May 22, 1996

SRC Research Report 140

Zippers: A Focus+Context Display of Web Pages

Marc H. Brown and William E. Weihl

digital

Systems Research Center
130 Lytton Avenue
Palo Alto, California 94301

Systems Research Center

The charter of SRC is to advance both the state of knowledge and the state of the art in computer systems. From our establishment in 1984, we have performed basic and applied research to support Digital's business objectives. Our current work includes exploring distributed personal computing on multiple platforms, networking, programming technology, system modelling and management techniques, and selected applications.

Our strategy is to test the technical and practical value of our ideas by building hardware and software prototypes and using them as daily tools. Interesting systems are too complex to be evaluated solely in the abstract; extended use allows us to investigate their properties in depth. This experience is useful in the short term in refining our designs, and invaluable in the long term in advancing our knowledge. Most of the major advances in information systems have come through this strategy, including personal computing, distributed systems, and the Internet.

We also perform complementary work of a more mathematical flavor. Some of it is in established fields of theoretical computer science, such as the analysis of algorithms, computational geometry, and logics of programming. Other work explores new ground motivated by problems that arise in our systems research.

We have a strong commitment to communicating our results; exposing and testing our ideas in the research and development communities leads to improved understanding. Our research report series supplements publication in professional journals and conferences. We seek users for our prototype systems among those with whom we have common interests, and we encourage collaboration with university researchers.

Robert W. Taylor, Director

Zippers: A Focus+Context Display of Web Pages

Marc H. Brown and William E. Weihl

May 22, 1996

Abstract

This report describes *zippers*, an application of outline-processor technology to the display of Web pages. Zippers allow users to expand and contract selected sections of a document, thereby displaying simultaneously the contents of individual sections of a document as well as its overall structure. Zippers can be implemented either directly in a Web browser or by a proxy (and consequently used by any off-the-shelf Web browser); in either case, no changes to HTML source files are required.

Overview

As people rush to put information onto the World Wide Web, more and more structured documents are appearing. These documents include home pages with lots of hierarchically organized links, papers with many sections and subsections, and other lengthy documents such as books and manuals.

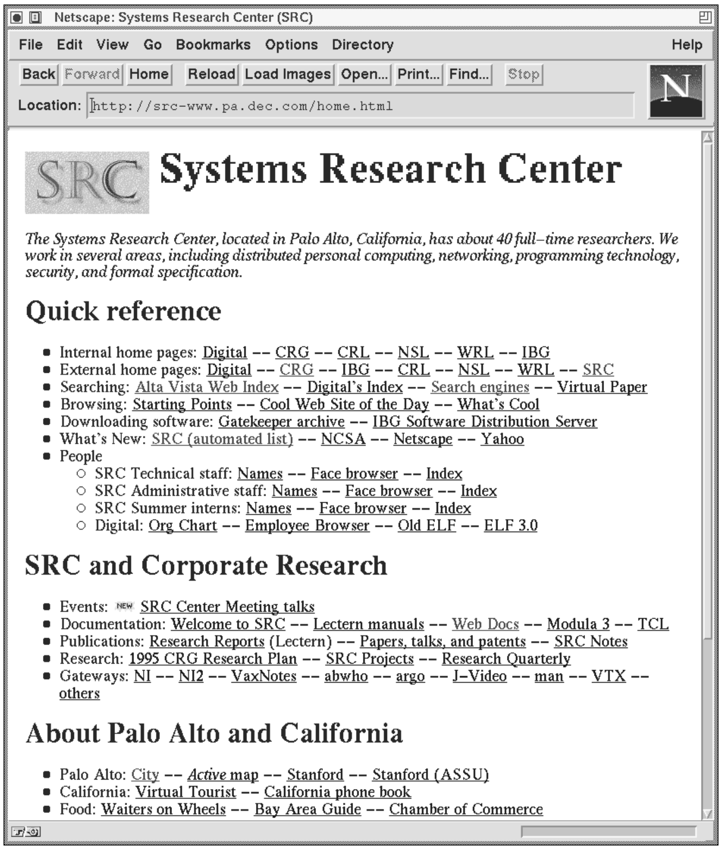
All Web browsers that we know of display each page as a continuous scroll. Unfortunately, it is easy to lose context when viewing a snippet of the whole, and it is hard to jump to arbitrary places in the page. These problems become more severe with longer pages.

Outline processors provide one well known technique for addressing these problems. Outline processors allow a user to expand and contract selected sections and subsections of a document, thus retaining the high-level structure of the document while also displaying individual sections. In addition, outline processors allow the user to rapidly jump within the document. This report describes the application of outline processor technology to the display of Web pages.

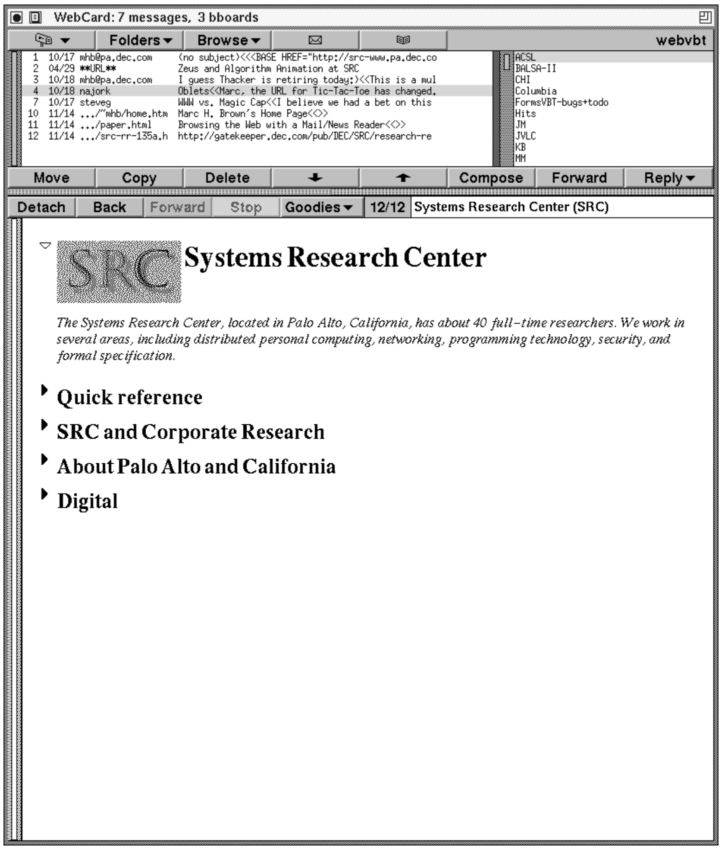
Zippers

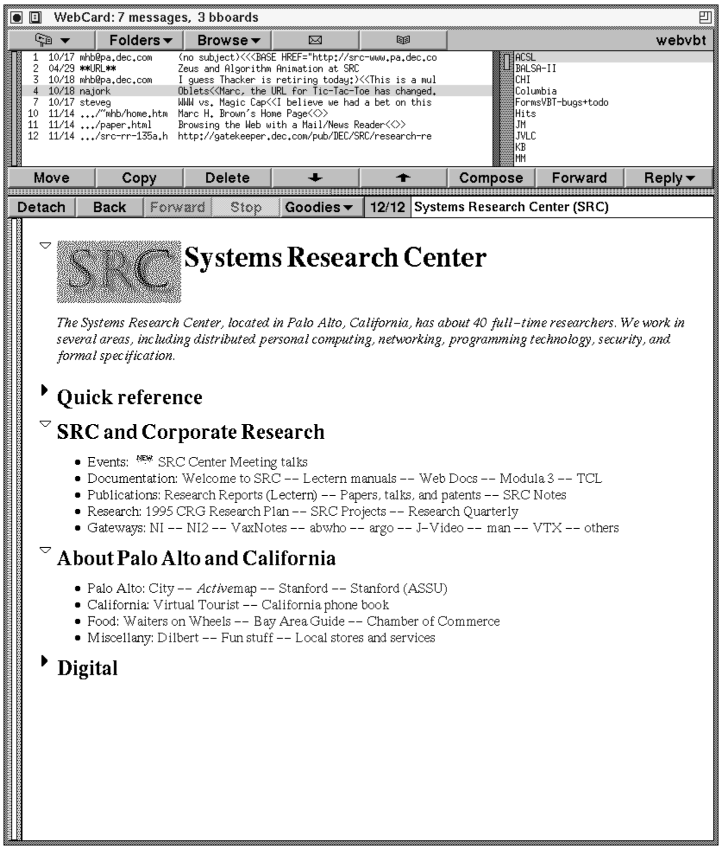
Our display of Web pages infers an outline structure from the heading tags (i.e., H1, H2, …, H6) in the HTML source. We mark each heading with an icon called a *zipper*. Clicking on the zipper causes the section introduced by the heading to expand and contract. Re-expanding a section causes the state of all subsections to reappear as they were before the section was contracted. However, shift-clicking on a zipper icon causes the section *and all of its subsections* to expand or to contract.

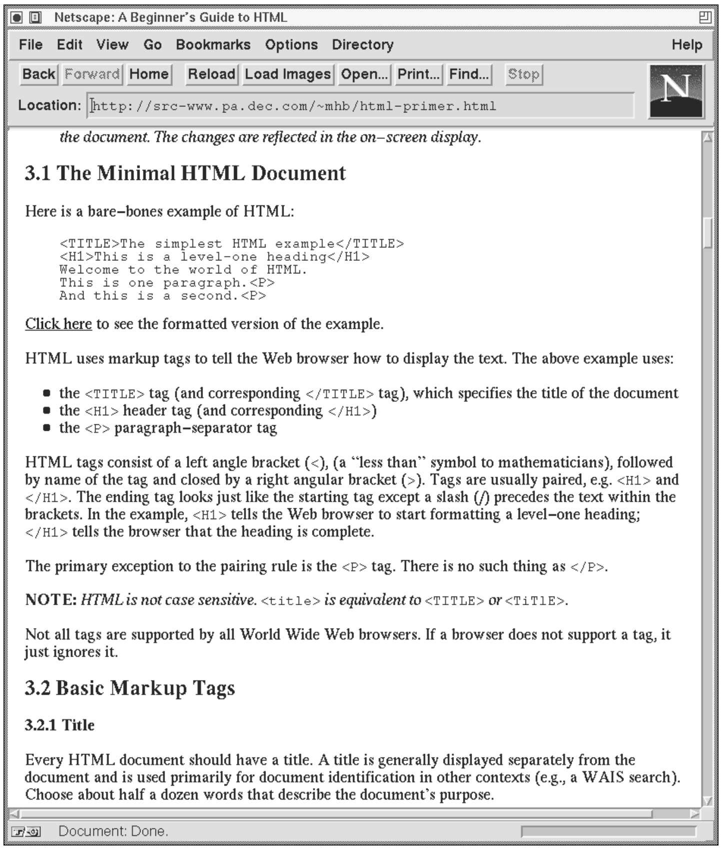
The screen dumps on the next pages shows a Web page using Netscape (the left-side page) and using zippers (the right-side page). The zipper display is within the WebCard browser, an integrated system for handling e-mail messages, bboard articles, and Web pages [3].



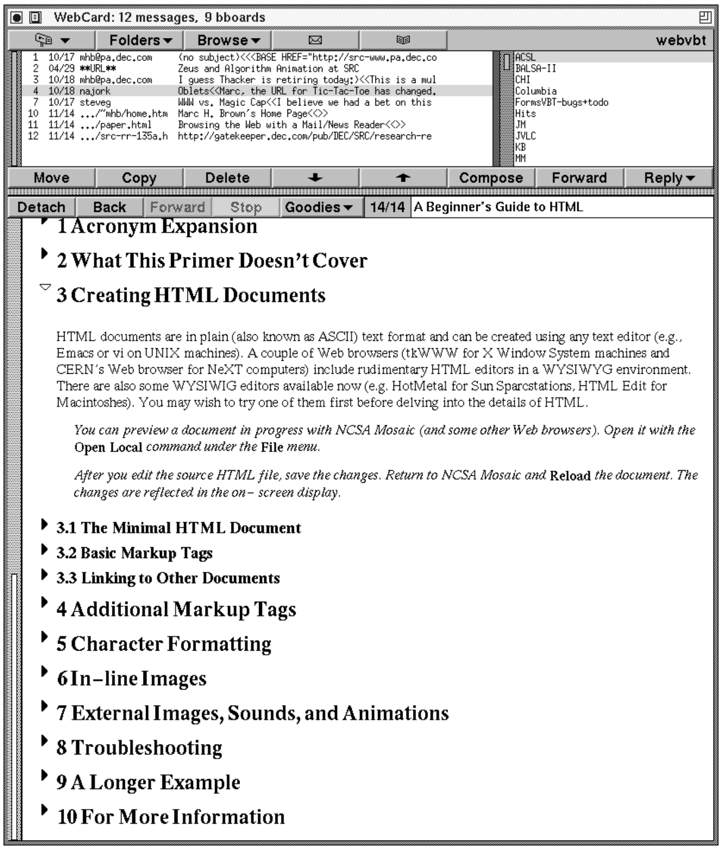
The screen dump above shows the SRC home page. The page contains a level-1 heading (a graphic with the letters SRC followed by “Systems Research Center”), some text, and then four level-2 headings. The top screen dump on the facing page is the default display with zippers: The single level-1 heading is automatically expanded, thereby causing the text it contains and any subheaders to be displayed. By default, subheaders are displayed contracted. In the bottom screen dump on the facing page, we’ve expanded the second and third subheaders.

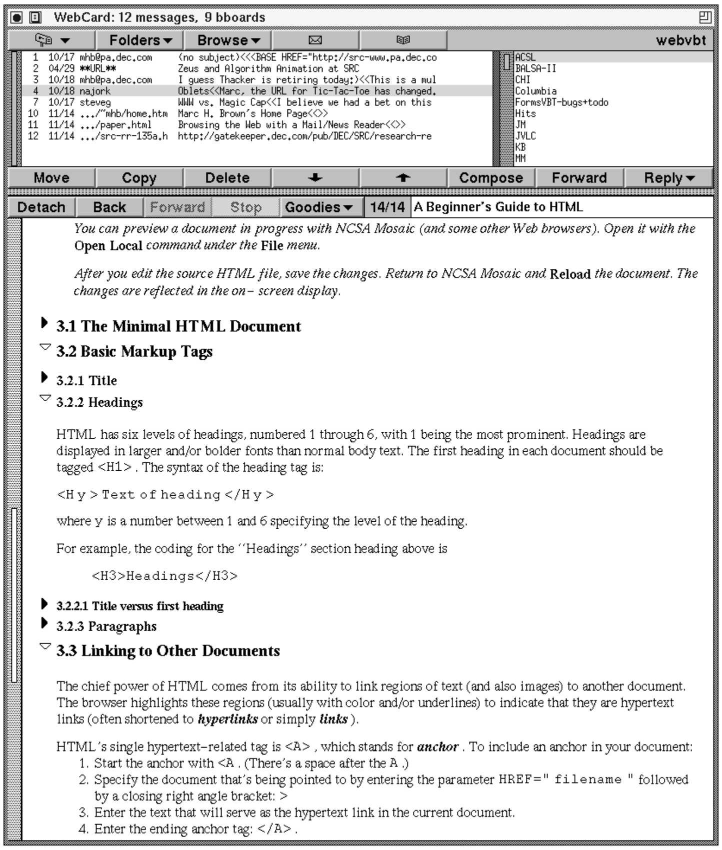

WebCard: 7 messages, 3 bboards
Folders
Browse
webvbt
1 10/17 mhb@pa.dec.com (no subject)<<<BASE HREF="http://src-www.pa.dec.co
2 04/29 **URL** Zeus and Algorithm Animation at SRC
3 10/18 mhb@pa.dec.com I guess Thacker is retiring today;)<<This is a mul
4 10/18 najork Oblets<<Marc, the URL for Tic-Tac-Toe has changed.
7 10/17 steveg WWW vs. Magic Cap<<I believe we had a bet on this
10 11/14 .../~mhb/home.htm Marc H. Brown's Home Page<<>>
11 11/14 .../paper.html Browsing the Web with a Mail/News Reader<<>>
12 11/14 .../src-rr-135a.h http://gatekeeper.dec.com/pub/DEC/SRC/research-re
ACSL
BALSA-II
CHI
Columbia
FormsVBT-bugs+todo
Hits
JM
JVLC
KB
MM
Move
Copy
Delete
Compose
Forward
Reply
Detach
Back
Forward
Stop
Goodies
12/12
Systems Research Center (SRC)
SRC
Systems Research Center
The Systems Research Center, located in Palo Alto, California, has about 40 full-time researchers. We work in several areas, including distributed personal computing, networking, programming technology, security, and formal specification.
Quick reference
SRC and Corporate Research
About Palo Alto and California
Digital


WebCard: 7 messages, 3 bboards
Folders
Browse
webvbt
1 10/17 mhb@pa.dec.com (no subject)<<<BASE HREF="http://src-www.pa.dec.co
2 04/29 **URL** Zeus and Algorithm Animation at SRC
3 10/18 mhb@pa.dec.com I guess Thacker is retiring today;)<<This is a mul
4 10/18 najork Oblets<<Marc, the URL for Tic-Tac-Toe has changed.
7 10/17 steveg WWW vs. Magic Cap<<I believe we had a bet on this
10 11/14 .../~mhb/home.htm Marc H. Brown's Home Page<<>>
11 11/14 .../paper.html Browsing the Web with a Mail/News Reader<<>>
12 11/14 .../src-rr-135a.h http://gatekeeper.dec.com/pub/DEC/SRC/research-re
ACSL
BALSA-II
CHI
Columbia
FormsVBT-bugs+todo
Hits
JM
JVLC
KB
MM
Move
Copy
Delete
Compose
Forward
Reply
Detach
Back
Forward
Stop
Goodies
12/12
Systems Research Center (SRC)
SRC
Systems Research Center
The Systems Research Center, located in Palo Alto, California, has about 40 full-time researchers. We work in several areas, including distributed personal computing, networking, programming technology, security, and formal specification.
Quick reference
SRC and Corporate Research
• Events: NEW SRC Center Meeting talks
• Documentation: Welcome to SRC -- Lectern manuals -- Web Docs -- Modula 3 -- TCL
• Publications: Research Reports (Lectern) -- Papers, talks, and patents -- SRC Notes
• Research: 1995 CRG Research Plan -- SRC Projects -- Research Quarterly
• Gateways: NI -- NI2 -- VaxNotes -- abwho -- argo -- J-Video -- man -- VTX -- others
About Palo Alto and California
• Palo Alto: City -- Activemap -- Stanford -- Stanford (ASSU)
• California: Virtual Tourist -- California phone book
• Food: Waiters on Wheels -- Bay Area Guide -- Chamber of Commerce
• Miscellany: Dilbert -- Fun stuff -- Local stores and services
Digital



The screen dump above shows a large document, "A Beginner's Guide to HTML" by NCSA [1]. (We edited the page to add section numbers, in order to facilitate the description of zippers.) The Netscape display is 21 screens of information, scrolled to the spot just before section "3.1 The Minimal HTML Document." The screen dumps on the facing page show the same document, with zippers, scrolled to about the same location. In the top screen dump, we've expanded section "3 Creating HTML Documents" of the default zipper display. The contents of the section are displayed ("HTML documents … screen display."), and the three subsections are visible in their contracted form. In the bottom screen dump, we've expanded three more sections: "3.2 Basic Markup Tags," and then "3.2.2 Headings" (which only became visible after "3.2 Basic Markup Tags" was expanded), and finally "3.3 Linking to Other Documents."


WebCard: 12 messages, 9 bboards
Folders
Browse
webvbt
1 10/17 mhb@pa.dec.com (no subject)<<<BASE HREF="http://src-www.pa.dec.co
2 04/29 **URL** Zeus and Algorithm Animation at SRC
3 10/18 mhb@pa.dec.com I guess Thacker is retiring today;)<<This is a mul
4 10/18 najork Oblets<<Marc, the URL for Tic-Tac-Toe has changed.
7 10/17 steveg WWW vs. Magic Cap<<I believe we had a bet on this
10 11/14 .../~mhb/home.htm Marc H. Brown's Home Page<<>
11 11/14 .../paper.html Browsing the Web with a Mail/News Reader<<>
12 11/14 .../src-rr-135a.h http://gatekeeper.dec.com/pub/DEC/SRC/research-re
ACSL
BALSA-II
CHI
Columbia
FormsVBT-bugs+todo
Hits
JM
JVLC
KB
MM
Move
Copy
Delete
Compose
Forward
Reply
Detach
Back
Forward
Stop
Goodies
14/14
A Beginner's Guide to HTML
1 Acronym Expansion
2 What This Primer Doesn't Cover
3 Creating HTML Documents
HTML documents are in plain (also known as ASCII) text format and can be created using any text editor (e.g., Emacs or vi on UNIX machines). A couple of Web browsers (tkWWW for X Window System machines and CERN's Web browser for NeXT computers) include rudimentary HTML editors in a WYSIWYG environment. There are also some WYSIWIG editors available now (e.g. HotMetal for Sun Sparcstations, HTML Edit for Macintoshes). You may wish to try one of them first before delving into the details of HTML.
You can preview a document in progress with NCSA Mosaic (and some other Web browsers). Open it with the Open Local command under the File menu.
After you edit the source HTML file, save the changes. Return to NCSA Mosaic and Reload the document. The changes are reflected in the on-screen display.
3.1 The Minimal HTML Document
3.2 Basic Markup Tags
3.3 Linking to Other Documents
4 Additional Markup Tags
5 Character Formatting
6 In-line Images
7 External Images, Sounds, and Animations
8 Troubleshooting
9 A Longer Example
10 For More Information


WebCard: 12 messages, 9 bboards
Folders
Browse
webvbt
1 10/17 mhb@pa.dec.com (no subject)<<<BASE HREF="http://src-www.pa.dec.co
2 04/29 **URL** Zeus and Algorithm Animation at SRC
3 10/18 mhb@pa.dec.com I guess Thacker is retiring today;)<<This is a mul
4 10/18 najork Oblets<<Marc, the URL for Tic-Tac-Toe has changed.
7 10/17 steveg WWW vs. Magic Cap<<I believe we had a bet on this
10 11/14 .../~mhb/home.htm Marc H. Brown's Home Page<<>
11 11/14 .../paper.html Browsing the Web with a Mail/News Reader<<>
12 11/14 .../src-rr-135a.h http://gatekeeper.dec.com/pub/DEC/SRC/research-re
ACSL
BALSA-II
CHI
Columbia
FormsVBT-bugs+todo
Hits
JM
JVLC
KB
MM
Move
Copy
Delete
Compose
Forward
Reply
Detach
Back
Forward
Stop
Goodies
14/14
A Beginner's Guide to HTML
You can preview a document in progress with NCSA Mosaic (and some other Web browsers). Open it with the Open Local command under the File menu.
After you edit the source HTML file, save the changes. Return to NCSA Mosaic and Reload the document. The changes are reflected in the on-screen display.
3.1 The Minimal HTML Document
3.2 Basic Markup Tags
3.2.1 Title
3.2.2 Headings
HTML has six levels of headings, numbered 1 through 6, with 1 being the most prominent. Headings are displayed in larger and/or bolder fonts than normal body text. The first heading in each document should be tagged <H1>. The syntax of the heading tag is:
<Hy>Text of heading</Hy>
where y is a number between 1 and 6 specifying the level of the heading.
For example, the coding for the "Headings" section heading above is
<H3>Headings</H3>
3.2.2.1 Title versus first heading
3.2.3 Paragraphs
3.3 Linking to Other Documents
The chief power of HTML comes from its ability to link regions of text (and also images) to another document. The browser highlights these regions (usually with color and/or underlines) to indicate that they are hypertext links (often shortened to hyperlinks or simply links).
HTML's single hypertext-related tag is <A>, which stands for anchor. To include an anchor in your document:
1. Start the anchor with <A . (There's a space after the A.)
2. Specify the document that's being pointed to by entering the parameter HREF=" filename " followed by a closing right angle bracket: >
3. Enter the text that will serve as the hypertext link in the current document.
4. Enter the ending anchor tag: </A>.

Discussion

Zippers work well on Web pages that use heading tags to indicate the logical structure of the page. Unfortunately, many authors use heading tags to produce particular formatting effects, such as font and pointsize changes, rather than indicate logical structure. On such pages, users simply turn off the zippers and the page is displayed conventionally.

We know of one Web site that has hand-coded zippers [7]. The drawback of hand coding zippers is that it requires server interaction to expand or contract, and an exponential number of files (or a complex script) to generate all states.

Authors of long pages frequently add a table of contents to the top of the page, with entries in the table linking to the various sections. Sometimes, each section appears on its own page, with "next," "previous," "up," and "top" links on each page. Unfortunately, it is easy for the viewer to lose the big picture because the table of contents is not visible while looking at the contents of a particular section.

An alternative to zippers for retaining the big picture while viewing the details is a multi-panel display, such as in SuperBook [2]. One panel displays the table of contents and the other panel displays sections in the document. Clicking on an entry in the table of contents causes the other panel to display the corresponding part of the document. The user can also open and close levels of the table of contents, but the body of a section is always displayed in the second panel. A multi-panel display such as Superbook could be implemented using Netscape's frames, by adding appropriate HTML markups and Java code to a source document.

Another related system is SoftQuad's Panorama Pro [6], which displays SGML documents using a two-panel viewer similar to that of SuperBook. Panorama Pro is also loosely integrated with the Web: The application can be configured as an external viewer of documents whose MIME type is SGML. Clicking on a URL in a document displayed by Panorama Pro will cause Netscape (or some other user-specified browser) to fetch *and display* the URL. Electronic Book Technologies' DynaText [4] is another impressive SGML viewer; it is integrated into Netscape as a plug-in. It's important to realize, however, that Panorama Pro and DynaText are not Web browsers.

Our decision to expand an outline view in place was inspired in part by Pad++ [5], a zooming graphical interface, and in part by the host of successful "context+focus" visualizations developed at Xerox PARC.

We are currently working on a proxy-based implementation of zippers that allows zipper-enhanced pages to be displayed in any Web browser. The idea is simple: A "zipper proxy" runs on the same machine as the user's browser and sits between the browser and the browser's normal proxy. The zipper proxy uses the normal proxy for fetching pages, and modifies the returned HTML to elide material and to include zipper icons. Each zipper icon is linked to a specially constructed URL that is intercepted by the zipper proxy and which allows the zipper proxy to return an appropriate view of the page.

Conclusion

Viewing a Web page using zippers has the nice property of allowing one to see details of parts of the page while maintaining the global context of the entire page. The larger the Web page—or the smaller the vertical space available for the display—the more benefit there is to this technique. Putting this technology into a browser or into a proxy seems preferable to hand-coding it into each document.

References

[1] A Beginner's Guide to HTML
`http://www.ncsa.uiuc.edu/demoweb/html-primer.html`

[2] About Bellcore's SuperBook(R) Document Browser
`http://superbook.bellcore.com:80/SB/`

[3] Marc H. Brown. Browsing the Web with a Mail/News Reader. *UIST'95*, pages 197–198.

[4] EBT–Product Information
`http://www.ebt.com/docs/prodinfo.html`

[5] Pad++: Zoomable Graphical Interfaces
`http://www.cs.unm.edu:80/pad%2b%2b/begin.html`

[6] SoftQuad: Panorama PRO
`http://www.sq.com/products/panorama/panor-fe.htm`

[7] UCI Bookstore Ordering Information
`http://bookweb.cwis.uci.edu:8042/Orders/orders-pt.html`