mode, too (although it's called Presentation mode). Press Ctrl-P and all the controls are removed, displaying the Web document full screen. All in all, a great browser. Now, when will IBM release a Windows version?

Internet Chameleon: WebSurfer (Windows)

WebSurfer is a recent addition to NetManage's well-known Internet Chameleon package. The browser is quite reasonable, although it will be better when NetManage fixes a couple of bugs.

You can't save Web documents as text files, although you can save them in HTML format; you'll have to use the Edit HTML command to load the document into Notepad first. But the program doesn't properly convert the Unix documents found on the Web into DOS documents (the line break character is not properly converted).

You can fix this--and avoid problems with Notepad's 60-K document-size limit--by changing the Preferences to use a word processor such as Windows Write in place of Notepad. Write is able to open the document and save it with the correct line breaks. WebSurfer also doesn't display some graphics correctly. Simple inline images that appear correctly in other browsers appear murky and dithered in WebSurfer.

It does have some nice features, however. Like InternetWorks and SlipKnot (see "The Non-SLIP Connection"), WebSurfer can save hypermedia documents via an option called Save Cached Documents Between Sessions. You are saving the entire document, including the inline images and not just the basic HTML text. That means that if you return to a document in a later session, it will be pulled from your hard disk, not from the Web itself.

There's also an excellent document-style configuration system that lets you change attributes such as document color, margins, line spacing, text sizes, fonts, colors, indents, and so on. The main drawback here is that you can only modify nine types of text, and as any HTML author knows, there are a lot more.

The Log system is interesting, too, letting you watch the commands run between your browser and the Web server--an interesting and handy way to get an idea of what's going on, and handier still if you actually speak HTTP (Hypertext Transfer Protocol). The browser also is fast, displaying part of the document immediately and filling the rest, including the pictures, while you read.

SuperHighway Access: WinTapestry (Windows)

WinTapestry is an unusual combination application in Frontier Technologies' SuperHighway Access and SuperTCP Pro products. The program aims to organize your work around your interests rather than various tools. To do so, it brings together Web sites, Gopher menus, telnet and FTP sites, and so on in a sort of card file.

You can organize this card file into various categories--sports, music, art, television, for example--and put all sorts of Internet resources into each file. If you click on one of the entries marked with a Web icon, the Web browser window opens. It's a simple browser, with minimal configuration options.

There's no history list, although you can add bookmarks to a card file of your choice by using a menu command or by dragging a link to a card file to use that as a bookmark. The interesting thing about WinTapestry is how it integrates Web sites with all other Internet resources.

Proprietary Browsers

Several large Internet access providers supply their own software to users, which can only be used with the provider's system. For users who don't want the hassle of manually configuring a SLIP or PPP connection, such software can make life easier.

Delphi: InterNav (Windows)

Phoenix Technologies Ltd.'s InterNav is a Windows front end for the Delphi online service. (The name on the box is Internet Express, although the program is InterNav.) While a Windows program, InterNav doesn't

provide a true Internet graphical user interface. It's simply a serial communications program that offers a few tools to help you use Delphi's dial-in terminal connection. Once connected, you are working with the same menus and command lines you'd see if you dialed in with a basic terminal communications program.

There's a text-based Web browser at the Delphi site--and quite a good one. InterNav helps a bit by letting you double-click on a word to transmit that word as a command. If you use the line-mode browser (see "The Non-SLIP Connection"), for instance, you can double-click on a link number instead of typing the number and pressing Enter. But this doesn't always work correctly, and is not like working with most of the other Web browsers here.

InterNav is good at what it does--providing a front end to a text-based terminal connection--but it's not a huge step forward in the graphical user interface world.

The Pipeline: Internaut (Windows)

Internaut is the World-Wide Web-browsing component of Pipeline's tightly integrated suite of Internet programs. The software works with the Pipeline Network, a service provider in New York City, or with any provider that has licensed the system from Pipeline, such as California's Hooked. There are Windows and Mac versions of the Pipeline software, but at the time of this review, the Mac version didn't yet offer Internaut.

The Windows Web browser is simple but quite capable. Its strength is in the way it links to other parts of the interface. If you see a Web URL in an e-mail or newsgroup message, for example, you can highlight it and press Ctrl-W to launch the browser; click on a Web link to an FTP or telnet site, and Internaut opens the appropriate window. There's also a system-wide Bookmark system in which bookmarks are stored for FTP and telnet sites, Gopher menus, and Web sites.

The browser is relatively quick, although not as fast as Netscape or InternetWorks. Like those two browsers, it displays part of a document while downloading the remainder. You can run multiple Web sessions, each in a separate window. There's a history list, but because it's at the bottom of the File menu, there's a limit to how many documents can be added. You can view the source document and save it, and you can copy a document's URL directly to the Clipboard. There's also a simple way to modify the way text appears on your screen by changing the "base font."

You won't want to get Pipeline just for its Web browser: Its strength is in its overall suite of tools. Its tight integration lets you cruise the Internet and jump from tool to tool quickly and easily.

Netcom: NetCruiser (Windows)

NetCruiser is Netcom's suite of Internet tools. The Web browser is easy to use and, in some ways, too simple. It probably has enough features to keep most casual users happy, but don't expect anything fancy. The overall NetCruiser suite is a breeze to work with, although it doesn't have the sort of system integration you'll find with Pipeline's. And Netcom has gained a reputation for being difficult to contact--either to connect to the system or to reach technical support.

NetCruiser's browser has a simple bookmark and history system and two built-in viewers that display text and graphics. You can save a document you are viewing in HTML format, but you can't print it. You can, however, run multiple Web sessions. The browser is easy to use and reasonably quick, although it doesn't use the special techniques employed by new browsers such as Netscape and InternetWorks to speed up Web work. It transfers all the document before displaying any of it.

Up And Coming

As is the norm with software of any sort, new products are always around the corner. Several Web browsers are scheduled for release in the coming months.

Microsoft Word will soon release a free Word for Windows accessory, Word Viewer, that turns Word into a Web browser. The core code is based on the InternetWorks browser, although that won't be apparent to the user. Unfortunately, at the time of this writing, there was no beta version available. It should be out soon.

Quarterdeck, the company that brought you the QEMM memory manager, will soon release a Web browser, code-named Normandy. Its HTML-editing tool is already being beta tested.

Peter's Picks

So which browser is best? I choose InternetWorks. I like its look and feel, it's fast, it has loads of useful features, and it does almost everything I want. Certainly it could do with improvements, such as a quicker way to add URLs to its hotlist--Card Catalog--system. But overall, it takes the prize.

On the other hand, I'm very impressed with the most recent release of Netscape. Browsers seem to leapfrog one another, with each leap taking only a few weeks. Right now InternetWorks and Netscape are the best. By the summer, who knows?

I've also used Web Navigator and Cello when searching for a document I want to save as text, though now I can copy to the Clipboard from Netscape. I'll even use my service provider's Lynx program if I want to get something done really quickly and don't require pictures.

So, here's the bottom line: If you have a Windows machine, get InternetWorks and Netscape and try them both. The new version of Cello sounds intriguing, too, and you might want to try it when it comes out. If you have a Mac, get Netscape. And don't assume that the commercial browsers are better just because they cost money.

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- [For a list of Browser Profiles, click here](#)
- [For a list of Selected Web Services Companies, click here](#)

The Non-SLIP Connection

If you don't want or can't get a SLIP connection, there are some workaround solutions that will allow you to cruise the Web with a graphical browser.

SlipKnot

Designed for Windows users without SLIP or PPP connections, SlipKnot is a new and unusual browser: It's designed for a dial-in connection to a shell account. That's great news for people who access the Internet via systems that simply can't or won't provide a TCP/IP link, such as Freenets and many colleges.

Perhaps not surprisingly, SlipKnot is slower than a browser running on a TCP/IP connection, but it's a very good product nonetheless. The software includes its own terminal program to let you dial your service provider. Once you connect, you click on a button and SlipKnot launches your service provider's copy of Lynx, a text-based browser (see below). Although Lynx can't display images, SlipKnot can.

Don't get the idea that SlipKnot is a toy. It has many features available in the better-known TCP/IP browsers as well as features those browsers should have. For example, you can save complete Web documents-- graphics included. (InternetWorks and WebSurfer are the only other browsers that do this).

SlipKnot uses this feature to speed up sessions: When you click on a link, the program checks to see if you already have the document on your hard disk. It has a good Bookmark (hotlist) system that lets you categorize your favorite sites in different folders and a history list that can display a list of documents that you viewed in a previous session. Links can be taken from the history list and placed in a bookmark folder.

SlipKnot is a sophisticated browser and a real boon to dial-in Internet users who have been feeling left out of the Web brouhaha.

The Internet Adapter

If you don't have a TCP/IP connection to the Internet but still want to try out all the neat TCP/IP browsers, there's hope. Consider using TIA, The Internet Adapter from InterMind Corp. and Cyberspace Development Corp. TIA fools your software into thinking it's running on a TCP/IP connection, even though it's really a simple serial connection.

Because TIA is a Unix program, you need to install it in your directory on your provider's system-- something that your provider might not permit. And even if it does allow this, setting up TIA is not simple and will take a little time and effort. Nevertheless, it will likely be worth it, especially if you're charged a premium for SLIP access.

Line Mode

If you don't want to install your own browser, there are other ways to get to the Web, albeit without the graphics. First, there's the Web's original line-mode browser. You can usually start this from your provider's Unix prompt by entering www; links in a document will appear as bracketed numbers (as in "To find out more, click here [17].").

Then, rather than click on a link, you enter its number on the command line. If your provider doesn't offer the line mode browser, you can try it by telnetting to nxoc01.cern.ch. Only use this if you can't get Lynx, which is far superior.

Lynx

Available for virtually all Internet host computers, Lynx is an excellent text-based browser. You start it by entering lynx at a command prompt or by selecting it from your service provider's menu.

The Web via E-mail

Finally, there's the poor man's Web, which is grabbing Web documents through e-mail. This reminds me of an old TV game show in which a player is blindfolded and given a crossbow, then tries to hit a target by

following a partner's instructions. It can be done, but it's frustrating. If you want more information, send e-mail to listserv@info.cern.ch with www in the message body, or send e-mail to webmail@www.ucc.ie with help in the body of the message.

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http://www.internet.com