UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

SANDPIPER CDN, LLC.,
Patent Owner.

Case IPR2025-00969
Patent No. 8,478,903

DECLARATION OF LAUREN GLUCKMAN REGARDING EXHIBIT 1006 ("*VETTER*")

I, Lauren Gluckman, state and declare as follows:

I. Introduction

1. I have prepared this Declaration in connection with a Petition for *Inter Partes* Review of U.S. Patent No. 8,478,903 which I understand will be filed concurrently with this Declaration.

2. I am currently a Senior Research Analyst at Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, 901 New York Avenue, NW, Washington, DC 20001-4413.

3. I am over eighteen years of age and am competent to make this Declaration. I make this Declaration based on my own personal knowledge and based on my knowledge of library science practices.

4. I earned a Master of Science in Library Science ("MLS") from Rutgers University in 1993, and a Bachelor of Arts in Political Science from Rutgers University in 1991. I have worked as a librarian for over thirty years. I have been employed at Finnegan, Henderson, Farabow, Garrett & Dunner, LLP since August 2021. My previous position, from 2006-2021, was as the Head of Collection Management and Reference Librarian at the Montague Law Library at Penn State Law of the Pennsylvania State University. From 2002-2006, I was employed as a Reference Librarian at Sutherland Asbill & Brennan. I was employed as a Senior Reference Librarian at the United States Senate Library from

1996-2002 and from 1993-1995 I was an Assistant Librarian at Debevoise & Plimpton.

5. I am a member of the American Association of Law Libraries.

II. Standard Library Practice for Receiving, Cataloging, and Making Materials, including Serial and Monograph Publications, Publicly Available

6. I have knowledge of and experience with standard library practices regarding the receipt, cataloging, shelving, and making materials, including serial and monograph publications, available to the public. I have knowledge of and experience with the Machine-Readable Cataloging (MARC) system, an industry-wide standard that libraries use to catalog materials. I also have knowledge of and experience with OCLC (previously called Online Computer Library Center, Inc.) and OCLC Control Numbers, which are unique accession numbers assigned by the OCLC system when a bibliographic record is catalogued and made available to the public through WorldCat. OCLC control numbers are often used by the public to search for specific records within WorldCat, which is an online database of 586,648,074 bibliographic records from libraries throughout the world as of December 2024 (Source: https://www.oclc.org/en/worldcat/inside-worldcat.html).

7. Based on standard library practice, when a library receives a print item, the cataloguer or cataloguer's assistant will examine the item and date-stamp and/or affix a label to the item with the library name and/or barcode with the date it

was received. Next, the library will catalog the item within a few days of receiving it. As a general practice, cataloguing is centralized and performed by a cataloguing department within a library or university setting.

8. Normally, after an item is cataloged, the public may access the item by searching a library online catalog, browsing the physical library shelves, searching a physical card catalog, or by seeking assistance from a Librarian to identify the item. Standard library practice is to make an item available to the public within several days of cataloging. If an item requires original cataloguing, the item will be made available to the public up to and including one week from the date of receipt.

III. Serial Publications

9. A serial publication, often known as a "journal" or "periodical," is a resource that is issued in successive parts and has no predetermined conclusion. These successive parts are commonly referred to as "issues," and each issue is usually chronologically numbered and dated. The presence of enumeration, years of coverage, and/or other chronological information also indicates a serial publication.

10. There are significant differences between cataloging finite resources (books/monographs) and continuing resources (serials). For serials, the catalog record provides information about the serial as a whole, including the first or

earliest available issue. It also provides information as to holdings – the volumes and issues, with dates, received by the library and made available to the public. In serials cataloging, there are identifying characteristics unique to serials that are slightly different from monographs (books). The issue date for a print serial publication, for example, generally appears on the cover (front or back), the masthead page, the title page (if any), the table of contents page(s), or on the pages of the individual articles contained in the issue. The initial periodicals cataloging record will sometimes not reflect all subsequent changes in publication details (including minor variations in title, etc.). More information regarding the unique aspects of cataloguing serials can be found at this link: https://www.loc.gov/aba/pcc/conser/scctppt/Basic-2014/Basic-Trainee-Mannual.pdf.

IV. Ownership and Date-Stamp

11. Libraries have different policies on whether to date-stamp received publications. It is becoming increasingly common for libraries to no longer date-stamp the publications they receive. In the past, it was common practice to affix an ownership and date stamp somewhere within the publication, usually on the cover page, verso of the cover page, or a designated page within the publication. The timing of when an ownership/date stamp is entered on the monograph or periodical can vary from one library to another. It could occur when the item is received in

acquisitions after shipment to the library, or at the time of cataloging. Therefore, it is possible for there to be instances when the date of receipt precedes the cataloging date or vice versa.

V. MARC Records

12. The MARC system was developed during the 1960s to standardize bibliographic catalog records so they could be read by computers and shared among libraries. By the mid-1970s, MARC had become the international standard for cataloging bibliographic materials and is still used today. Many libraries provide public access to their MARC records via their electronic cataloging systems at the library. In a MARC record, each field provides specific information about the cataloged item, including how materials are held and when they were made available to the public.

13. The MARC record system uses specific three-digit numeric codes ("field tags") (from 001-999) to identify each field in a catalog record. For example, field tag 008 provides the six-digit date an item was catalogued (Date entered on file). The first six characters of field tag 008 are always in the "YYMMDD" format. Descriptions and definitions of all the character positions of field tag 008 are outlined here: https://www.loc.gov/marc/bibliographic/bd008a.html.

14. As is relevant to this Declaration, MARC field tag 022 provides the International Standard Serial Number (ISSN), a unique identification number assigned to a serial publication. MARC field tag 245 sets forth the Title and statement of responsibility for the work. MARC field tag 260 sets forth information relating to the place of publication, printing, distribution, and copyright date. MARC field tag 949 sets forth notes regarding the local holding information.

VI. Public Availability of *Vetter*

15. This Declaration relates to the date of receipt, accessibility, and public availability of the following reference: R. J. Vetter, C. Spell and C. Ward, "Mosaic and the World Wide Web," in Computer, vol. 27, no. 10, pp. 49-57, Oct. 1994. I understand the *Vetter* reference is being submitted as Exhibit 1006.

16. As detailed below, I have reviewed the print reference of **Computer** containing *Vetter* which was retained by Wisconsin TechSearch (WTS) from the supplier BEA DOX obtained at the Library of Congress on April 24, 2025, to determine the date of public accessibility and availability for this reference.

17. **Appendix 1** to this Declaration is a true and accurate copy of the cover page, table of contents and the reference for the print version of R. J. Vetter, C. Spell and C. Ward, "Mosaic and the World Wide Web," in Computer, vol. 27,

no. 10, pp. 49-57, Oct. 1994. **Appendix 1** also sets forth the reference was received by the Library of Congress on OCT 12 1994, as indicated with a date stamp.

18. **Appendix 2** to this Declaration is a true and accurate copy of the Library of Congress public catalog record for its copy of *Computer* containing *Vetter* which was downloaded from https://catalog.loc.gov/vwebv/search?searchArg1=0018-9162&argType1=all&searchCode1=KNUM&searchType=2&combine2=and&searchArg2=&arg%E2%80%A6 on April 25, 2025.

19. The Library of Congress public catalog record, **Appendix 2** sets forth the publication, contents, and holdings information for its copy of *Computer* containing *Vetter*. **Appendix 2** also denotes *Computer* containing *Vetter* is located at call number TK7885.A1 I5 and may be requested in the Jefferson or Adams Building Reading Rooms.

20. **Appendix 3** contains the MARC record for its holdings of *Computer* containing *Vetter.* **Appendix 3** was downloaded from https://catalog.loc.gov/vwebv/staffView?searchId=10818&recPointer=0&recCount=25&searchType=2&bibId=11183610 on April 25, 2025. **Appendix 3** confirms the fixed data elements of MARC field tag 008 as 751023c19709999caumr p 0 a0eng. As discussed above, the first six characters "751023" are in typical "YYMMDD" format and indicate, *Computer* was cataloged by the Library of Congress on

October 23, 1975. The "c" refers to the publication as a continuing resource currently published since 1970.

21. **MARC** field tag 022 sets forth the unique ISSN as 0018-9162. MARC field tag 245 sets forth the title of the publication as Computer. MARC field tag 260 sets forth information relating to the place of publication and distribution for Computer as |**a** [Long Beach, Calif., etc.] |**b** IEEE Computer Society.

22. Based on the information in **Appendices 2** and **3** attached to this Declaration, standard library practices, and my experience as a librarian, *Computer* containing *Vetter* was received by the Library of Congress OCT 12 1994 as set forth in the date stamp.

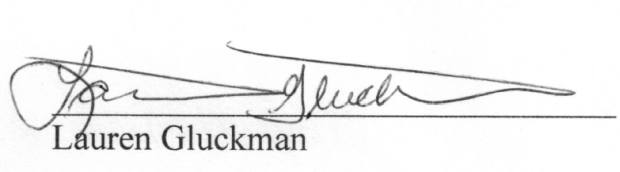
23. Accordingly, based on the information set forth in **Appendices 2** and **3** attached to this Declaration, standard library practices and my experience as a librarian, *Computer* containing *Vetter*, would have been made available to the public within a few days of being checked-in and cataloged on OCT 12 1994. The interested public could have been able to access *Computer* containing *Vetter* by searching the Library of Congress public catalog, visiting the Library and requesting the volume within a few days of OCT 12 1994.

VII. Conclusion

24. In signing this Declaration, I understand it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I understand I may be subject to cross-examination in this case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

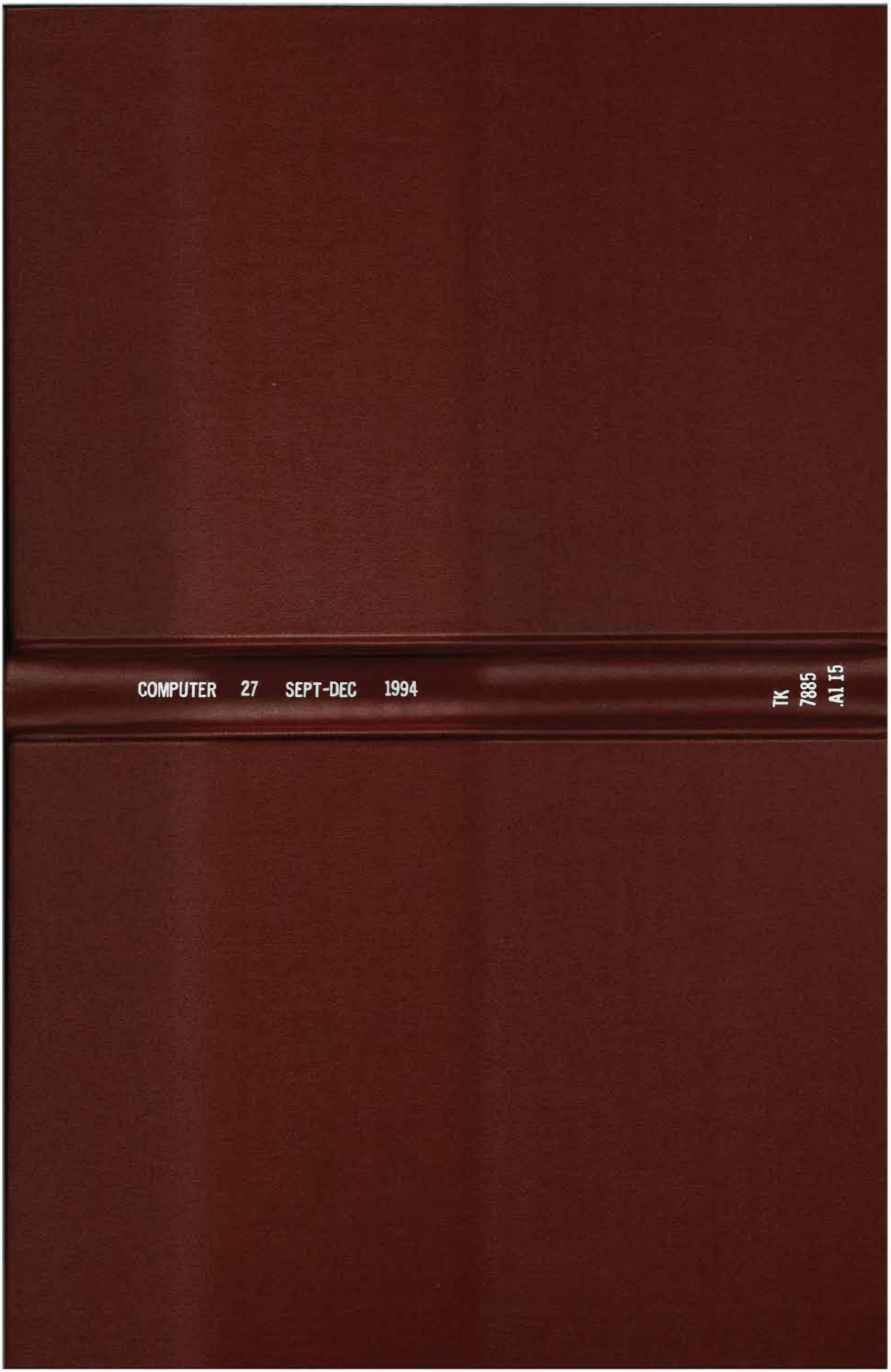
25. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed on May 7, 2025 in State College, Pennsylvania.



Lauren Gluckman

APPENDIX 1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OCTOBER 1994

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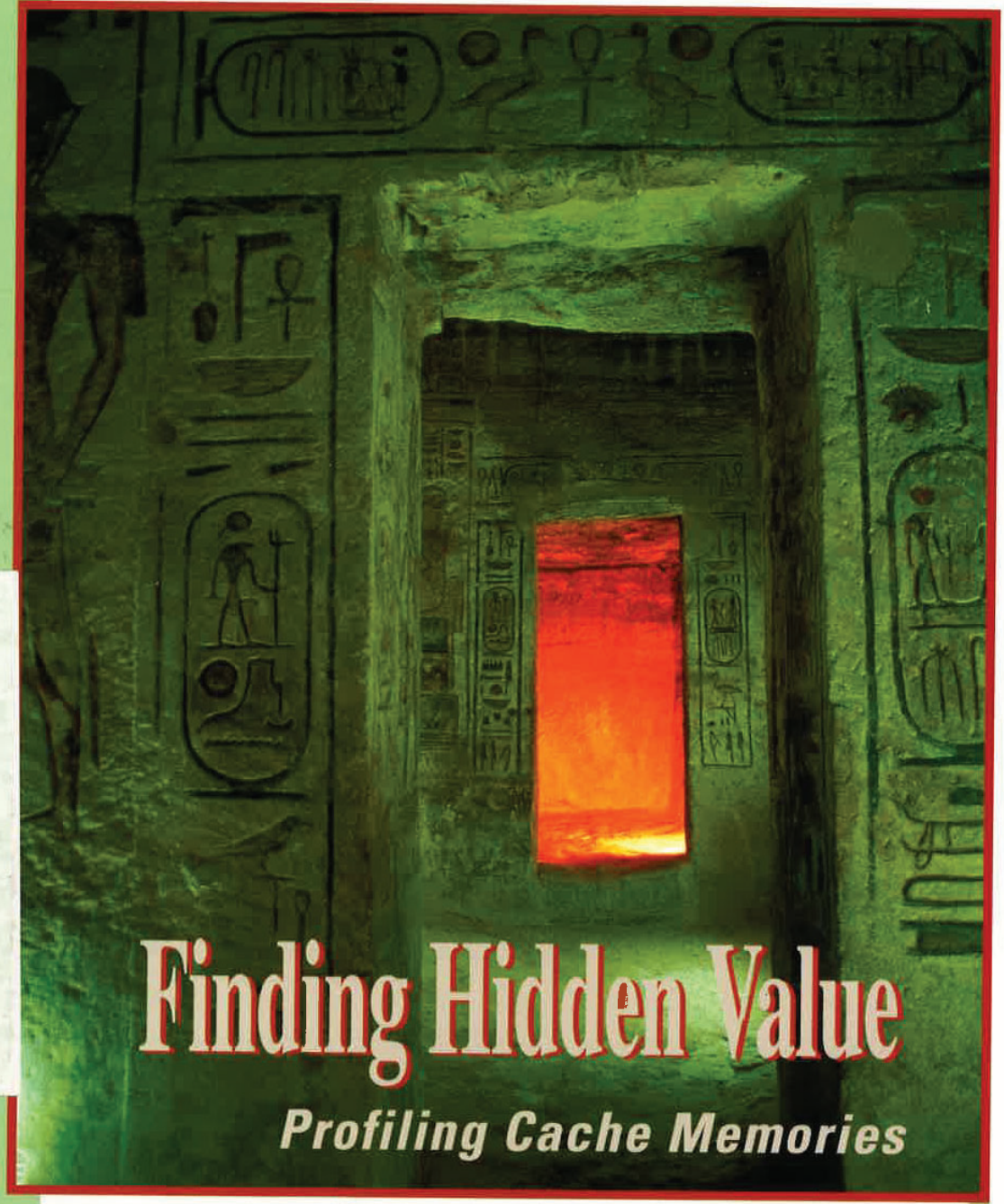

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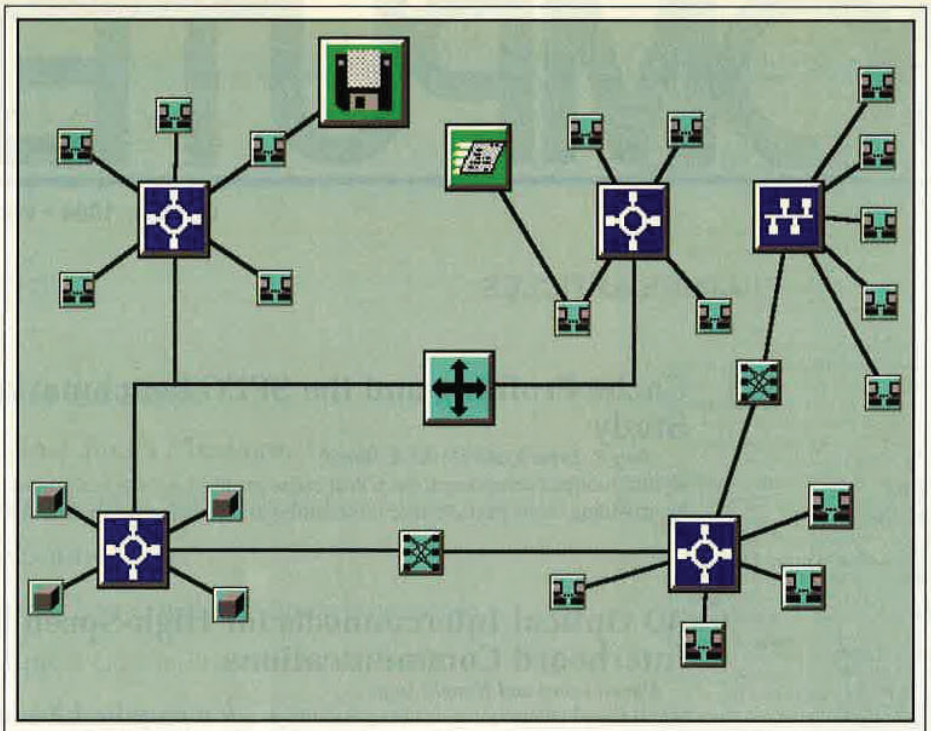

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FEATURE ARTICLES

COMPUTING PRACTICES

COMPUTING MILIEUX

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DEPARTMENTS

In the next issue: Associative processing and processors

On CS On-Line: See p. 93 for a list of items now available on the Computer Society's infoserver.

Cover image: The tomb of Ramses II; Stock Imagery © 1993, G. Adams
Cover design: Chris Patterson

Back in the late 1970s, I was predicting that a more user-friendly operating system would quickly supplant Unix. But I hadn't reckoned on MIT's X Windows. More recently, I suggested that the Internet was passé, soon to be overshadowed by advances in multimedia office environments. Oops, wrong again. Mosaic is to Internet what X Windows was to Unix.

Our first article, "Mosaic, HTML, and the World-Wide Web," by Ronald Vetter, Chris Spell, and Charles Ward, provides an introduction to the Mosaic browser, a GUI for this net-based hypertext system. If you're a net user not (yet) familiar with Mosaic, this article will get you started. If you're already a Mosaic user, you'll still appreciate this overview.

Our second article effectively embodies the original intent of this column. Months ago we ran an article describing an Ada tool for analyzing system dependencies. Joseph Skazinski wrote me to say that while he found the article interesting, it didn't fully describe the difficulties of porting Ada. I asked for examples, and he sent a short draft detailing his experiences. After some editorial give and take, I'm pleased to present his "Porting Ada: A Report From the Field." It's a nuts-and-bolts article about porting a large military application across several platforms. Even if you're not working in Ada, I think you'll find some of Joseph's suggestions useful.

Oh, and thanks to all of you who have written to me about the last two issues. Your feedback will ensure that Computing Practices stays in touch with the working engineer. As usual, feel free to contact me about what you liked and didn't like here in Practices.

— Paul Oman

Mosaic and the World-Wide Web

Ronald J. Vetter
North Dakota State University

Chris Spell and Charles Ward
University of North Carolina at Wilmington

The World-Wide Web, one of the newest information services on the Internet, uses hypertext links to other textual documents or files.[1] With this method, users can click on a highlighted word or words in the text to provide additional information about the selected word(s). Users can also access graphic pictures, images, audio clips, or even full-motion video through hypermedia, an extension of hypertext.

The World-Wide Web project was started by CERN (European Center for Nuclear Research) in an attempt to build a distributed hypermedia system.[2] Users access WWW through a "browser program" that can read and fetch documents locally as well as from sites around the world via the Internet. Browsers access files using FTP, NNTP, Gopher, and several other Internet-based protocols (see the glossary of terms). Browser clients can also search remote documents and databases if the associated server at that site has built-in search capabilities.

Browsers can be line-oriented (to work with traditional terminals) or graphics-oriented (to work with more modern graphics display terminals). One of the most popular graphics-oriented browsers is Mosaic, which was developed at the National Center for Supercomputing Applications (NCSA) as a way to graphically navigate the WWW. The first version of NCSA's Web browser, a WWW client for Unix with X Windows called XMosaic, was made available to the Internet community in 1993. Due primarily to its easy-to-use graphical user interface (GUI), XMosaic soon became the most popular interface to the Web.[3]

Mosaic is a system for wide-area distributed asynchronous collaboration and hypermedia-based information discovery and retrieval. Mosaic browsers are currently available for Unix workstations running X Windows, PCs running Microsoft Windows, and Macintosh computers. Mosaic can access data in WWW servers, Wide Area Information Servers (WAIS), Gopher servers, Archie servers, and several others. Figure 1 shows an example Mosaic screen (the home page) from the University of North Carolina at Wilmington.

Many commercial and government organizations and universities are migrating to Mosaic because of its many useful features and capabilities.[2,3] It has a consistent mouse-driven graphical interface and can display electronic data in a variety of fonts and styles. Mosaic reads SGML (Standard Generalized Markup Language) and

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Glossary of terms

Archie — A system that allows searching of indexes of files available on public servers by anonymous FTP on the Internet.

CERN —European Center for Nuclear Research.

FTP — File Transfer Protocol.

GIF — Graphics Interchange Format.

Gopher — A distributed information service that makes available hierarchical collections of information across the Internet. Both the server and client software are available as public domain software from the University of Minnesota.

HTML — HyperText Markup Language.

HTML+ —HTML extension that supports new features.

HTTP — HyperText Transfer Protocol, the native WWW protocol.

ISO — International Standards Organization.

Mosaic — A system for wide-area distributed asynchronous collaboration and hypermedia-based information discovery and retrieval. Mosaic browsers are high-level graphical user interfaces (GUIs) currently available for Unix workstations running X Windows, PCs running Microsoft Windows, and the Apple Macintosh.

NCSA — National Center for Supercomputer Applications.

NNTP — Network News Transfer Protocol.

PPP — Point-to-Point Protocol, which allows a computer to use the TCP/IP protocols with a standard telephone line and a high-speed modem. PPP is replacing SLIP (see below) as a standard.

SGML — Standard Generalized Markup Language.

SLIP — Serial Line Internet Protocol, which allows a computer to use TCP/IP (Internet) protocols with a standard telephone line and a high-speed modem.

TCP/IP — Transmission Control Protocol/Internet Protocol.

Telnet — Lets users connect to any remote system on which the user has an account.

URL — Uniform Resource Locator.

HTML (HyperText Markup Language) text, enabling information to be presented in an attractive way. Mosaic also supports a wide variety of basic forms elements, such as fields, check boxes, and radio buttons, as well as characters from different languages (as defined by the ISO 8859 standard), including French, German, and Hawaiian. Finally, Mosaic supports graphics of up to 256 colors (in GIF or X bitmap format) as well as digital audio and video.

Users can extend Mosaic's functionality by creating custom servers and by letting other applications control its display remotely. Screen contents can be broadcast to a network of users running multiplatform groupware, such as NCSA's Collage, using NCSA's Data Transfer Mechanism (DTM). Mosaic users can traverse hypermedia links to provide basic network services (for example, FTP, Gopher, Telnet, NNTP, and WAIS) and store those links in "hotlists" for quick reference. And with the additional features available in HTML+, Mosaic users can "check out" Web documents for revision or for local or remote annotation.

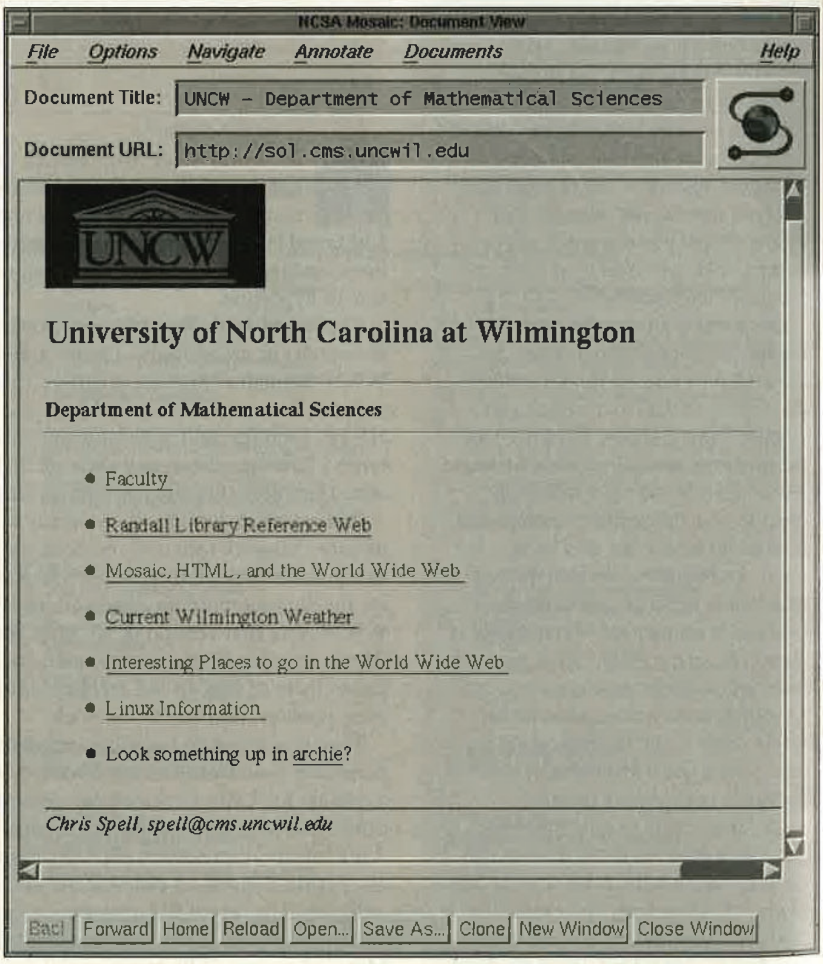

Figure 1. Sample Mosaic screen for the home page of the University of North Carolina at Wilmington.

HTML and HTML+

The Web uses HTML for creating and recognizing hypermedia documents.[3] This is a simple markup system, related

to the Standard Generalized Markup Language (SGML), used to format hypertext documents. (On the Web, these documents usually carry the ".html" suffix.) HTML code describes how textual elements (like paragraphs, lists, numbered and bulleted lists, descriptive lists, and quoted paragraphs) will be displayed. The current HTML standard supports basic hypermedia document creation and layout, but this capability is still very limited. The HTML+ extension supports interactive forms, defined "hotspots" (hyperlinks) in images, formatted tables, and more versatile document layout, formatting options, and styles.

Writing HTML documents. Most HTML documents are written using a standard text editor — for example, *vi* in a Unix environment — in a plain text format. Although HTML code is a tedious language to write, some authoring tools can now convert plain text to HTML automatically.

One way to learn how to write HTML documents is to look at how others have created their documents. You can do this by using the "source" button (available on most Mosaic browsers) to view the HTML code for a document or page you find particularly interesting. Most HTML statements are fairly straightforward. For example, Figure 2 shows the HTML code for the Mosaic screen image depicted in Figure 1. The code corresponds closely to the final graphic document. If you intend to write HTML code, we recommend that you read the on-line Mosaic document "A beginner's guide to HTML," which is available on the Web (see sidebar on HTML editors and converters).

```
<TITLE>UNCW - Department of Mathematical Sciences</TITLE>
<img src="/icons/uncwlogo_half.gif">
<H1>
University of North Carolina at Wilmington
</H1>

<hr> <b>
Department of Mathematical Sciences</b>
<hr> <ul>

<p> <li>
<a href="faculty.html">
Faculty
</a>

<p> <li>
<a href="/randall/ref.html">
Randall Library Reference Web
</a>

<p> <li>
<a href="mosaicpaper.html">
Mosaic, HTML, and the World Wide Web
</a>

<p> <li>
<a href="ncweather.html">
Current Wilmington Weather
</a>

<p> <li>
<a href="OtherLinks.html">
Interesting Places to go in the World Wide Web
</a>

<p> <li>
<a href="/linux/linux.html"> Linux Information
</a>

<p> <li>
Look something up in <A HREF="/cgi-bin/archie">archie</A>? <P>
<p> <li> <p> </ul> <p>

---

<address>
Chris Spell, spell@cms.uncwil.edu
</address>
```

Figure 2. HTML code for the Mosaic screen shown in Figure 1.

HTML editors. HTML documents can be created with WYSIWYG (what you see is what you get) editors or with editors that simply assist you by allowing you to select the desired markup tags from a menu. HTML editors are easier to use and interactively display the resulting HTML document on-screen. For example, current versions of the Emacs editor have an "HTML mode" to assist users with writing statements. There is also an editor for Microsoft Windows called HTML Assistant. For X users, tkWWW supports WYSIWYG HTML editing; and since it is a browser, you can try out links immediately after creating them. HotMetal is a professional HTML Plus editor for X and Microsoft Windows. For Macintosh users, the BBEdit HTML extensions allow the BBEdit and BBEdit Lite text editors to conveniently edit HTML documents.

Navigating the Web

Information currently accessible through the Web includes information served through Telnet, Gopher, WAIS, FTP, Usenet news, Archie, and anything in the form of Unix man pages or hypermedia documents. Mosaic lets users effectively navigate the Web and access the

wide variety of information databases associated with these existing Internet resources.

Uniform Resource Locators. A Uniform Resource Locator (URL) refers to the format used by WWW documents to locate other files and is currently a draft standard for specifying an object or resource on the Internet. A URL gives the type of resource being accessed (for example, Gopher or WAIS) and the path of the file. The format used is: *scheme://host.domain[:port]/path/filename.*

The first part of the URL, the scheme, specifies the access method. Several keywords can be specified for the scheme:

- FTP — retrieves a file on your local system or on an anonymous FTP server,
- HTTP — retrieves a file on a WWW server (the native WWW protocol),
- Gopher — retrieves a file on a Gopher server,
- WAIS — retrieves a file on a WAIS server,
- News — reads the latest Usenet news, or
- Telnet — uses the telnet protocol to connect to some site.

The part of the URL after the colon is interpreted with regard to the specific access method. In general, two slashes after the colon indicate a machine name or, optionally, a port. (For additional information, see "A Beginner's Guide to URLs," http://www.ncsa.uiuc.edu/demoweb/url-primer.html.) The last part of the URL describes the location-specific path and filename of the desired document. Some example URLs are:

- ftp://ftp.uu.net/info/README
- ftp://ftp.uu.net/usenet
- http://info.cern.ch:80/default.html
- news: alt.hypertext
- telnet://dra.com

HTML editors and converters

BBEdit HTML — A Macintosh editor for HTML documents obtained by accessing http://www.uji.es/bbedit-html-extensions.html. You can also obtain the extensions package by anonymous FTP from sumex-aim.stanford.edu in file /info-mac/text/bbedit-html-ext-b4.hqx.

Emacs editor — Current version Emacs have an HTML mode to assist users with writing HTML statements (ftp://ftp.ncsa.uiuc.edu/Web/elisp/html-mode.el).

HTML — An introductory reference, "A Beginner's Guide to HTML," is available at http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html. The HTML primer is available at http://www.vuw.ac.nz/who/Nathan.Torkington/ideas/www-html.html.

HTML Assistant — A Microsoft Windows editor with features to assist in the creation of HTML documents can be obtained by anonymous FTP from ftp.cs.dal.ca:/htmlasst.

HTML+ — To learn more about HTML+, you can examine the ASCII text of a draft specification for it at ftp://ds.internic.net/internet-drafts/draft-raggett-www-html-00.txt.; or a PostScript version of the same at ftp://ds.internic.net/internet-drafts/draft-raggett-www-html-00.ps

LaTex2HTML — Converts LaTex documents to HTML (http://cbl.leeds.ac.uk/nikos/tex2html/doc/latex2html.html).

Mail2HTML — Converts electronic mailboxes to HTML documents (ftp://info.cern.ch/pub/www/dev).

NCSA's list of filters and editors — This document mentions several editors, including two for Microsoft Windows (http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/faq-software.html#editors).

RTF2HTML — Converts Rich Text Format (RTF) to HTML (file://oac.hsc.uth.tmc.edu/public/unix/WWW).

HyperText Transfer Protocol. HTTP is the protocol employed between the server and client.[4] It requires only a reliable connection-oriented transport service, typically TCP/IP. The client establishes a connection with the server and sends a request containing the word GET, a space, and the partial URL of the node to be retrieved, terminated by the carriage return and line feed characters. The server responds with the node contents, which consist of HTML text documents. The end of the contents is signaled by the server closing the connection.

Ways to spin a Web. Creating a Web can be as simple as pointing a hyperlink from an existing Web document to your existing data. Making it public involves running the FTP or HTTP daemon. Any file available by anonymous FTP can be immediately linked into the Web. This method requires only a small start-up effort and allows contributions to be made network accessible via the Internet in a very short period of time.

You can also create a Web by writing your own HTML code and pointing it to databases of interest. Data may come from local archives or be stored elsewhere on the Internet. This requires familiarity with the HTML language and the information resources currently available on the Internet. Existing files (for example, a LaTex document) can be converted to HTML automatically by using a set of special software tools.[5]

When creating Web documents for public access, we have found the following guidelines to be useful.

- Remember that most users accessing information over the Internet are browsing and are therefore unwilling to wait long for a document to appear on their screen. You should use graphics only to catch the reader's attention. Keep the size of images on the home page small; they should be used as simple icons that show what the object points to. Wait until the user selects the icon to incorporate high-quality (and large) images into your documents. This will let users access the home page quickly and will ease server and network load. Although each image takes time to process and slows the display, using a particular image multiple times in a

document causes very little performance degradation compared to using it once.

- Documents transmitted over a network will not display as quickly as documents will locally, where you typically develop them. Before making any document public, be sure to test the document's remote access time to ensure that it is reasonable.
- Always provide an estimate of the number of bytes that will be sent when a user selects a given "hotword" (especially for high-resolution images and digital audio and video). This helps users decide whether to select a given hotword.
- Do not mix a large number of different fonts, colors, and so forth on a single display screen. Use good graphic arts design principles. This is especially important if the screens will be used for educational purposes and projected onto an overhead screen.[6] For example, certain colors that look good together on screen and are easily distinguishable may not be so distinguishable when sent through a projection panel and displayed with an overhead projector. We have provided some guidelines to help developers of multimedia presentations avoid some of the common problems associated with the projection of these materials.[6]
- Do not say "Click Here." It is redundant and only clutters the screen. Hotwords are normally a different color or font, so it is obvious (especially to frequent users) that "clicking here" will cause a hyperlink to be traversed.
- Put a reference (for example, an electronic mail address) at the bottom of every page telling whom to contact about the document. This can be accomplished by using the HTML Address Tag construct.
- Do not make your pages too long. Rather, create a hierarchical set of menus that group items into meaningful categories. That way only those items of interest will have to be selected.

How does the WWW compare to Gopher and WAIS?

While all three of these information presentation systems are client-server based, they differ in terms of their data models. In Gopher, data is either a menu, a document, an index, or a Telnet connection. In WAIS, everything is an index, and everything that is returned from the index is a document. In WWW, everything is a hypertext document, which may be searchable if it contains text. This means that WWW can represent Gopher and WAIS data models as well as provide extra functionality. Only WWW has hyperlinks.

Although text is supported by all three systems, WWW provides facilities for displaying "richer" text (for example, headings, lists, and emphasized text) in a standardized way. Image, audio, and video data are all supported by external viewers (for example, MPEGplay). There is little direct support for application-specific data in any of the three systems, and all use different methods for expressing type and encoding. Also, all three systems have little support for controlling the presentation of nontext data. For example, backdrops and synchronization in time are not supported, and buttons are only supported in a limited way. (See Adie[2] for a more comprehensive evaluation.)

Limitations. Perhaps the greatest limitation of current distributed hypermedia systems is that there is no simple way to find out what information has changed, what information is new, or even what information is out there on the Internet. Mosaic users commonly complain about difficulties finding resources on a particular topic or subject. Unless the user has extensive knowledge of the Internet, it is hard to locate resources of interest on the WWW. A related problem is remembering where resources were found when trying to access them again (hotlists are useful, but it is better to annotate the location and description of the resource on a notepad or set of index cards so that it can later be recalled). Another problem is that there are simply too many links,

Getting started: How to access the Web[1]

To access the Web, you first need an account on a machine that is connected to the Internet. All WWW features can be accessed with client/browser software from this machine. To obtain a browser for your machine, refer to the discussion below. Many of the browsers discussed here require that you have SLIP, PPP, or other TCP/IP networking to your computer. SLIP or PPP can be accomplished over phone lines, but only with the active cooperation of your network provider or educational institution. If you only have normal dial-up access, your best option is to run a browser on the system you call directly or from a system that can be connected to.

Browsers accessible via Telnet. Several browsers are available over the Internet through Telnet. An up-to-date list of these is available on the Web as http://info.cern.ch/hypertext/WWW/FAQ/Bootstrap.html. For example,

- **Info.cern.ch** — No password is required. This is in Switzerland, so continental US users might be better off using a closer browser.
- **ukanaix.cc.ukans.edu** — A full-screen browser "Lynx" that requires VT100 terminal emulation. Log in as www.
- **www.njit.edu** — A full-screen browser in New Jersey Institute of Technology. Log in as www.
- **vms.huji.ac.il** — A dual-language Hebrew/English database at Hebrew University of Jerusalem in Israel, with links to the rest of the world. Log in as www.
- **sun.uakom.cs** — A machine in Slovakia. Log in as www.
- **fserv.kfki.hu** — A machine in Hungary. Log in as www.

Continued on overleaf

Table A. Mosaic browsers.

Operating system	Program	FTP Availability	Comment
Windows	Cello	ftp.law.cornell.edu:/pub/LII/cello	
	Mosaic for Windows	ftp.ncsa.uiuc.edu:/PC/Mosaic	
Macintosh	Mosaic for Macintosh	ftp.ncsa.uiuc.edu:/Mac/Mosaic	
	Samba	info.cern.ch:/pub/www/bin/mac	
Amiga	AMosaic	max.physics.sunysb.edu:/pub/amosaic	
NextStep	OmniWeb	ftp.omnigroup.com:/pub/software; for information, http://www.omnigroup.com/	The browsers listed here are native NextStep applications. Next systems can also run X-based browsers using one of the widely used X-server products for the Next.
	CERN's Browser-Editor	info.cern.ch:/pub/www/src	Allows WYSIWYG hypertext editing. Requires NextStep 3.0.
X/Dec-Windows	Mosaic for X	ftp.ncsa.uiuc.edu:/Web	Unix browser using X11/ Motif; compiled for several popular platforms.
	Mosaic for VMS	ftp.ncsa.uiuc.edu:/Mosaic	NCSA Browser using X11/DecWindows/Motif.
	tkWWW Browser/	harbor.ecn.purdue.edu:/pub/tcl/extensions/tkwww (followed by an extension dependent on the current version)	Editor for X11 supports WSYIWYG HTML editing.
	Viola for X (Beta)	ftp.ora.com:/pub/www/viola	Viola has two versions for Unix/X: one using Motif, one using Xlib (no Motif). Handles HTML+ forms and tables. Has extensions for multiple columning and collapsible/expandable lists. Client-side document included.
	Chimera	ftp.cs.unlv.edu:/pub/chimera	Unix/X Browser using Athena (doesn't require Motif).
Text-mode Unix and VMS browsers	Line Mode Browser	info.cern.ch:/pub/www/src	This program gives WWW access to anyone with a dumb terminal. A general-purpose information retrieval tool.
	Lynx full-screen	ftp2.cc.ukans.edu:/pub/WWW/lynx	This hypertext browser for VT100 terminals uses full browser screen, arrow keys, highlighting, etc.
	perlWWW	archive.cis.ohio-state.edu:/pub/w3browser	A tty-based browser written in Perl.
	VMS client	vms.huji.ac.il:www/vms_client	A full-screen client based on VMS's SMG screen management routines.

Obtaining your own browser. The preferred method of accessing the Web is to run a browser yourself. Browsers are available for many platforms, both in source and executable forms. Table A lists some available browsers (a more extensive listing can be found at http://info.cern.ch/hypertext/WWW/Clients.html).

Setting up your own server. Browsers can obtain data from programs supplied by information providers. These programs can either be WWW servers that understand the HyperText Transfer Protocol, "gateway" programs that convert an existing information format to hypertext, or a non-HTTP server that WWW browsers can access — anonymous FTP or Gopher, for example. To learn more about WWW servers, you can consult a WWW server primer available at http://www.vuw.ac.nz/who/Nathan.Torkington/ideas/www-servers.html. Table B lists some servers currently available for Unix, Macintosh, Microsoft Windows, and VMS systems. (For more information on writing servers and gateways in general, see http://info.cern.ch/hypertext/WWW/Daemon/Overview.html.)

Creating a public home page. There are several things you can do to publicize your new HTML server or other offering:

- Submit it to the NCSA "What's New Page" at http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/Docs/whatsnew.html.
- Post it to the newsgroup comp.infosystems.announce. Please read the newsgroup first to get a feel for the contents. You can also crosspost to comp.infosystems.www.
- Submit it to the maintainers of various catalogs, such as the WWW Virtual Library http://info.cern.ch/hypertext/DataSources/bySubject/Overview.html.

Reference

1. "World-Wide Web Frequently Asked Questions," http://siva.cshl.org/~boutell/www-faq.html, June 1994.

Table B. Mosaic servers.

Operating System	Program	FTP Availability	Comment
Unix	NCSA httpd	ftp.ncsa.uiuc.edu:/Web/ncsa_httpd	
	CERN httpd	info.cern.ch:/pub/www/src.	
	GN Gopher/HTTP server	URL http://hopf.math.nwu.edu	Serves WWW and Gopher clients. A good server for migrating from Gopher to WWW, although lacking the NCSA and CERN servers' script capabilities.
	Plexus	http://bsdi.com/server/doc/plexus.html	Written in the Perl scripting language. Documentation available at the URL.
Macintosh	MacHTTP	http://www.uth.tmc.edu/mac_info/machttp_info.html	
MS Windows and Windows NT servers	HTTPS (Windows NT)	ftp://emwac.ed.ac.uk:/pub/https	A server for Windows NT systems, both Intel- and Alpha-based.
	NCSA httpd (Windows)	ftp.ncsa.uiuc.edu:/Web/ncsa_httpd/contrib/whtp11a6.zip	The NSCA server has most features of the Unix version, including scripts.
	SerWeb	FTP://winftp.cica.indiana.edu:/pub/pc/win3/winsock/serweb03.zip	A simple, effective server for Windows.
VMS Servers	CERN HTTP	http://delonline.cern.ch/disk$user/duns/doc/vms/distribution.html	A port of the CERN server to VMS.
	Region 6 Threaded HTTP Server	http://kcgl1.eng.ohio-state.edu/www/doc/serverinfo.html	A native VMS server that uses DECthreads.

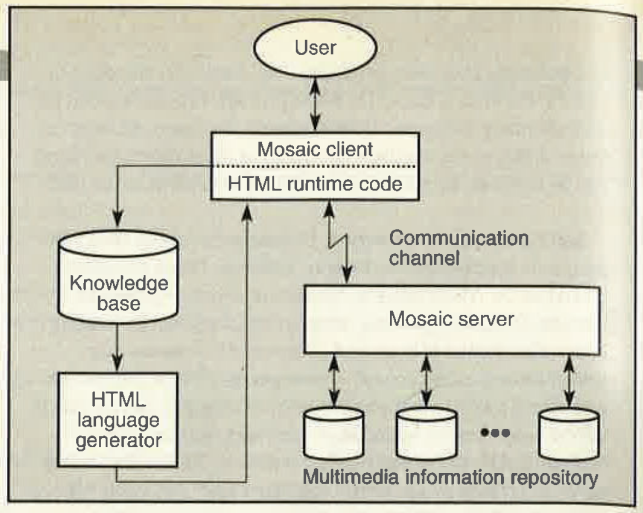

Figure 3. Mosaic extension model. An intelligent agent monitors user preferences to create a knowledge base that dynamically filters the hyperlinks presented to the user.

as Hall has pointed out in a recent article.[7] Users of distributed hypermedia systems are often overwhelmed by the large number of possible links and become disoriented when moving between different application packages and information servers.

Steps are being taken to address some of these problems in Mosaic. Several resources now provide information on new and established Mosaic servers by topic. For example,

- The WWW Virtual Library[8] is a good place to find resources on a particular subject, and
- What's New With NCSA Mosaic[9] carries announcements of new servers on the Web.

More recently, several software tools have been developed that create automatic indexes you can search. Two such tools are WebCrawler(http://www.bio-tech.washington.edu/WebQuery.html) and WWW Worm(http://www.cs.colorado.edu/home/mcbryan/WWWW.html). WebCrawler indexes the contents of the documents, whereas WWW Worm builds its index based on page titles and URL contents. Although tools that automatically traverse the Web are useful, tools that recursively search for information may not notice self-referencing links and may begin to return an infinite number of indexes.

Popularity. The WWW is gaining popularity as evidenced by the amount of network traffic (in bytes) across the National Science Foundation's North American Network (NSFNet).[10] In fact, WWW traffic recently surpassed Gopher traffic, according to statistics produced by monitoring traffic on the Internet backbone. (Since WWW browsers can also access Gopher servers, the Gopher traffic may be somewhat inflated.) From January to August 1993, the amount of traffic attributed to Web use multiplied by 414 times, and usage of the server at CERN doubled every four months — twice the rate of Internet expansion.[3] The Web is now ranked eighth of all network services in terms of sheer byte traffic as of May 1994 (Gopher is ranked tenth).

Extending Mosaic to support customized views

We are building an interface agent for Mosaic that helps users find the various types of Internet data available on the WWW. Our approach is similar to that undertaken by others who have developed autonomous agents to provide personalized assistance with meeting scheduling, electronic mail handling, electronic news filtering, and selection of entertainment.[11] The idea is to augment Mosaic with an intelligent interface agent that can learn the particular interests, habits, and preferences of individual users and then help them obtain the desired information in a way that reduces the number of links offered to the user. We accomplish this by supplying the interface agent with domain-specific background knowledge about user preferences and interests. At runtime, the interface agent uses this knowledge to find and recognize information of interest to the user. The agent must also be capable of acquiring knowledge on its own and building appropriate rules and facts in the knowledge base by monitoring user behavior over time (a form of machine learning).

Our approach aims at having Mosaic customize the link-following processes to suit a user's unique interests, habits, and access patterns. The system customizes the hypermedia environment supported by Mosiac by creating links dynamically, using rule-based algorithms or neural networks. This approach is much more flexible than many of today's closed hypermedia systems and still provides the user with the power to ask for more information when needed rather than statically displaying all available links on a particular topic every time.

Figure 3 depicts the system model we propose. Initially, users (and agents) store information about particular interests in the knowledge base. The rules and facts are used as input to the HTML Language Generator. User-specific HTML code (and links) are then generated at runtime. This requires communication with other Mosaic agents and servers (much like Archie servers are used) to find the relevant information on a particular topic or subject.

The goal of our work is to demonstrate that an intelligent interface agent can be used to satisfactorily limit the number of links offered to the user while simultaneously providing users with a more effective interface to the WWW.

The World-Wide Web is still evolving at a rapid pace. Clearly, distributed hypermedia systems on the Internet will continue to be an active area of development in the future. We believe that the flexibility of the WWW design, its use of hyperlinks, and the integration of existing WAIS and Gopher information resources, make the WWW ideal for future research and study. We also realize that highly interactive multimedia applications will require more sophisticated tools than currently exist. The most significant issue that needs to be resolved is the mismatch between WWW system capabilities and user requirements in the areas of presentation and quality of service. The lack of adequate directory services will continue to plague WWW users, and future work on distributed hypermedia systems will need to address these issues.

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APPENDIX 2

LIBRARY | CATALOG

1 of 1

PERIODICAL OR NEWSPAPER

Computer

Full Record MARC Tags

Main title

Computer.

Published/Created

[Long Beach, Calif., etc.] IEEE Computer Society.

Request this Item LC Find It

More Information

LCCN Permalink	https://lccn.loc.gov/74648480
Publication history	v. 3, no. 5- Sept./Oct. 1970-
Description	volumes illustrations 28 cm
Current frequency	Monthly, <1975->
Former frequency	Bimonthly, <-1971> Quarterly, <1973->
ISSN	0018-9162
Linking ISSN	0018-9162

LC classification	TK7885.A1 I5 QA76 .C63
Continues	Institute of Electrical and Electronics Engineers. Computer Group. Computer Group news 0537-9229 (DLC) 77008779 (OCoLC)2259653
Serial key title	Computer (Long Beach, Calif. Print)
Abbreviated title	Computer (Long Beach Calif. Print)
Related names	IEEE Computer Society.
LC Subjects	Computers--Periodicals.
Other Subjects	Computers. Computers.
Form/Genre	Periodicals. Periodicals. Periodicals.
Browse by shelf order	TK7885.A1 QA76
Reproduction no./Source	5855 Naples Plaza, 90803
Has supplement	IEEE computing futures (DLC)sn 90040673 (OCoLC)20749846
Additional formats	Online version: Computer (Long Beach, Calif. : Online) 1558-0814 (DLC) 2005215211 (OCoLC)44506384 Online version: Computer (OCoLC)654380368
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CODEN	CPTRB4
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National bib agency no.	(AMICUS)000000108243 9878067 C35890000 012432522 012402926
Other system no.	(OCoLC)ocm02240099

Additional Links	http://ieeexplore.ieee.org/servlet/opac?punumber=2
Type of material	Periodical or Newspaper
Content type	text
Media type	unmediated
Carrier type	volume

Item Availability

CALL NUMBER	TK7885.A1 I5 Set 1
Request in	Jefferson or Adams Building Reading Rooms
Status	In Process 04-07-2016
Older receipts	v.3:no.5-v.14:no.3 (1970:Sept./Oct.-1981:Mar.), v.14:no.8-v.16:no.6 (1981:Aug.-1983:June), v.16:no.9-v.22:no.6 (1983:Sept.-1989:June), v.22:no.8-v.24:no.3 (1989:Aug.-1991:Mar.) v.24:no.5-v.24:no.9 (1991:May-1991:Sept.), v.24:no.11-v.25:no.12 (1991:Nov.-1992:Dec.), v.26:no.7-v.26:no.9 (1993:July-1993:Sept.), v.27:no.1-v.27:no.7 (1994:Jan.-1994:July) v.27:no.9-v.30:no.12 (1994:Sept.-1997:Dec.), v.32 (1999), v.34:no.11-v.35:no.5 (2001:Nov.-2002:May), v.35:no.7-v.42:no.12 (2002:July-2009:Dec.), v.43:no.2-v.45:no.12 (2010:Feb.-2012:Dec.) v.46:no.1-v.46:no.10 (2013:Jan.-2013:Oct.), v.47:no.1-v.48:no.6 (2014:Jan.-2015:June), v.49:no.8-v.53:no.2 (2016:Aug.-2020:Feb.), v.53:no.4-v.56:no.12 (2020:Apr.-2023:Dec.)

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Request in	Newspaper & Current Periodical Reading Room (Madison LM133)
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Latest receipts	v. 58, no. 4 (2025 Apr.) v. 58, no. 3 (2025 Mar.) v. 58, no. 2 (2025 Feb.)

v. 58, no. 1 (2025 Jan.)
v. 57, no. 12 (2024 Dec.)
v. 57, no. 11 (2024 Nov.)
v. 57, no. 10 (2024 Oct.)
v. 57, no. 9 (2024 Sept.)
v. 57, no. 8 (2024 Aug.)
v. 57, no. 7 (2024 July)
v. 57, no. 6 (2024 June)
v. 57, no. 5 (2024 May)
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v. 57, no. 3 (2024 Mar.)
v. 57, no. 2 (2024 Feb.)
v. 57, no. 1 (2024 Jan.)
v. 49, no. 7 (2016 July)
v. 49, no. 6 (2016 June)
v. 49, no. 5 (2016 May)
v. 49, no. 4 (2016 Apr.)
v. 49, no. 3 (2016 Mar.)
v. 49, no. 2 (2016 Feb.)
v. 49, no. 1 (2016 Jan.)
v. 48, no. 12 (2015 Dec.)
v. 48, no. 11 (2015 Nov.)
v. 48, no. 8 (2015 Aug.)
v. 46, no. 12 (2013 Dec.)
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v. 46, no. 9 (2013 Sept.)
v. 43, no. 1 (2010 Jan.)

CALL NUMBER	TK7885.A1 I5 Copy 2 Unbound issues
Request in	Newspaper & Current Periodical Reading Room (Madison LM133)
Latest receipts	v. 46, no. 11 (2013 Nov.) v. 43, no. 1 (2010 Jan.)
Older receipts	v.41 - v.42 (2008 - 2009)

APPENDIX 3

LIBRARY | CATALOG

1 of 1

PERIODICAL OR NEWSPAPER

Computer

Full Record | **MARC Tags**

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001		11183610
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016	7_	|**a** C35890000 |**2** DNLM
016	7_	|**a** 012432522 |**2** Uk
016	7_	|**a** 012402926 |**2** Uk
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030	__	|**a** CPTRB4
032	__	|**a** 127360 |**b** USPS
035	__	|**a** (OCoLC)ocm02240099
037	__	|**b** 5855 Naples Plaza, 90803
040	__	|**a** DLC |**b** eng |**c** DLC |**d** NSD |**d** DLC |**d** NST |**d** AIP |**d** NSD |**d** AIP |**d** OCL |**d** NSD |**d** NST |**d** NSD |**d** NST |**d** OCL |**d** NST |**d** OCL |**d** NST |**d** MYG |**d** CUS |**d** MYG |**d** SYS |**d** IEEEX |**d** OCLCQ |**d** GUA |**d** NLM |**d** OCLCQ |**d** NSD |**d** IUL |**d** NLGGC |**d** LVB |**d** CUI |**d** OCLCQ |**d** M6U |**d** UKMGB |**d** OCLCO |**d** OCLCF |**d** OCLCO |**d** IUL |**d** OCLCO |**d** I8M |**d** OCLCQ |**d** CSJ |**d** AVA |**d** OCLCQ |**d** GILDS |**d** OCLCO |**d** NLC |**d** CPO |**d** OCLCQ
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321	__	|**a** Bimonthly, |**b** <-1971>
321	__	|**a** Quarterly, |**b** <1973->
336	__	|**a** text |**b** txt |**2** rdacontent
337	__	|**a** unmediated |**b** n |**2** rdamedia
338	__	|**a** volume |**b** nc |**2** rdacarrier
362	0_	|**a** v. 3, no. 5- Sept./Oct. 1970-
590	__	|**a** SERBIB/SERLOC merged record
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650	_6	|**a** Ordinateurs |**x** Périodiques.
650	_6	|**a** Informatique |**v** Périodiques.
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776	08	|**i** Online version: |**t** Computer |**w** (OCoLC)654380368
780	00	|**a** Institute of Electrical and Electronics Engineers. Computer Group. |**t** Computer Group news |**x** 0537-9229 |**w** (DLC) 77008779 |**w** (OCoLC)2259653
850	__	|**a** CU-S |**a** CaBVaS |**a** CaNBSU |**a** CaOTDT |**a** DLC |**a** KyLoU |**a** MH-SD |**a** MWelC |**a** NN |**a** NcD |**a** NcRS |**a** NcWsW |**a** NjR |**a** OrU-S |**a** PU |**a** TxU
859	41	|**u** http://ieeexplore.ieee.org/servlet/opac?punumber=2
853	33	|**8** 1 |**a** v. |**b** no. |**u** 12 |**v** r |**i** (year) |**j** (month) |**w** m |**x** 01
863	40	|**8** 1.1 |**a** <35> |**b** <1> |**i** <2002> |**j** <01>
890	__	|**a** Computer. (Institute of Electrical and Electronics Engineers. Computer Society) Northridge, Calif. 1966- . |**i** 74-648480
906	__	|**a** 7 |**b** cbc |**c** serials |**d** 4 |**e** ncip |**f** 19 |**g** n-oclcserc
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984	__	|**a** srvf |**d** 2001-10-31
985	__	|**e** eserial 200406
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991	__	|**b** c-GenColl |**h** TK7885.A1 |**i** I5 |**p** 00032485157 |**t** Copy 1 |**v** 19:Jul-Dec 1986 * 1986 |**w** CCF
991	__	|**b** c-GenColl |**h** TK7885.A1 |**i** I5 |**p** 00034530117 |**t** Copy 1 |**v** 20 JULY-DEC * 1987 |**w** CCF
991	__	|**b** c-GenColl |**h** TK7885.A1 |**i** I5 |**p** 00027864508 |**t** Copy 1 |**v** 1982 Jan-Jun * 8888 |**w** CCF
991	__	|**b** c-GenColl |**h** TK7885.A1 |**i** I5 |**p** 00001489744 |**t** Copy 1 |**v** 1984 Jan-Jun * 1984 |**w** CCF
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(2014:Jan.-2015:June), v.49:no.8-v.53:no.2 (2016:Aug.-2020:Feb.), v.53:no.4-v.56:no.12 (2020:Apr.-2023:Dec.)

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Request in	Newspaper & Current Periodical Reading Room (Madison LM133)
Status	Not Charged
Latest receipts	v. 58, no. 4 (2025 Apr.) v. 58, no. 3 (2025 Mar.) v. 58, no. 2 (2025 Feb.) v. 58, no. 1 (2025 Jan.) v. 57, no. 12 (2024 Dec.) v. 57, no. 11 (2024 Nov.) v. 57, no. 10 (2024 Oct.) v. 57, no. 9 (2024 Sept.) v. 57, no. 8 (2024 Aug.) v. 57, no. 7 (2024 July) v. 57, no. 6 (2024 June) v. 57, no. 5 (2024 May) v. 57, no. 4 (2024 Apr.) v. 57, no. 3 (2024 Mar.) v. 57, no. 2 (2024 Feb.) v. 57, no. 1 (2024 Jan.) v. 49, no. 7 (2016 July) v. 49, no. 6 (2016 June) v. 49, no. 5 (2016 May) v. 49, no. 4 (2016 Apr.) v. 49, no. 3 (2016 Mar.) v. 49, no. 2 (2016 Feb.) v. 49, no. 1 (2016 Jan.) v. 48, no. 12 (2015 Dec.) v. 48, no. 11 (2015 Nov.) v. 48, no. 8 (2015 Aug.) v. 46, no. 12 (2013 Dec.) v. 46, no. 11 (2013 Nov.) v. 46, no. 9 (2013 Sept.) v. 43, no. 1 (2010 Jan.)

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Latest receipts	v. 46, no. 11 (2013 Nov.) v. 43, no. 1 (2010 Jan.)
Older receipts	v.41 - v.42 (2008 - 2009)