US005963964A

# United States Patent [19]

**Nielsen**

[11] **Patent Number: 5,963,964**

[45] **Date of Patent: Oct. 5, 1999**

[54] **METHOD, APPARATUS AND PROGRAM PRODUCT FOR UPDATING VISUAL BOOKMARKS**

[75] Inventor: **Jakob Nielsen**, Atherton, Calif.

[73] Assignee: **Sun Microsystems, Inc.**, Palo Alto, Calif.

[21] Appl. No.: **08/628,414**

[22] Filed: **Apr. 5, 1996**

[51] **Int. Cl.**[6] ..... **G06F 17/21**

[52] **U.S. Cl.** ..... **707/501**

[58] **Field of Search** ..... 395/762; 707/501, 707/513; 709/218; 345/333, 335, 348, 349

[56] **References Cited**

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| 5,781,785 | 7/1998 | Rowe et al. | 707/513 |

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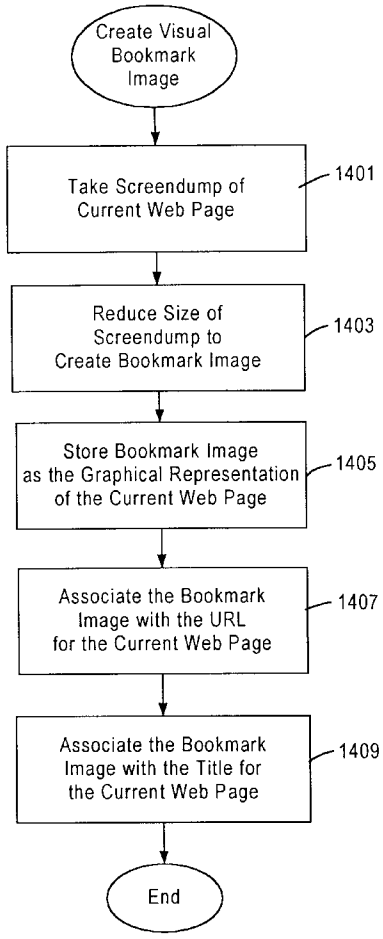
Hyper Card User's Guide, Apple Computer, Inc., Cover Page, Copyright Page and pp. 26, 27 and 139.

*Primary Examiner*—Joseph H. Feild
*Attorney, Agent, or Firm*—McDermott, Will & Emery

[57] **ABSTRACT**

Methods, systems, and computer program products are disclosed for creating, displaying, selecting, updating, and using visual bookmarks. A visual bookmark is a reduced graphical image of a web page that is associated with the URL for that web page. The invention allows the user to view a bookmarked web page by selecting a visual bookmark of the desired page from a plurality of visual bookmarks instead of making a selection from a list of web page titles. One way the visual bookmark is created is when the user decides to add a displayed web page to the user's bookmark list. This causes the displayed image to be captured, reduced, and associated with the web page's URL and title.

**15 Claims, 17 Drawing Sheets**



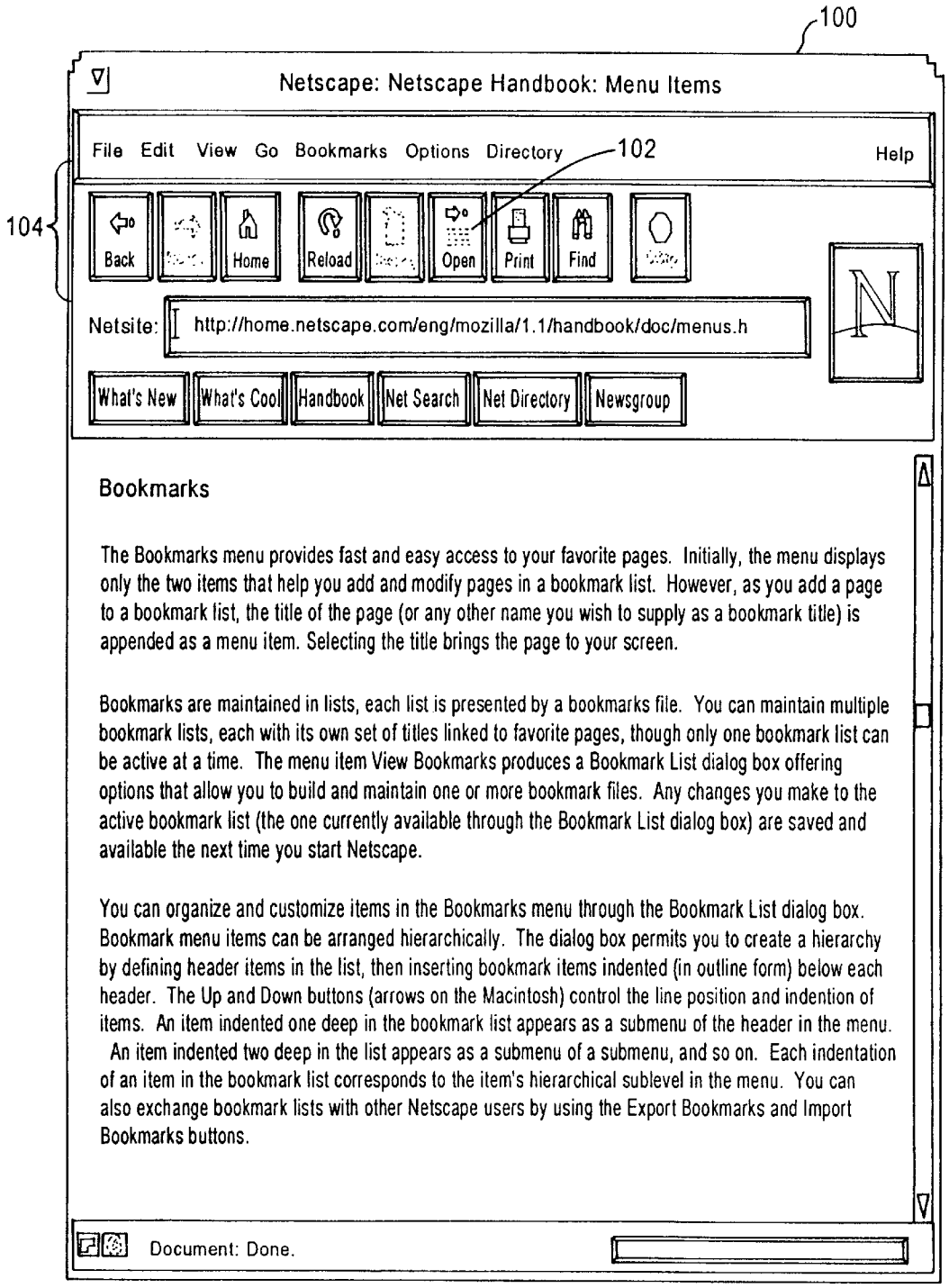

100
Netscape: Netscape Handbook: Menu Items
File Edit View Go Bookmarks Options Directory
102
Help
104
Back
Home
Reload
Open
Print
Find
Netsite:
http://home.netscape.com/eng/mozilla/1.1/handbook/doc/menus.h
What's New
What's Cool
Handbook
Net Search
Net Directory
Newsgroup
Bookmarks
The Bookmarks menu provides fast and easy access to your favorite pages. Initially, the menu displays only the two items that help you add and modify pages in a bookmark list. However, as you add a page to a bookmark list, the title of the page (or any other name you wish to supply as a bookmark title) is appended as a menu item. Selecting the title brings the page to your screen.
Bookmarks are maintained in lists, each list is presented by a bookmarks file. You can maintain multiple bookmark lists, each with its own set of titles linked to favorite pages, though only one bookmark list can be active at a time. The menu item View Bookmarks produces a Bookmark List dialog box offering options that allow you to build and maintain one or more bookmark files. Any changes you make to the active bookmark list (the one currently available through the Bookmark List dialog box) are saved and available the next time you start Netscape.
You can organize and customize items in the Bookmarks menu through the Bookmark List dialog box. Bookmark menu items can be arranged hierarchically. The dialog box permits you to create a hierarchy by defining header items in the list, then inserting bookmark items indented (in outline form) below each header. The Up and Down buttons (arrows on the Macintosh) control the line position and indention of items. An item indented one deep in the bookmark list appears as a submenu of the header in the menu. An item indented two deep in the list appears as a submenu of a submenu, and so on. Each indentation of an item in the bookmark list corresponds to the item's hierarchical sublevel in the menu. You can also exchange bookmark lists with other Netscape users by using the Export Bookmarks and Import Bookmarks buttons.
Document: Done.

Figure 1

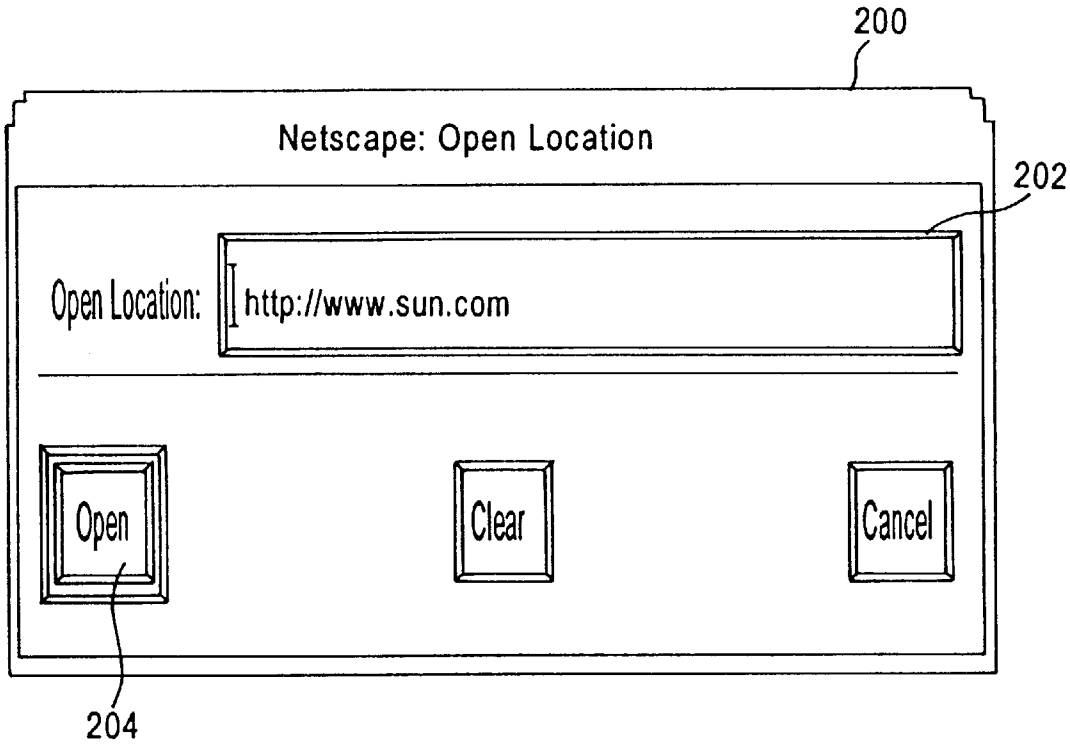

200
Netscape: Open Location
202
Open Location:
http://www.sun.com
Open
Clear
Cancel
204

Figure 2

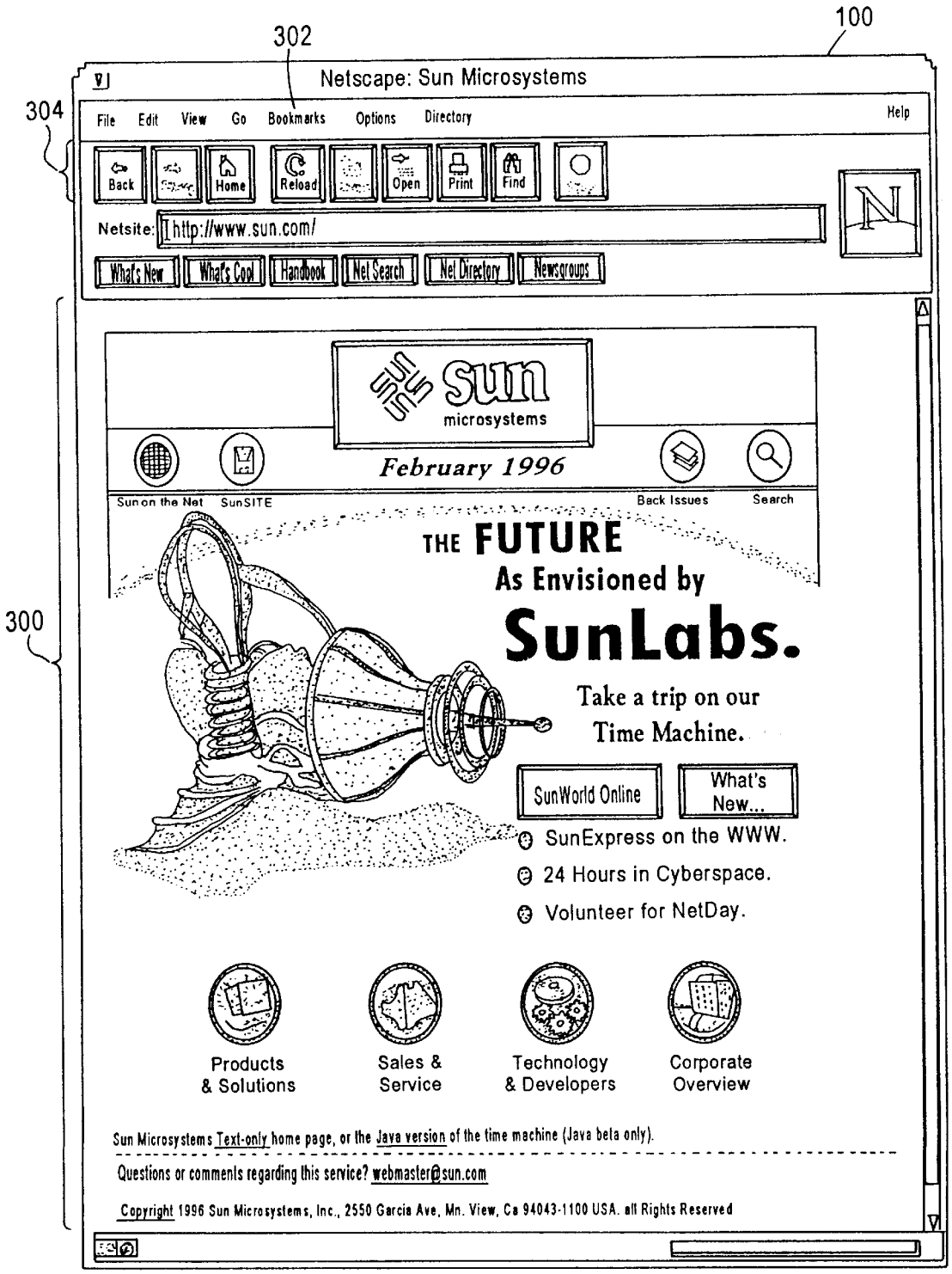

100
302
304
300
Netscape: Sun Microsystems
File Edit View Go Bookmarks Options Directory Help
Back Home Reload Open Print Find
Netsite: http://www.sun.com/
What's New What's Cool Handbook Net Search Net Directory Newsgroups
sun microsystems
February 1996
Sun on the Net SunSITE Back Issues Search
THE FUTURE
As Envisioned by
SunLabs.
Take a trip on our Time Machine.
SunWorld Online
What's New...
SunExpress on the WWW.
24 Hours in Cyberspace.
Volunteer for NetDay.
Products & Solutions
Sales & Service
Technology & Developers
Corporate Overview
Sun Microsystems Text-only home page, or the Java version of the time machine (Java beta only).
Questions or comments regarding this service? webmaster@sun.com
Copyright 1996 Sun Microsystems, Inc., 2550 Garcia Ave, Mn. View, Ca 94043-1100 USA. all Rights Reserved

Figure 3

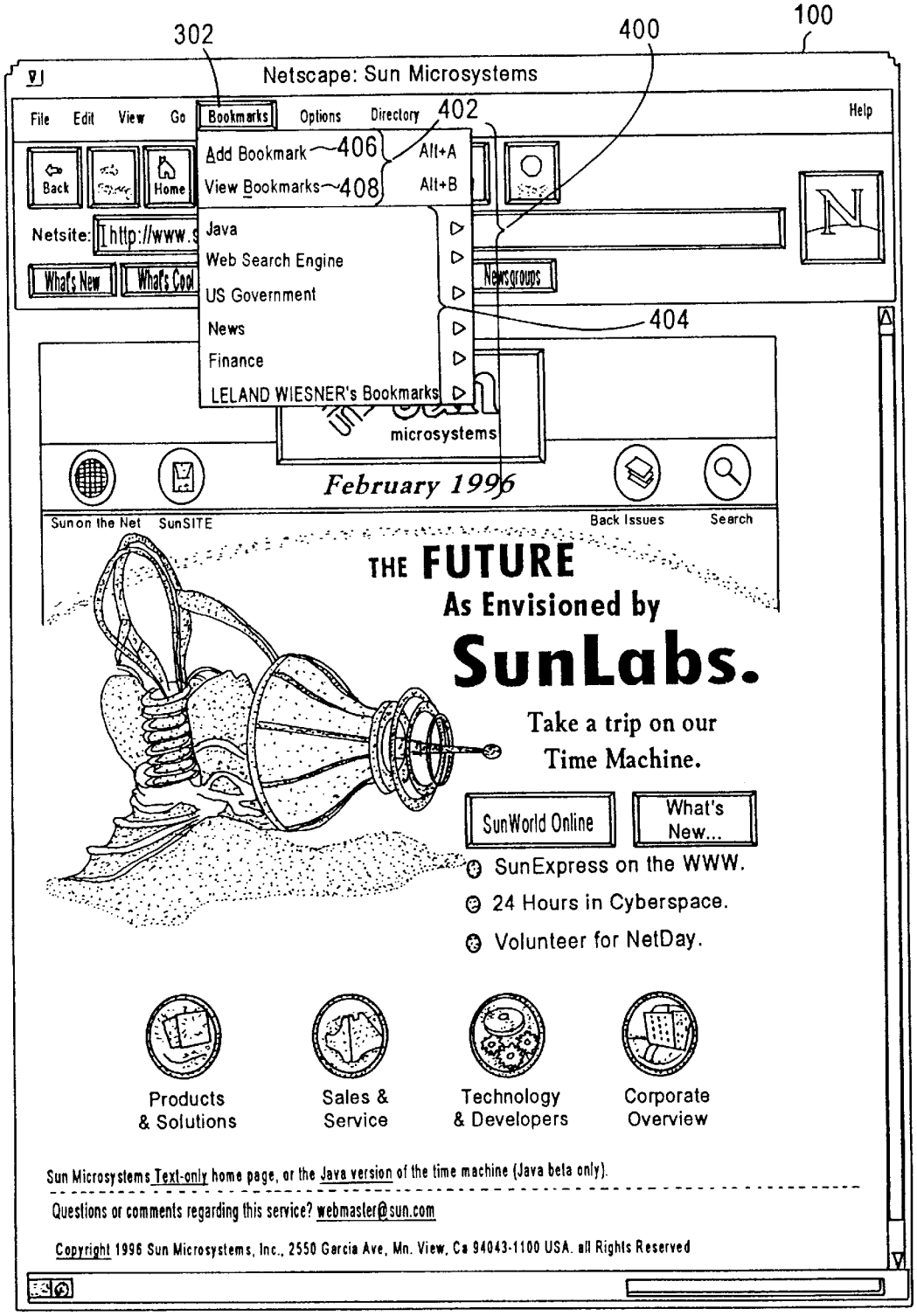
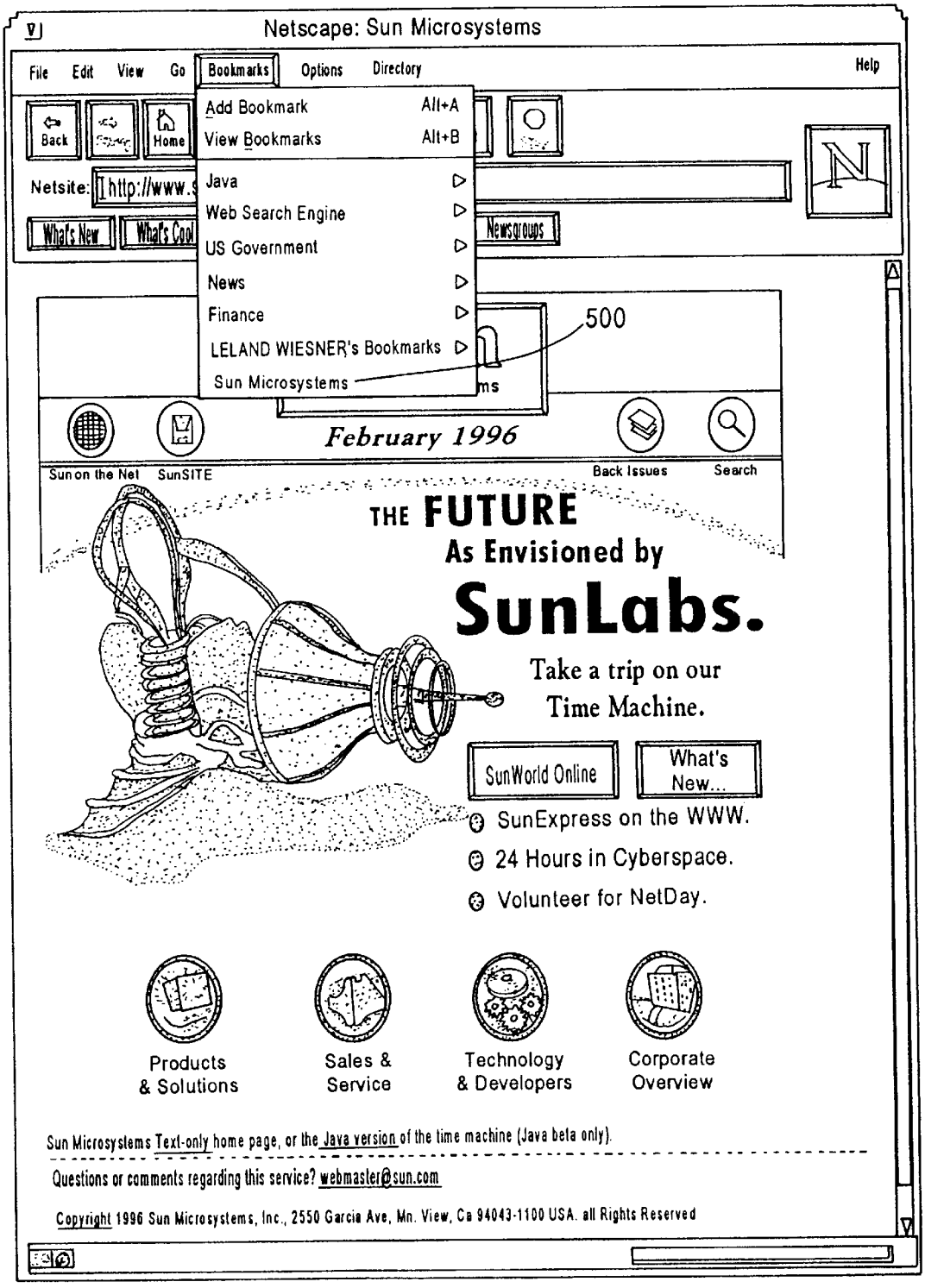

100
302
400
402
404
406
408
Netscape: Sun Microsystems
File Edit View Go Bookmarks Options Directory Help
Add Bookmark Alt+A
View Bookmarks Alt+B
Java
Web Search Engine
US Government
News
Finance
LELAND WIESNER's Bookmarks
Back
Home
Netsite: http://www.s
What's New
What's Cool
Newsgroups
microsystems
February 1996
Sun on the Net SunSITE
Back Issues Search
THE FUTURE
As Envisioned by
SunLabs.
Take a trip on our
Time Machine.
SunWorld Online
What's New...
SunExpress on the WWW.
24 Hours in Cyberspace.
Volunteer for NetDay.
Products & Solutions
Sales & Service
Technology & Developers
Corporate Overview
Sun Microsystems Text-only home page, or the Java version of the time machine (Java beta only).
Questions or comments regarding this service? webmaster@sun.com
Copyright 1996 Sun Microsystems, Inc., 2550 Garcia Ave, Mn. View, Ca 94043-1100 USA. all Rights Reserved

Figure 4


Netscape: Sun Microsystems
File Edit View Go Bookmarks Options Directory Help
Back Home
Netsite: http://www.s
What's New What's Cool Newsgroups
Add Bookmark Alt+A
View Bookmarks Alt+B
Java
Web Search Engine
US Government
News
Finance
LELAND WIESNER's Bookmarks
Sun Microsystems
500
February 1996
Sun on the Net SunSITE Back Issues Search
THE FUTURE
As Envisioned by
SunLabs.
Take a trip on our
Time Machine.
SunWorld Online
What's New...
SunExpress on the WWW.
24 Hours in Cyberspace.
Volunteer for NetDay.
Products & Solutions
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Technology & Developers
Corporate Overview
Sun Microsystems Text-only home page, or the Java version of the time machine (Java beta only).
Questions or comments regarding this service? webmaster@sun.com
Copyright 1996 Sun Microsystems, Inc., 2550 Garcia Ave, Mn. View, Ca 94043-1100 USA. all Rights Reserved

Figure 5

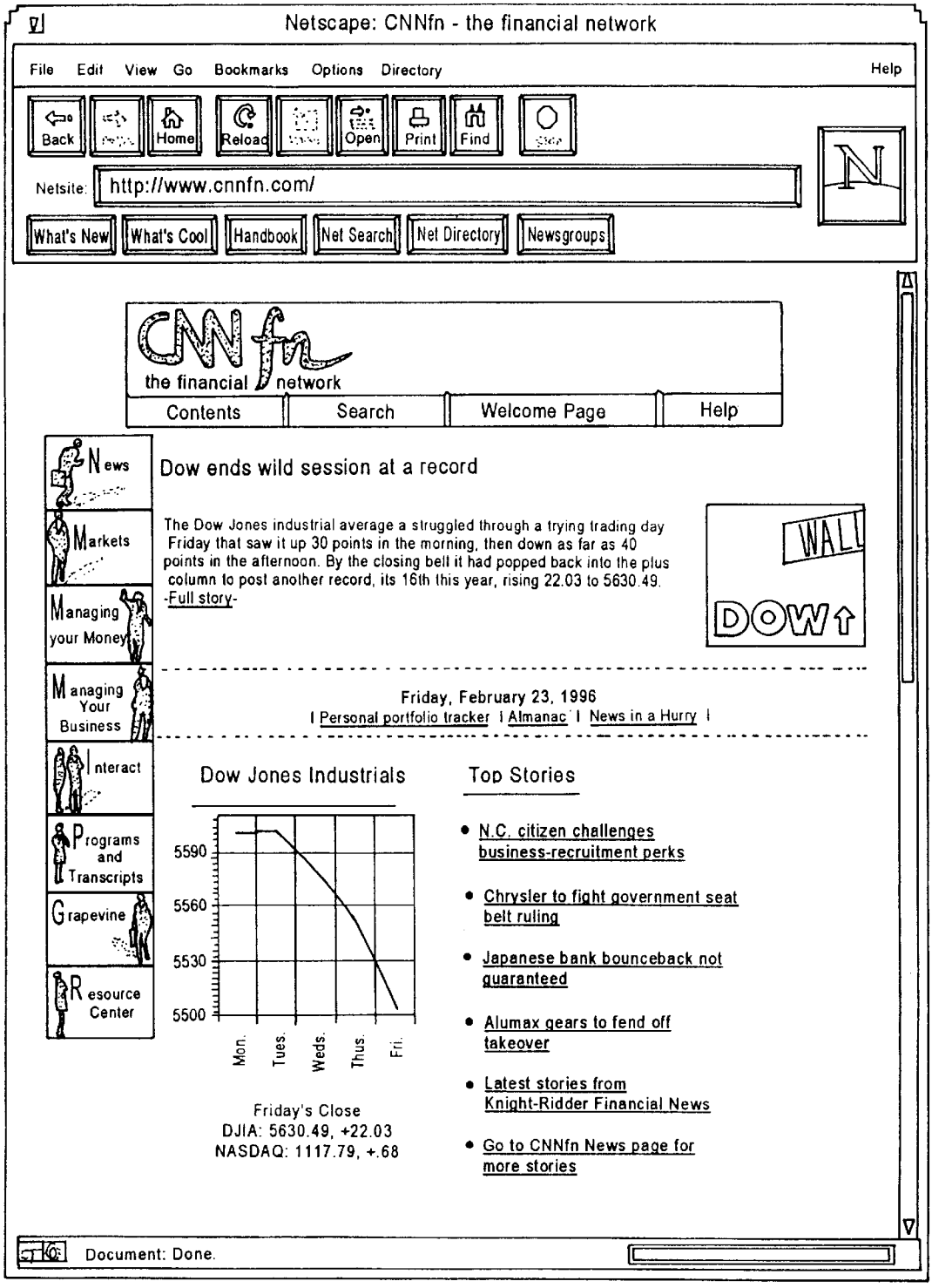
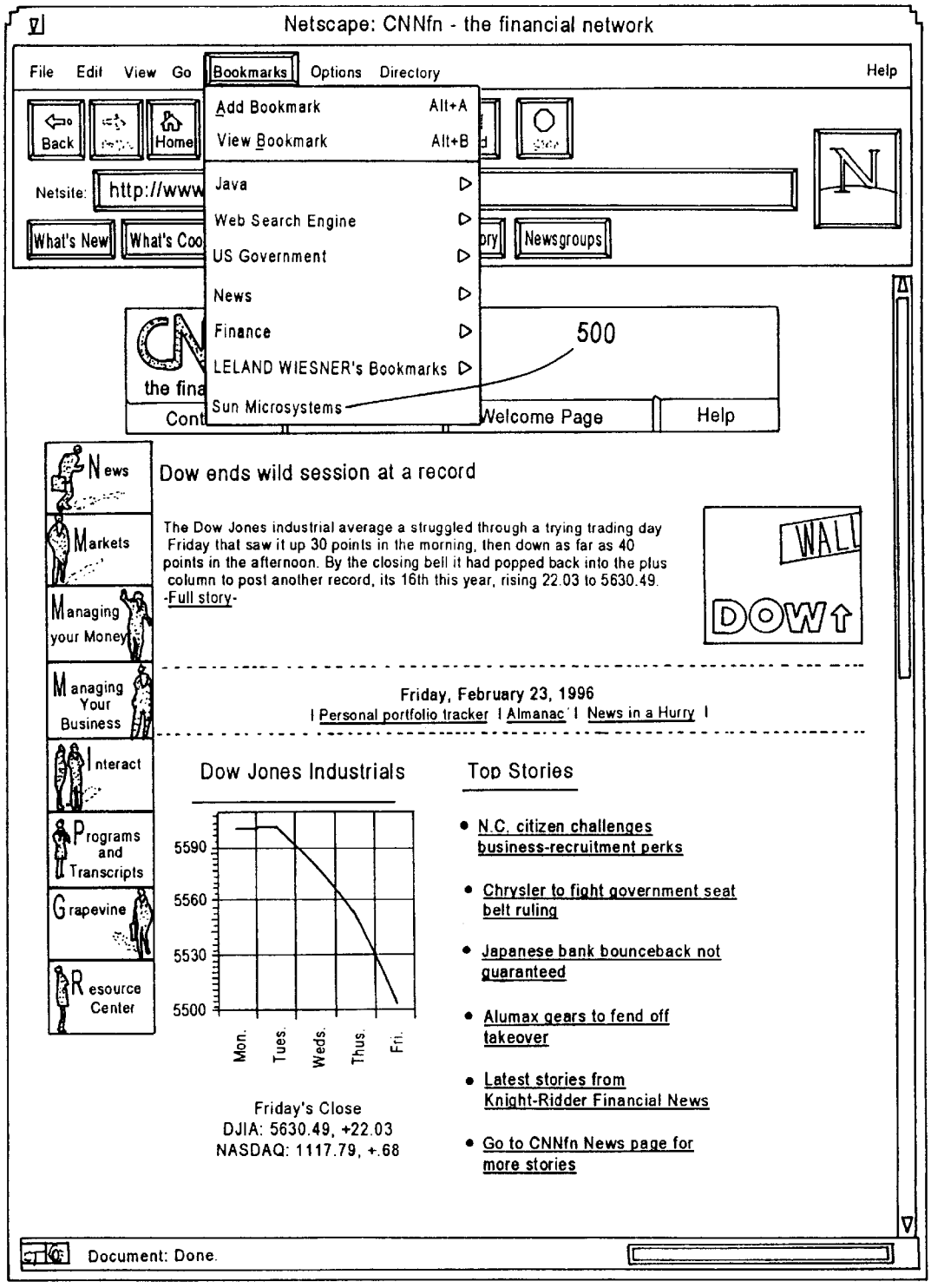

Netscape: CNNfn - the financial network
File Edit View Go Bookmarks Options Directory Help
Back Home Reload Open Print Find
Netsite: http://www.cnnfn.com/
What's New What's Cool Handbook Net Search Net Directory Newsgroups
CNNfn the financial network
Contents Search Welcome Page Help
News
Markets
Managing your Money
Managing Your Business
Interact
Programs and Transcripts
Grapevine
Resource Center
Dow ends wild session at a record
The Dow Jones industrial average a struggled through a trying trading day Friday that saw it up 30 points in the morning, then down as far as 40 points in the afternoon. By the closing bell it had popped back into the plus column to post another record, its 16th this year, rising 22.03 to 5630.49.
-Full story-
WALL
DOW
Friday, February 23, 1996
| Personal portfolio tracker | Almanac | News in a Hurry |
Dow Jones Industrials
5590
5560
5530
5500
Mon.
Tues.
Weds.
Thus.
Fri.
Friday's Close
DJIA: 5630.49, +22.03
NASDAQ: 1117.79, +.68
Top Stories
N.C. citizen challenges business-recruitment perks
Chrysler to fight government seat belt ruling
Japanese bank bounceback not guaranteed
Alumax gears to fend off takeover
Latest stories from Knight-Ridder Financial News
Go to CNNfn News page for more stories
Document: Done.

Figure 6


Netscape: CNNfn - the financial network
File Edit View Go Bookmarks Options Directory Help
Add Bookmark Alt+A
View Bookmark Alt+B
Java
Web Search Engine
US Government
News
Finance
LELAND WIESNER's Bookmarks
Sun Microsystems
500
Back
Home
Netsite: http://www
What's New
Newsgroups
Welcome Page
Help
News
Markets
Managing your Money
Managing Your Business
Interact
Programs and Transcripts
Grapevine
Resource Center
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WALL
DOW
Friday, February 23, 1996
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5590
5560
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5500
Mon.
Tues.
Weds.
Thus.
Fri.
Friday's Close
DJIA: 5630.49, +22.03
NASDAQ: 1117.79, +.68
Top Stories
N.C. citizen challenges business-recruitment perks
Chrysler to fight government seat belt ruling
Japanese bank bounceback not guaranteed
Alumax gears to fend off takeover
Latest stories from Knight-Ridder Financial News
Go to CNNfn News page for more stories
Document: Done.

Figure 7

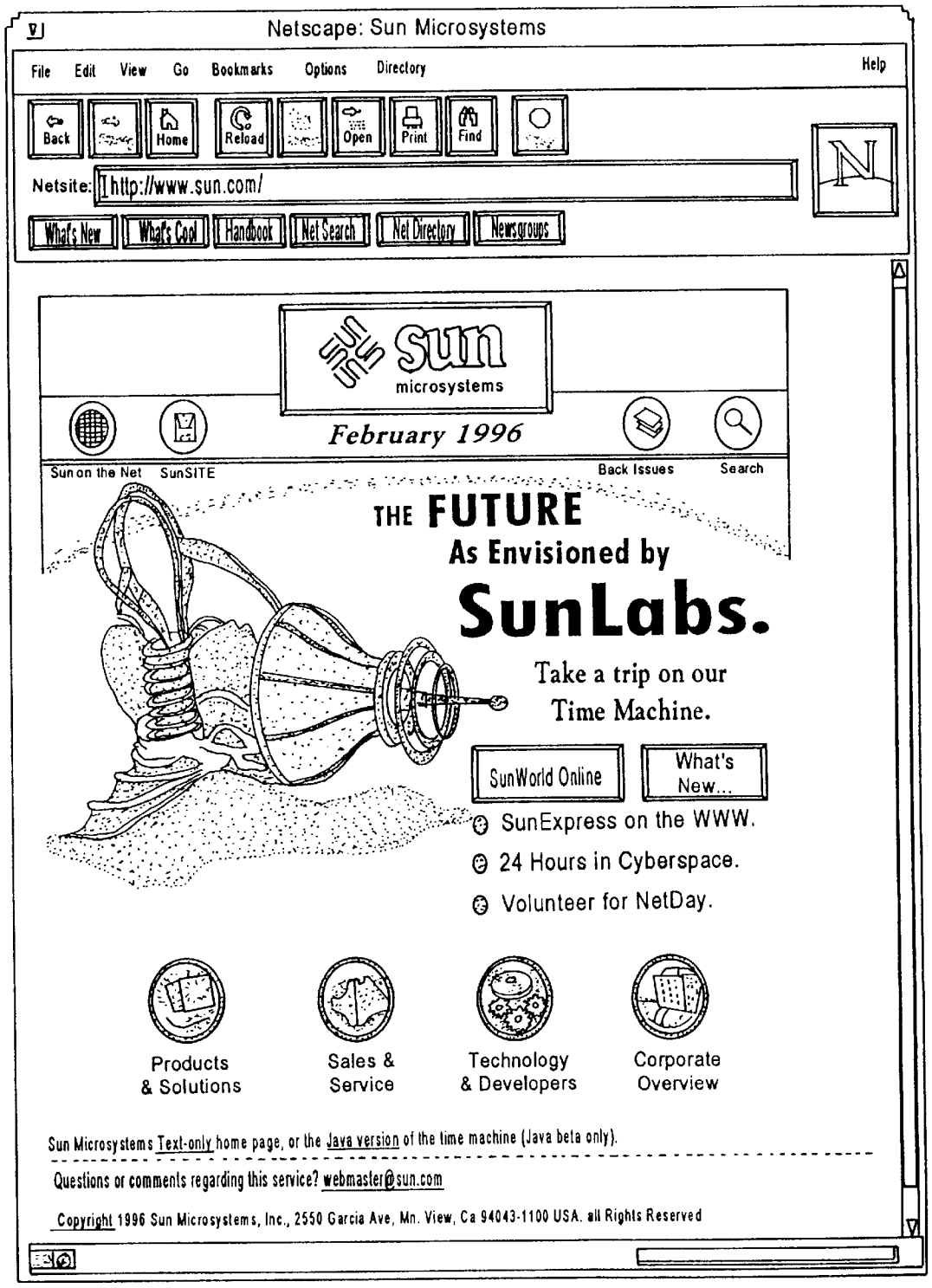
Netscape: Sun Microsystems
File Edit View Go Bookmarks Options Directory Help
Back Home Reload Open Print Find
Netsite: http://www.sun.com/
What's New What's Cool Handbook Net Search Net Directory Newsgroups
sun microsystems
February 1996
Sun on the Net SunSITE Back Issues Search
THE FUTURE
As Envisioned by
SunLabs.
Take a trip on our Time Machine.
SunWorld Online
What's New...
SunExpress on the WWW.
24 Hours in Cyberspace.
Volunteer for NetDay.
Products & Solutions
Sales & Service
Technology & Developers
Corporate Overview
Sun Microsystems Text-only home page, or the Java version of the time machine (Java beta only).
Questions or comments regarding this service? webmaster@sun.com
Copyright 1996 Sun Microsystems, Inc., 2550 Garcia Ave, Mn. View, Ca 94043-1100 USA. all Rights Reserved

Figure 8

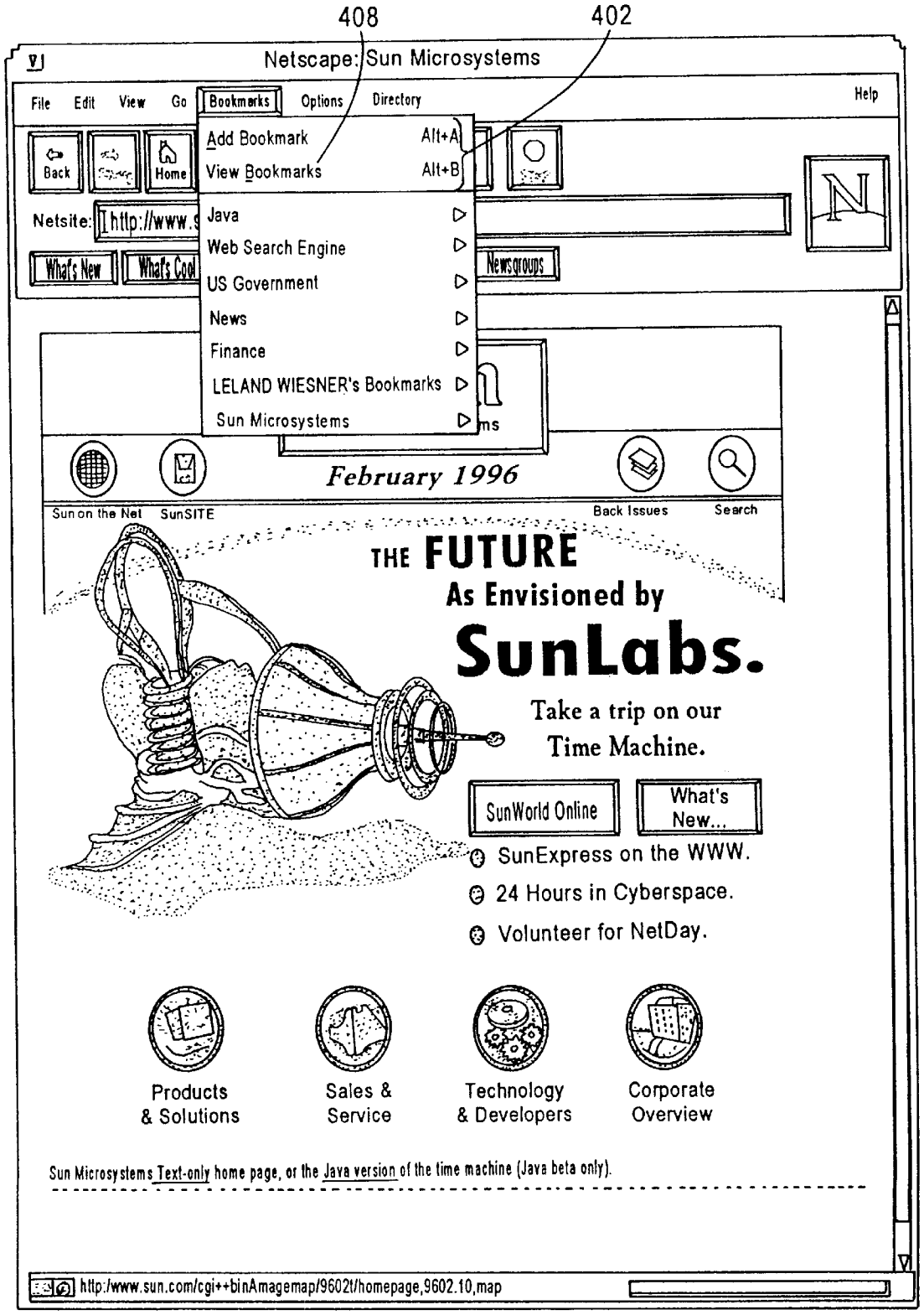
408
402
Netscape: Sun Microsystems
File Edit View Go Bookmarks Options Directory Help
Add Bookmark Alt+A
View Bookmarks Alt+B
Java
Web Search Engine
US Government
News
Finance
LELAND WIESNER's Bookmarks
Sun Microsystems
Back
Home
Netsite: http://www.s
What's New
What's Cool
Newsgroups
February 1996
Sun on the Net
SunSITE
Back Issues
Search
THE FUTURE
As Envisioned by
SunLabs.
Take a trip on our
Time Machine.
SunWorld Online
What's New...
SunExpress on the WWW.
24 Hours in Cyberspace.
Volunteer for NetDay.
Products & Solutions
Sales & Service
Technology & Developers
Corporate Overview
Sun Microsystems Text-only home page, or the Java version of the time machine (Java beta only).
http://www.sun.com/cgi++binAmagemap/9602t/homepage,9602.10,map

Figure 9

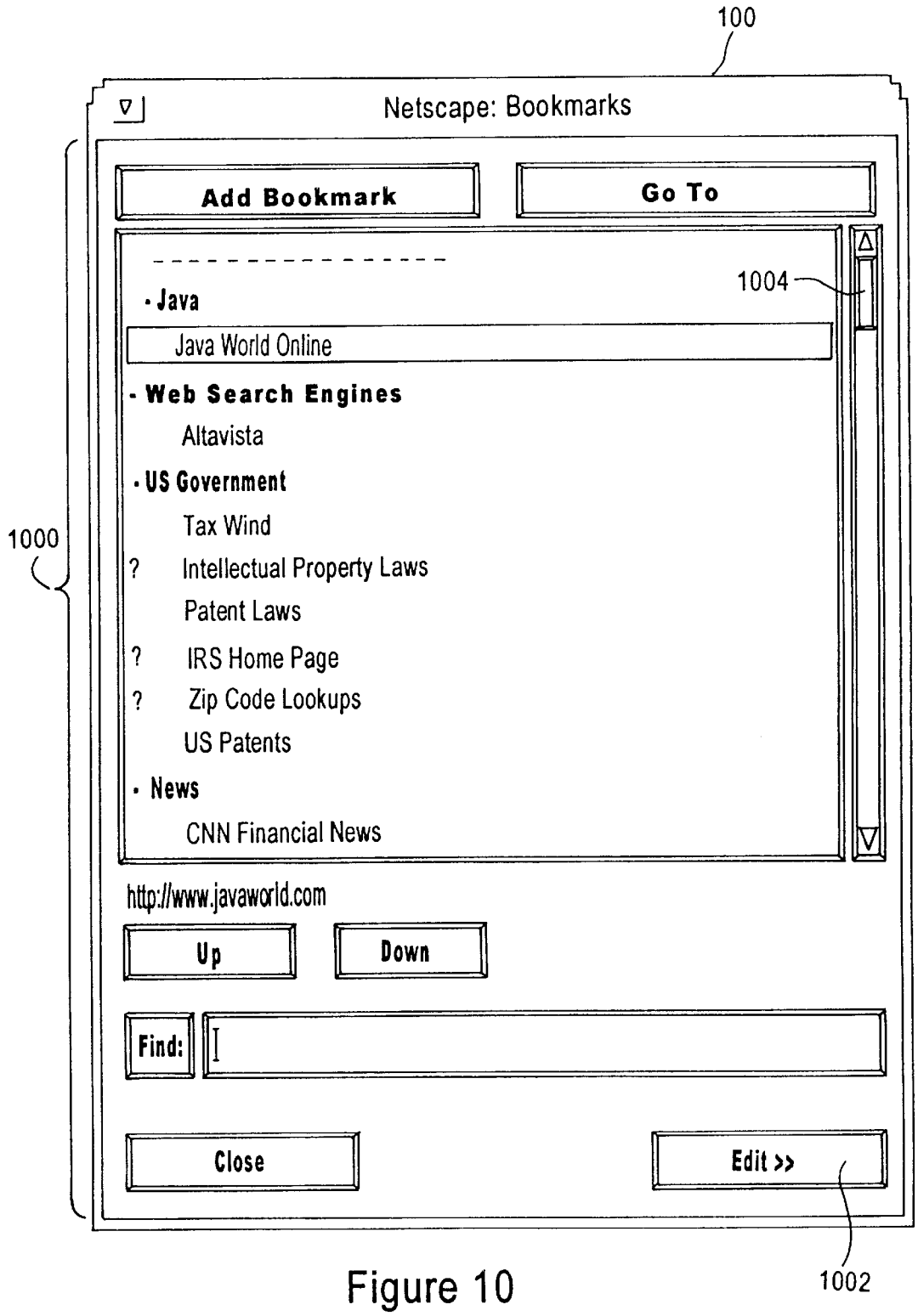
100
Netscape: Bookmarks
Add Bookmark
Go To
1004
• Java
Java World Online
• Web Search Engines
Altavista
• US Government
Tax Wind
? Intellectual Property Laws
Patent Laws
? IRS Home Page
? Zip Code Lookups
US Patents
• News
CNN Financial News
1000
http://www.javaworld.com
Up
Down
Find:
Close
Edit >>
1002

Figure 10

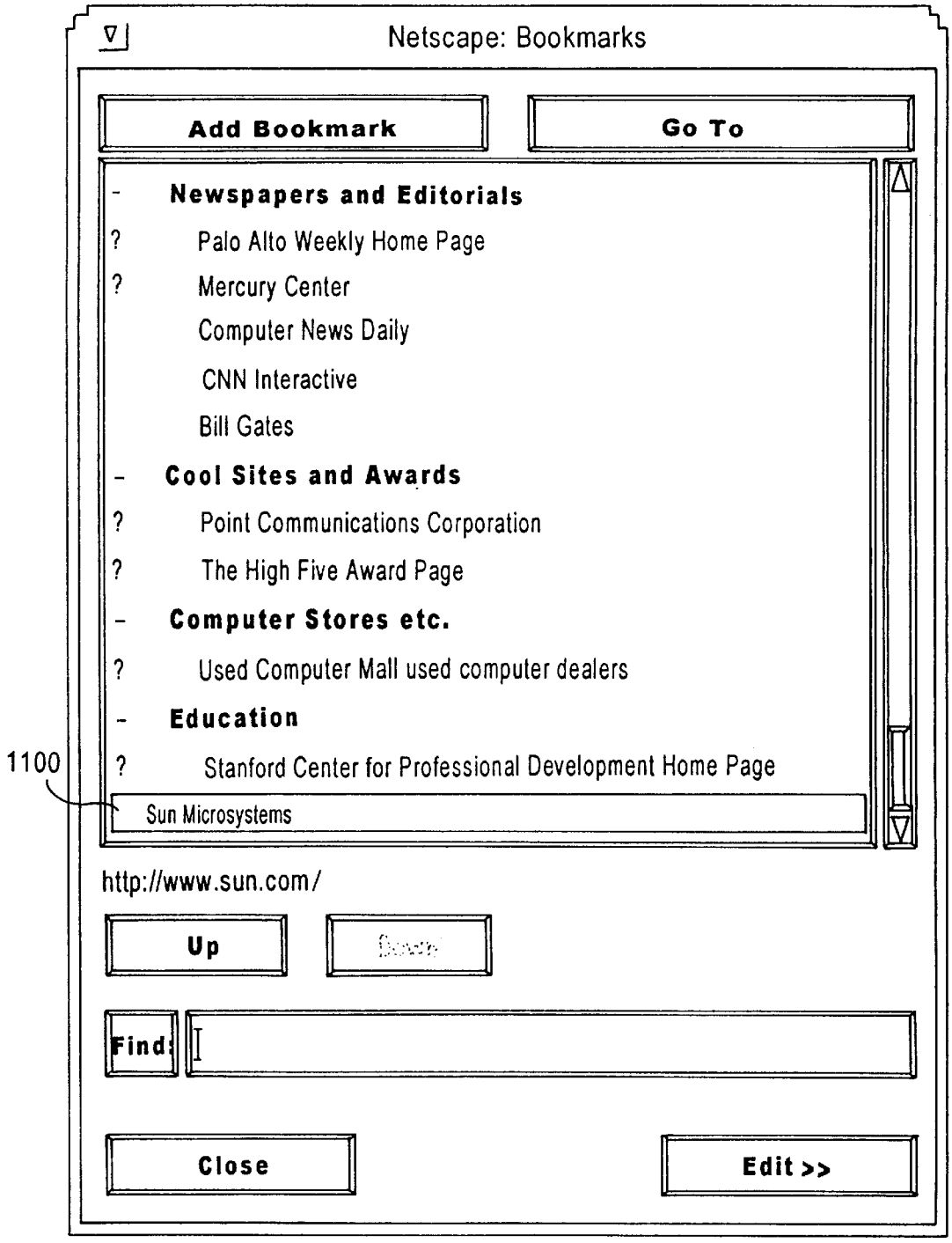
Netscape: Bookmarks
Add Bookmark
Go To
- Newspapers and Editorials
? Palo Alto Weekly Home Page
? Mercury Center
Computer News Daily
CNN Interactive
Bill Gates
- Cool Sites and Awards
? Point Communications Corporation
? The High Five Award Page
- Computer Stores etc.
? Used Computer Mall used computer dealers
- Education
? Stanford Center for Professional Development Home Page
1100
Sun Microsystems
http://www.sun.com/
Up
Find:
Close
Edit >>

Figure 11

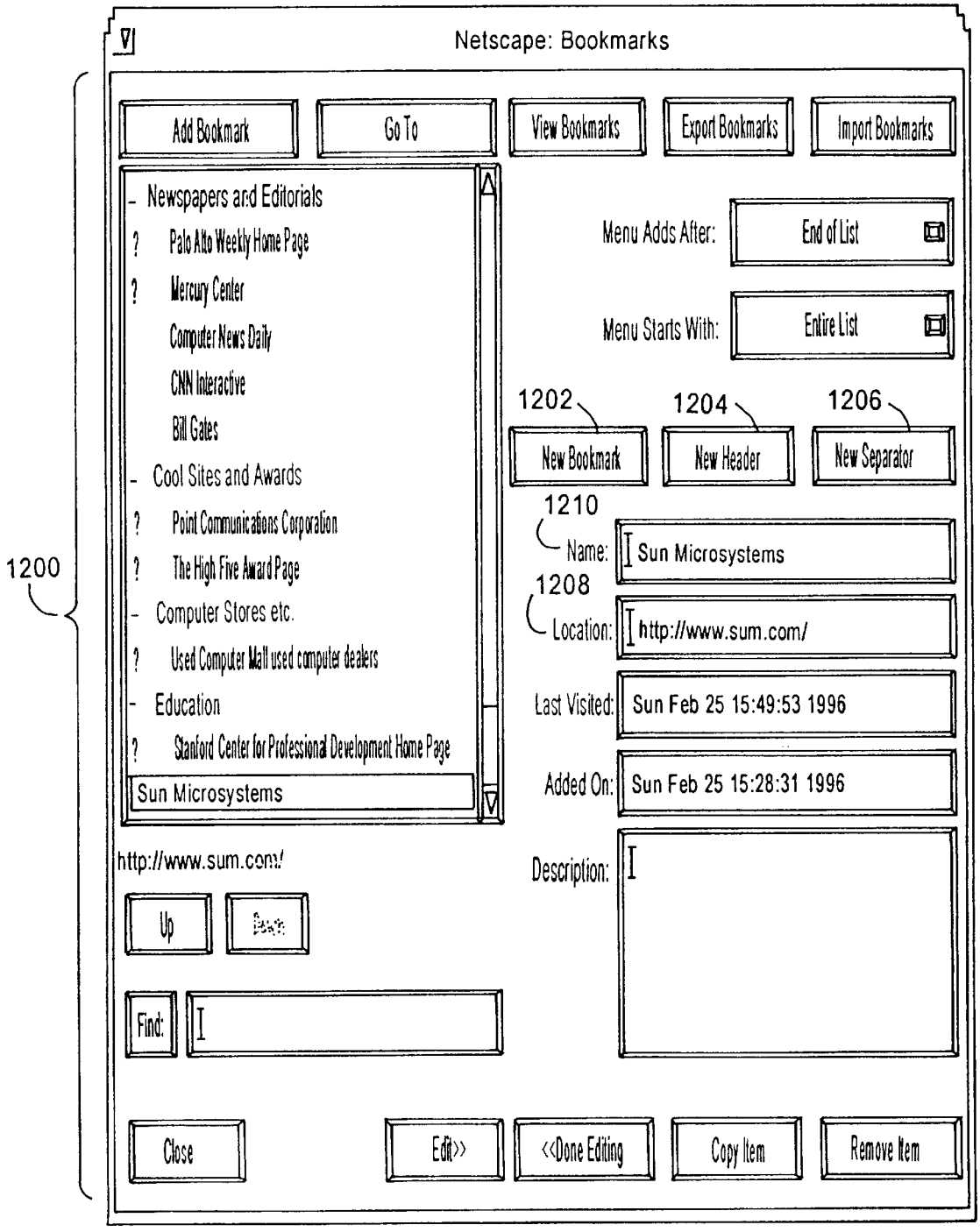
Netscape: Bookmarks
Add Bookmark
Go To
View Bookmarks
Export Bookmarks
Import Bookmarks
- Newspapers and Editorials
? Palo Alto Weekly Home Page
? Mercury Center
Computer News Daily
CNN Interactive
Bill Gates
- Cool Sites and Awards
? Point Communications Corporation
? The High Five Award Page
- Computer Stores etc.
? Used Computer Mall used computer dealers
- Education
? Stanford Center for Professional Development Home Page
Sun Microsystems
Menu Adds After:
End of List
Menu Starts With:
Entire List
1202
1204
1206
New Bookmark
New Header
New Separator
1210
Name:
Sun Microsystems
1208
Location:
http://www.sum.com/
Last Visited:
Sun Feb 25 15:49:53 1996
Added On:
Sun Feb 25 15:28:31 1996
Description:
http://www.sum.com/
Up
Find:
Close
Edit>>
<<Done Editing
Copy Item
Remove Item
1200

Figure 12

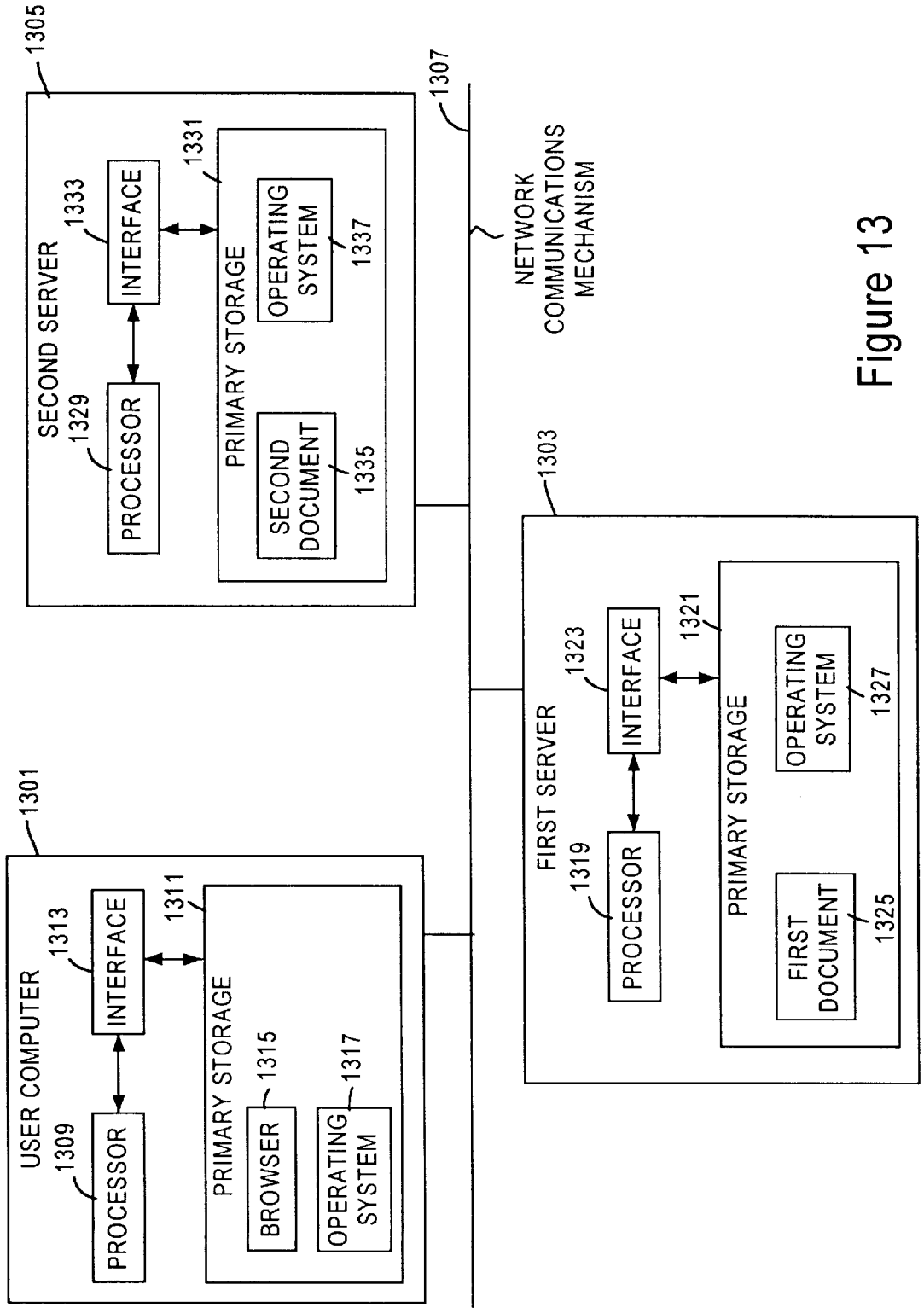
1305
SECOND SERVER
1329
PROCESSOR
1333
INTERFACE
1331
PRIMARY STORAGE
SECOND DOCUMENT
1335
OPERATING SYSTEM
1337
1307
NETWORK COMMUNICATIONS MECHANISM
1301
USER COMPUTER
1309
PROCESSOR
1313
INTERFACE
1311
PRIMARY STORAGE
BROWSER
1315
OPERATING SYSTEM
1317
1303
FIRST SERVER
1319
PROCESSOR
1323
INTERFACE
1321
PRIMARY STORAGE
FIRST DOCUMENT
1325
OPERATING SYSTEM
1327

Figure 13

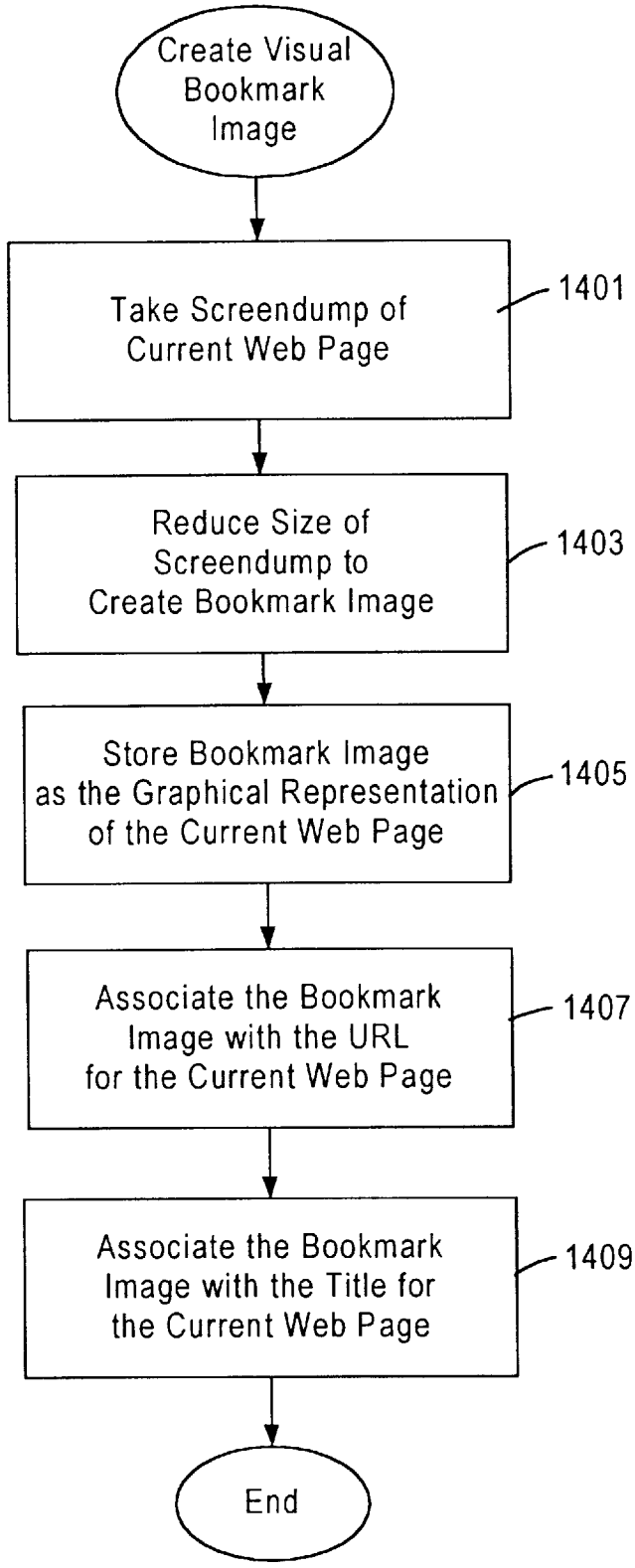
Create Visual Bookmark Image
Take Screendump of Current Web Page
1401
Reduce Size of Screendump to Create Bookmark Image
1403
Store Bookmark Image as the Graphical Representation of the Current Web Page
1405
Associate the Bookmark Image with the URL for the Current Web Page
1407
Associate the Bookmark Image with the Title for the Current Web Page
1409
End

Figure 14

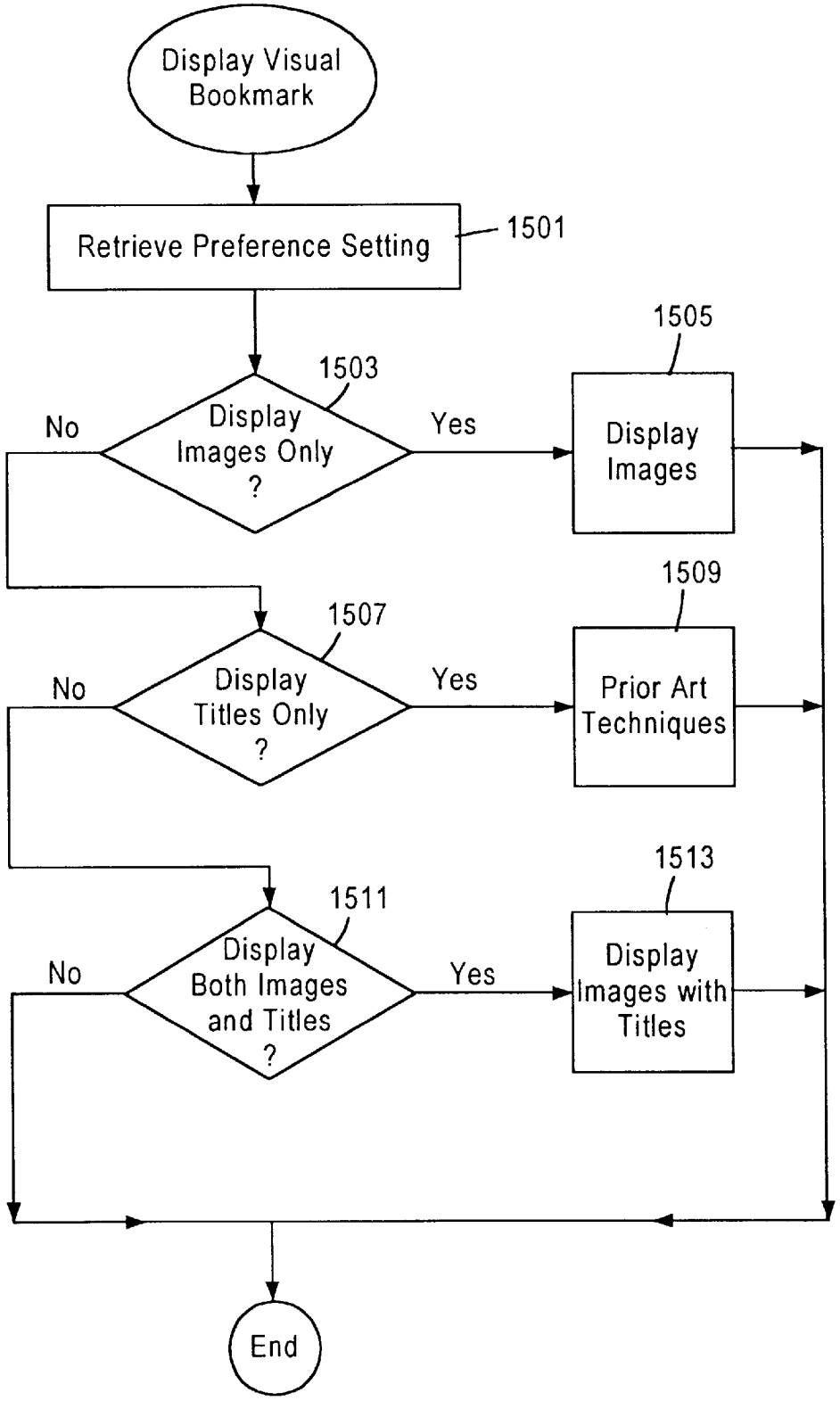
Display Visual Bookmark
Retrieve Preference Setting
1501
1503
Display Images Only ?
No
Yes
1505
Display Images
1507
Display Titles Only ?
No
Yes
1509
Prior Art Techniques
1511
Display Both Images and Titles ?
No
Yes
1513
Display Images with Titles
End

Figure 15

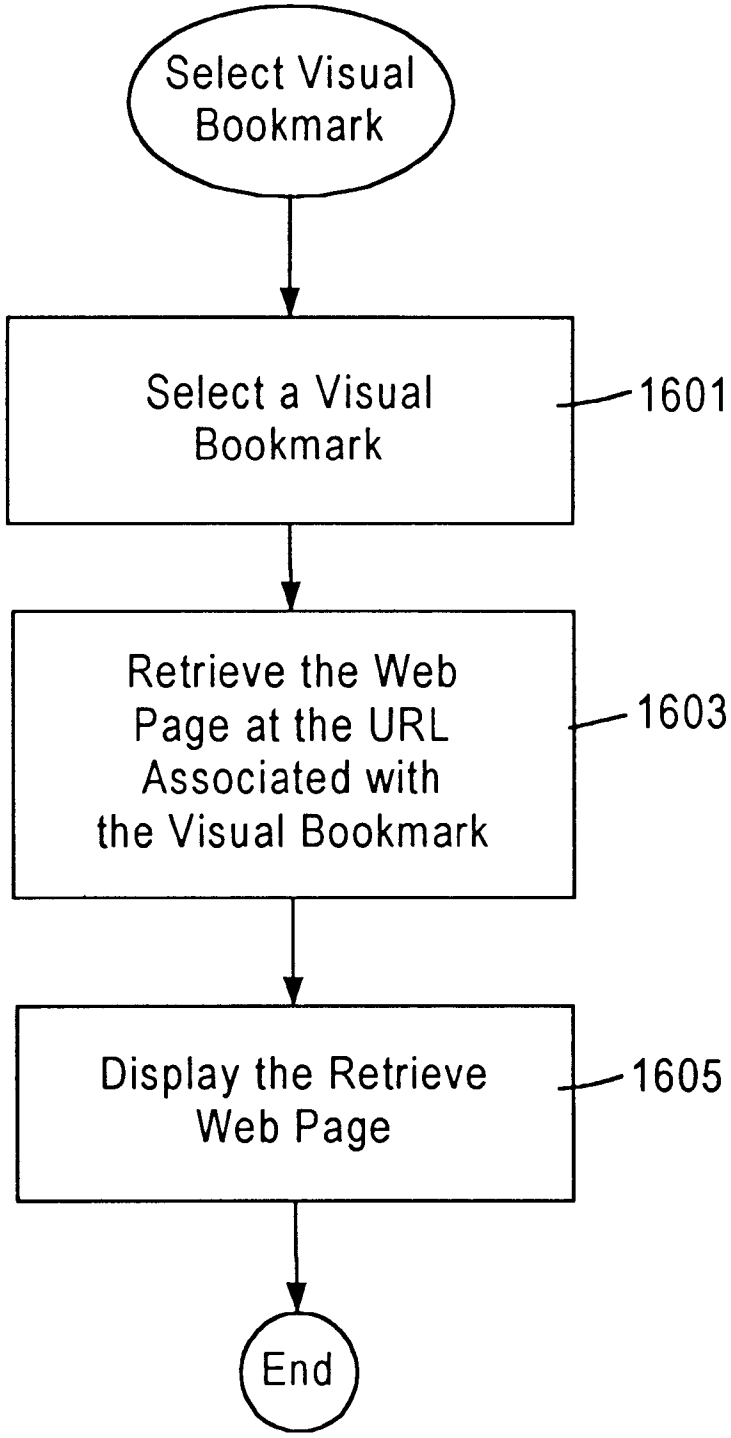
Select Visual Bookmark
Select a Visual Bookmark
1601
Retrieve the Web Page at the URL Associated with the Visual Bookmark
1603
Display the Retrieve Web Page
1605
End

Figure 16

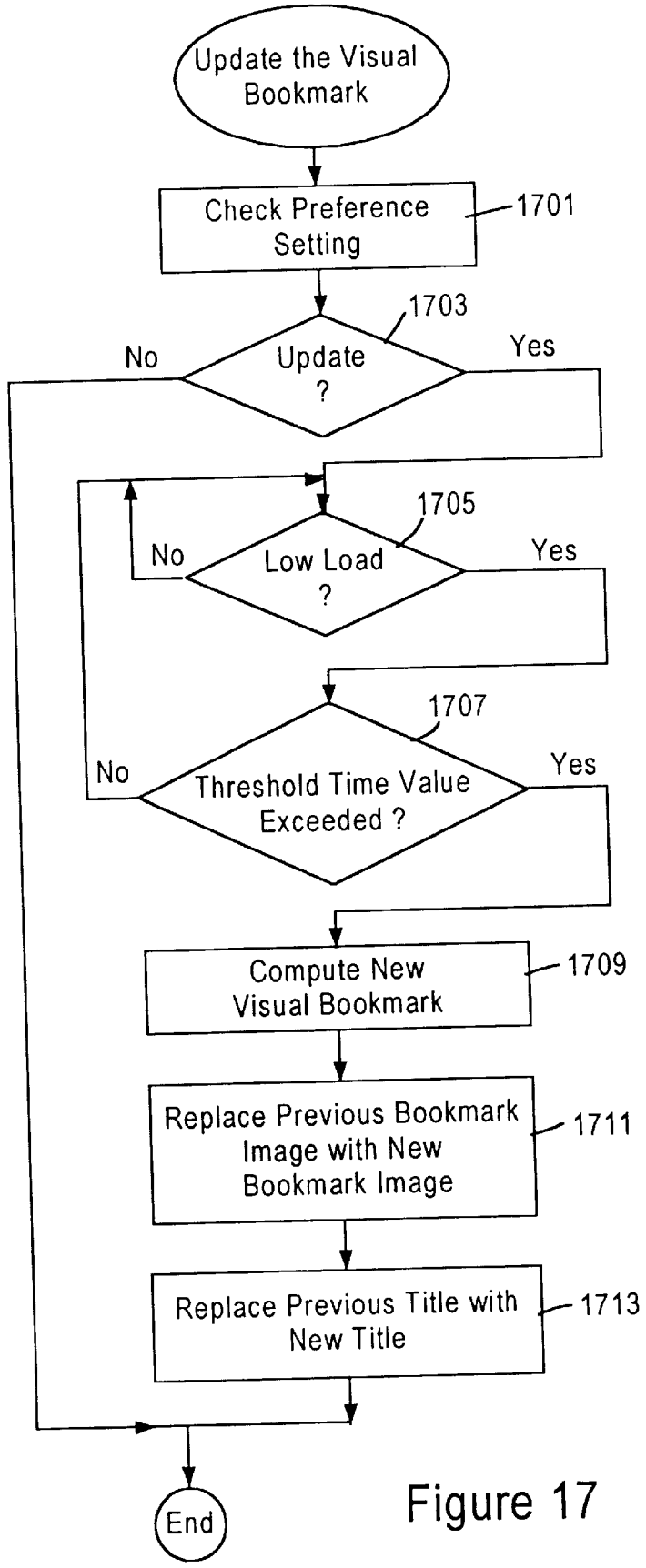
Update the Visual Bookmark
Check Preference Setting
1701
1703
Update ?
No
Yes
1705
Low Load ?
No
Yes
1707
Threshold Time Value Exceeded ?
No
Yes
Compute New Visual Bookmark
1709
Replace Previous Bookmark Image with New Bookmark Image
1711
Replace Previous Title with New Title
1713
End

Figure 17

# METHOD, APPARATUS AND PROGRAM PRODUCT FOR UPDATING VISUAL BOOKMARKS

## FIELD OF THE INVENTION

The present invention relates to an improved method and system for providing bookmarks in computerized information systems.

## BACKGROUND OF THE INVENTION

Almost all hypertext systems provide a facility for providing easy and fast access to a user's favorite pages on the World Wide Web ("web pages"). Such a facility is often referred to as a hotlist or a bookmark list. Existing systems depict the bookmark list as a textual list of web page titles (called "bookmarks") in a pull-down menu on a web browser. A typical pull-down menu also permits users to add new bookmarks to the list, update the titles associated with the web pages, and display the updated lists.

An example of how bookmarks are created, displayed, updated, and used to access web sites is demonstrated below using the Netscape Navigator™ browser from Netscape Communications Corporation ("Netscape"). Bookmark creation is typically user initiated. First, the user launches a browser program for browsing the Internet. FIG. **1** is a diagram of a user interface **100** for the Netscape Navigator browser from Netscape. Next, the user accesses a web site of interest (i.e., a web site which the user eventually wants to save as a bookmark) by inserting a Universal Resource Locator ("URL") into an "Open Location" dialog box and selecting an "Open" button. The "Open Location" dialog box is typically accessed by selecting an "Open" button **102** on a command bar **104** of the browser user interface **100**. FIG. **2** illustrates an Open Location dialog box **200**, loaded with a URL **202** for the Sun Microsystems'**198** home page. Dialog box **200** also includes a button **204**. When button **204** is actuated the browser retrieves the web page indicated by the URL and displays the retrieved web page on the user's computer. FIG. **3** illustrates the February 1996 home page of Sun Microsystems as displayed in the web page viewer section **300** of the browser **100** in response to actuation of button **204**.

In order to save the Sun Microsystems home page as a bookmark, the user selects a bookmarks menu item **302** from a menu bar **304**. FIG. **4** illustrates a state of the browser **100** after the user has selected the bookmarks menu item **302**. As FIG. **4** illustrates, selection of the bookmarks menu item displays a bookmarks pull-down menu **400**. The bookmarks pull-down menu consists of two primary components: a command section **402** and a bookmarks section **404**. The command section initially displays an "Add Bookmark" command **406** and a "View Bookmark" command **408**. In general, the bookmarks section displays all previously saved bookmarks. The bookmarks section displayed in FIG. **4** illustrates a five item list of previously saved bookmarks. In order to save the current web page as a new bookmark, the user selects the "Add Bookmarks" command from the command section **402**.

FIG. **5** illustrates a state of the bookmarks pull-down menu **400** after the Sun Microsystems home page has been added as entry **500**. Using the techniques discussed above, a user is able to save a bookmark for a favorite web site.

The process of displaying a web page associated with a bookmark is also user initiated. FIG. **6** illustrates the Netscape browser user interface as it displays CNN's Financial Network home page. The example which follows illustrates how a user, who is currently displaying CNN's home page on his or her browser, can use the Sun Microsystems bookmark **500** (FIG. **7**) to display Sun Microsystem's home page without using an "Open Location" dialog box. In short, the user positions a pointing device, such as a mouse pointer, over the Sun Microsystems bookmark, and actuates a mouse button to select the bookmark. In response to the user's selection, the browser displays Sun's home page (FIG. **8**).



The process of updating a bookmark is also user initiated. First the user selects the "View Bookmarks" command **408** from the command section **402** (FIG. **9**). In response to selection of the "View Bookmarks" command, a bookmarks dialog box **1000** with edit control button **1002** is displayed. FIG. **10** illustrates the bookmarks dialog box displayed in response to actuation of the "View Bookmarks" command from the bookmarks pull-down menu. The dialog box **1000** displays a list of the bookmarks currently stored by the browser. The user traverses the list by actuating a slider button **1004**. FIG. **11** illustrates a state of the dialog box after the user has traversed the list of bookmarks and has arrived at entry **1100** containing the Sun Microsystems bookmark. By actuating edit button **1002**, the dialog box **1000** expands to become dialog box **1200** (FIG. **12**). Dialog box **1200** contains additional edit control buttons **1202**, **1204**, and **1206**. Edit control button **1202** allows a user to add a URL to a location field **1208**. Edit control button **1204** allows a user to add a new header name to a name field **1210**. Edit control button **1206** allows a user to insert a graphical separation image in the list of bookmarks in dialog box **1000** (FIG. **10**). A user uses the edit control buttons to update data associated with bookmarks from the bookmark list.

Existing bookmark methods and systems cause four primary problems. First, some page designers do not include titles (for example for purely graphical pages) and therefore there is no text to put into the browser's list of bookmarks. Second, some titles are hard to recognize for users. For example, the web page entitled "Money and Investment Update" is probably most frequently thought of by users as the Wall Street Journal's web page. Third, visually oriented users may not like having to scan large boring lists of text. Finally, illiterate users, for example young children, may not be able to read the lists at all.

Embodiments of the present invention overcome the deficiencies of the prior art.

## SUMMARY OF THE INVENTION

Embodiments of the present invention provide a method and system for creating, displaying, selecting, updating, and using visual bookmarks. For example, when a user decides to bookmark a web page, embodiments of the invention take a screendump of the visual appearance of the web page in the browser. This screendump is then graphically reduced in size. The browser stores the bookmark image as the representation of the destination of the bookmark. The browser also stores the URL for the page, as well as its title.

To display images only or both images and text, the browser performs the following steps. When the user requests display of the bookmark list, the browser presents a page with a two-dimensional layout of the bookmark images. If the bookmark display setting is set to display both images and titles then the title is shown under the image.

The web page associated with a bookmark image is displayed when the user selects one of the bookmark images. As a result of the selection, the browser will retrieve and display the web page at the URL associated with the bookmark image.

To update bookmark representation the browser performs the following steps. Preferably during periods of low load, the browser retrieves one page at a time corresponding to the stored URLs. For each retrieved page, the browser computes a new bookmark image using the method as described above, with one exception, when the page was originally bookmarked, it was visible in the browser window, but when computing updated small images, the browser preferably draws the page on an off-screen bitmap (not shown) thus making it invisible to anybody who might be looking at the computer screen. As soon as an updated bookmark image has been computed for the bookmark, the browser deletes the previous bookmark image. The browser also retrieves and replaces the previously stored title of the page with its new title.

Notations and Nomenclature

The detailed descriptions which follow are presented largely in terms of methods and symbolic representations of operations on data bits within a computer. These method descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art.

A method is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. These steps require physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It proves convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like. It should be bourne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities.

Useful machines for performing the operations of the present invention include general purpose digital computers or similar devices. The general purpose computer may be selectively activated or reconfigured by a computer program stored in the computer. A special purpose computer may also be used to perform the operations of the present invention. In short, use of the methods described and suggested herein is not limited to a particular computer configuration.

For example, while the preferred embodiment of the present invention involves use of the Internet, those of ordinary skill will understand that any hypertext-enabled network could be used to implement embodiments of the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram of a user interface for the Netscape Navigator™ browser from Netscape Communications Corporation.

FIG. **2** illustrates an Open Location dialog box, loaded with a URL for the Sun Microsystems'™ home page.

FIG. **3** illustrates the February 1996 home page of Sun Microsystems as displayed in the web page viewer section of the Netscape Navigator browser.

FIG. **4** illustrates a state of the browser after display of a bookmarks pull-down menu.

FIG. **5** illustrates a state of the bookmarks pull-down menu after the Sun Microsystems home page has been added as an entry.

FIG. **6** illustrates the Netscape browser user interface as it displays CNN's Financial Network home page.

FIG. **7** illustrates a state of the browser after a user selects a bookmarks pull-down menu while displaying CNN's Financial Network home page.

FIG. **8** illustrates the February 1996 home page of Sun Microsystems as displayed in a web page viewer section of the browser in response to actuation of an Open Location button.

FIG. **9** illustrates the February **1996** home page of Sun Microsystems as displayed in the web page viewer section of the Netscape Navigator browser.

FIG. **10** illustrates the bookmarks dialog box displayed in response to actuation of the "View Bookmarks" command from the bookmarks pull-down menu.

FIG. **11** illustrates a state of the dialog box of FIG. **10** after the user has traversed the list of bookmarks and has arrived at entry containing the Sun Microsystems bookmark.

FIG. **12** illustrates an expanded version of the dialog box of FIG. **10**.

FIG. **13** is a block diagram of a network computer system for practicing the preferred embodiment of the present invention.

FIG. **14** is a flow diagram that illustrates the preferred steps for creating a bookmark image.

FIG. **15** is a flow diagram that illustrates the preferred steps for displaying a bookmark image.

FIG. **16** is a flow diagram that illustrates the preferred steps for using a bookmark image.

FIG. **17** is a flow diagram that illustrates the preferred steps for updating a bookmark image.

## DETAILED DESCRIPTION

Overview Of The Preferred Method

Embodiments of the present invention provide a method and system for creating, displaying, selecting, updating, modifying, and using visual bookmarks. For example, one embodiment facilitates the creation of the visual bookmark. When a user decides to bookmark a page, this embodiment of the invention takes a screendump of the visual appearance of the web page in the browser. This screendump is then graphically reduced in size. The browser stores the reduced image as the representation of the destination of the bookmark, and associates the image with both the URL for the page, as well as its title.

Another embodiment facilitates the display of the visual bookmark. In a preferred embodiment, the browser in fact has a preference setting to switch between three different ways of displaying bookmarks: display images only, display titles only, and display both images and titles. The preferred default setting is to display both images and titles. If the bookmark display setting is set to display titles only, the browser will act the same way as current browsers do.

If the bookmark display setting is set to display images only or both images and text, then the browser performs the following steps. When the user requests display of the bookmark list, the browser presents a page with a two-dimensional layout of the bookmark images. If the bookmark display setting is set to display both images and titles then the title is shown under the image.

Yet another embodiment facilitates accessing the web page associated with a bookmark image when the user selects one of the bookmark images. As a result of the selection, the browser will retrieve and display the web page at the URL associated with the image.

Another embodiment facilities the updating of bookmark image. The browser has a preference setting to allow the user to determine whether the bookmark representations should be updated or whether they should be kept constant. The

default value is to update the bookmark representations on a periodic basis. If the preference setting is set to update the bookmark representations the browser performs the following steps. The browser retrieves one page at a time corresponding to the stored URLs, if a threshold amount of time has passed since it was last retrieved by the browser. For each retrieved web page, the browser computes a new bookmark image using the method as described above, with one exception, when the page was originally bookmarked, it was visible in the browser window, but when computing updated small images, the browser preferably draws the page on an off-screen bitmap (not shown), thus making it invisible to anybody who might be looking at the computer screen. As soon as an updated bookmark image has been computed for the bookmark, the browser replaces the previous bookmark image with the updated bookmark image. The browser also replaces the previously stored title of the web page with its new title.

Overview Of The Preferred System

FIG. **13** is a block diagram of a network computer system **1300** for practicing the preferred embodiment of the present invention. The computer system **1300** includes a user computer **1301**, a first server **1303**, a second server **1305**, and a network communications mechanism **1307**.

The user computer **1301** includes a processor **1309**, a memory **1311**, and an interface **1313** for facilitating input and output in the user computer **1301**. The memory **1311** stores a number of items, including a browser **1315**, and an operating system **1317**. The preferred browser is a Java™ enabled browser such as Hot Java™ from Sun Microsystems, Inc., of Mountain View, Calif.[1] The preferred operating system is the Solaris™ operating system from Sun Microsystems, Inc.

1.Sun, Solaris, Java and Hot Java are trademarks or registered trademarks of Sun Microsystems, Inc., in the United States and other countries.

The first server **1303** includes a processor **1319**, a memory **1321**, and an interface **1323** for facilitating input and output in the first server **1303**. The memory **1321** stores a number of items, including a first document **1325**, and an operating system **1327**. The preferred operating system is the Solaris operating system from Sun Microsystems, Inc. of Mountain View, Calif.

The preferred first document is a text document interspersed with constructs of the HTML markup language (e.g., a document for a web page). Another possibility would be a text document

Page: **10** marked up with SGML (Standard Generalized Markup Language). In general, this embodiment does not require that the first document is encoded in HTML, If the first document is not encoded in HTML, SGML, or some other standard format, is acceptable.

This embodiment of the invention does rely on the title information being represented as text, though there is no requirement that the text be encoded in ASCII. For use with other languages, text may be encoded in Unicode (the preferred embodiment for non-European languages).

The second server **1305** includes a processor **1329**, a memory **1331**, and an interface **1333** for facilitating input and output in the second server **1305**. The memory **1331** stores a number of items, including a second document **1335**, and an operating system **1337**. The preferred second document is a text document interspersed with constructs of the HTML markup language (e.g., a document for a second web page). The preferred operating system is the Solaris operating system from Sun Microsystems, Inc. of Mountain View, Calif.

The network communications mechanism **1307** provides a mechanism for facilitating communication between the user computer **1301**, the first server **1303**, and the second server **1305**.

It should be noted that the user computer **1301**, the first server **1303**, and the second server **1305** may all contain additional components not shown in FIG. **13**. For example, each computer could also include some combination of additional components including a video display device, an input device, such as a keyboard, mouse, or pointing device, a CD-ROM drive, and a permanent storage device, such as a disk drive.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred implementation of the present invention is perhaps best described through reference to FIGS. **14–17**. FIG. **14** is a flow diagram which illustrates the preferred steps for creating a visual bookmark. In step **1401** the method takes a screendump of the visual appearance of the current web page displayed by the browser. In a preferred embodiment, the method takes the screendump using the "Snapshot" program of Sun Microsystems. Those of ordinary skill in the art will understand that on other computer platforms other screendump programs will be used. The programmer determines what is the best screendump facility for the particular platform when porting the system to a new platform. Any programmer with minimal knowledge of a particular platform would know what screendump program he or she likes.

In step **1403** the screendump is graphically reduced by a reduction factor, rho, that can be set as a user preference. In the preferred embodiment the default reduction factor is eighteen percent (18%). Thus, using the default value for rho, if the original web page was 200 pixels wide and 400 pixels high, the bookmark image will be 36 pixels wide (18% of 200) and 72 pixels high (18% of 400). The width and height of the bookmark image are both rounded to the nearest whole number of pixels.

In step **1405** the method stores the resulting bookmark image as the graphical representation of the current web page. In step **1407** the method associates the bookmark image with the URL for the current web page. Finally, in step **1409**, the method associates the bookmark image with the title for the current web page. If no title is available on the web page, then the empty string is associated with the bookmark image.

FIG. **15** is flow diagram which illustrates the preferred steps for displaying visual bookmarks. Before the steps of FIG. **15** are carried out, however, a preference setting data structure is set which indicates how the visual bookmarks should be displayed. In the preferred embodiment, the browser has a preference setting which allows a user to switch between three different ways of displaying bookmarks: display images only, display titles only, and display both images and titles. The preferred default setting is to display both images and titles.

In step **1501**, the method retrieves the preference setting to determine the display mode in which to display the bookmark images. In step **1503** the browser determines whether the preference setting is set to display images only. If the preference setting is set to display images only then in step **1507** the browser displays only images of the visual bookmarks. Upon completion of step **1507**, the browser ends processing. However, if the preference setting does not indicate that only images should be displayed then, in step

**1507**, the browser determines whether the preference setting indicates that only titles should be displayed. If only title should be displayed then the browser displays those titles using techniques well known in the prior art (step **1509**). Upon completion of step **1509** processing ends in the method to display bookmark images.

Returning to the discussion of step **1507**, if the preference setting does not indicate that only titles should be displayed (step **1511**), the method determines if the preference setting indicates that both images and titles should be displayed. If both images and titles should be displayed then, in step **1513**, the method displays both images and titles. Upon completion of **1513**, processing ends in the method to display bookmark images.

The preferred layout for displaying bookmark images is as follows: when the user requests to see the bookmark list, the browser presents a page with a two-dimensional layout of the bookmark images. The images run across the screen from left to right (if running in a locale where the reading direction is left-to-right) with a four-pixel blank space between each small image. If the bookmark display setting is set to display both images and titles then the title is shown under the image with the text word-wrapped to the width of the image. If rho is chosen as 18% then there will typically be room for five small images in each row. The browser continues to show images on as many additional rows as necessary. A vertical scrollbar should be used in case there are more rows than can be shown in the available window.

FIG. **16** is a flow diagram which illustrates the preferred steps performed in response to a user selection of a bookmark image. In step **1601**, the user selects a bookmark image. In step **1603** the user retrieves the web page at the URL associated with the bookmark image. In step **1605**, the method displays the retrieved web page. Upon completion of step **1605** the method to use bookmark images ends processing.

FIG. **17** is a flow diagram that illustrates the preferred steps for updating a bookmark image. In step **1701** the method checks an "update" preference settings data structure. The update preference settings data structure contains state data which indicates whether the bookmark images should be updated or whether they should be kept constant. In the preferred embodiment, the preference setting indicates that the bookmark image should be updated.

In step **1703** the method determines whether the preference setting data structure indicates that the bookmark image should be updated. If the preference setting indicates that the bookmark image should not be updated then processing in the method to update a bookmark image ends. However, if the preference setting indicates that the bookmark image should be updated, then in step **1705**, the method preferably checks to determines if the computer on which the browser is currently running is experiencing at period of "low load".

A "period of low load" is defined as having all the following four conditions met at the time when retrieval of a page is started:

a) No input has been received from the user for at least 30 minutes

b) The computer's CPU utilization is less than 50%

c) The local area network's utilization is less than 25%

d) The connection between the LAN and the Internet has a utilization of less than 25%

(Note: the parameters can be set to desired values by a system administrator, but the values given here are recommended defaults).

If the computer system is not experiencing low load then processing cycles at step **1705**. However, if the computer system is experiencing a low load then in step **1707**, the method determines whether a treshold time value has been exceeded. In a preferred embodiment, a web page is retrieved if it is at least 24 hours since the browser last retrieved the web page. If the threshold time value has not been exceeded then processing cycles back to step **1705**. If the treshold time value has been exceeded then processing continues with step **1709** where the method computes a new visual bookmark by taking a screendump of the web page associated with the bookmark image, and then reducing the size of the screendump to create a new bookmark image. In the preferred embodiment, when computing updated bookmark images, the browser draws the web page on an off-screen bitmap (thus making it invisible to anybody who might be looking at the computer screen). In step **1711** the method then replaces the previous bookmark image with the new bookmark image. In step **1713** the method replaces the previous title of the web page associated with the bookmark image with the new title associated with bookmark image. Upon completion of step **1713**, processing ends in the method to update a visual bookmark.

While specific embodiments have been described herein for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. For example, storage space may be conserved by converting the bookmark images into grayscale or black-and-white images before they are stored in the user does not have a color monitor. Also, if the web page being bookmarked contains so-called frames (a way of splitting the page up into different areas), then the bookmark image may be constructed either by capturing and reducing the entire page (this is the preferred embodiment) or by only capturing and reducing the main frame (usually, the main frame is defined as being the largest frame on the page).

Accordingly, the invention is not limited to the above described embodiments, but instead is defined by the claims in light of their full scope of equivalents.

What is claimed is:

**1**. A computer controlled method for updating a visual bookmark representing a web page, said visual bookmark including a location indicator for said web page and a current captured image of said web page; said method comprising steps of:

(a) accessing said visual bookmark to retrieve said location indicator;

(b) retrieving said web page using said location indicator;

(c) generating a new captured image of said web page; in response to said retrieving and

(d) replacing said current captured image with said new captured image in said visual bookmark.

**2**. The computer controlled method of claim **1** wherein said visual bookmark also includes a current title of said web page and said method further comprising:

(e) retrieving a new title from said web page; and

(f) replacing said current title in said visual bookmark with said new title.

**3**. The computer controlled method of claim **1** wherein said location indicator is a universal resource locator (URL).

**4**. The computer controlled method of claim **1** wherein step (c) generates said new captured image into an off-screen bitmap.

**5**. The computer controlled method of claim **1** wherein step (c) further comprises reducing said new captured image.

**6**. An apparatus having a central processing unit (CPU) and a memory coupled to said CPU for updating a visual

bookmark representing a web page, said visual bookmark including a location indicator for said web page and a current captured image of said web page; said apparatus comprises:

an access mechanism configured to access said visual bookmark to retrieve said location indicator;

a retrieval mechanism configured to retrieve said web page using said location indicator;

an image generation mechanism configured to generate a new captured image of said web page; in response to retrieving said web page; and

an image replacement mechanism configured to replace said current captured image with said new captured image in said visual bookmark.

**7**. The apparatus of claim **6** herein said visual bookmark also includes a current title of said web page and said apparatus further comprising:

a title retrieval mechanism configured to retrieve a new title from said web page; and

a title replacement mechanism configured to replace said current title in said visual bookmark with said new title.

**8**. The apparatus of claim **6** wherein said location indicator is a universal resource locator (URL).

**9**. The apparatus of claim **6** wherein the image generation mechanism generates said new captured image into an off-screen bitmap.

**10**. The apparatus of claim **6** wherein step the image generation mechanism further comprises an image reduction mechanism configured to reduce said new captured image.

**11**. A computer program product comprising:

a computer usable storage medium having computer readable code embodied therein for updating a visual bookmark representing a web page, said visual bookmark including a location indicator for said web page and a current captured image of said web page; said computer readable code comprising:

computer readable program code configured to cause said computer to effect an access mechanism configured to access said visual bookmark to retrieve said location indicator;

computer readable program code configured to cause said computer to effect a retrieval mechanism configured to retrieve said web page using said location indicator;

computer readable program code configured to cause said computer to effect an image generation mechanism configured to generate a new captured image of said web page; in response to retrieving said web page; and

computer readable program code configured to cause said computer to effect an image replacement mechanism configured to replace said current captured image with said new captured image in said visual bookmark.

**12**. The computer program product of claim **11** wherein said visual bookmark also includes a current title of said web page and said product further comprising:

computer readable program code configured to cause said computer to effect a title retrieval mechanism configured to retrieve a new title from said web page; and

computer readable program code configured to cause said computer to effect a title replacement mechanism configured to replace said current title in said visual bookmark with said new title.

**13**. The computer program product of claim **11** wherein said location indicator is a universal resource locator (URL).

**14**. The computer program product of claim **11** wherein the image generation mechanism generates said new captured image into an off-screen bitmap.

**15**. The computer program product of claim **11** wherein step the image generation mechanism further comprises computer readable program code configured to cause said computer to effect an image reduction mechanism configured to reduce said new captured image.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

# CERTIFICATE OF CORRECTION

PATENT NO. : 5,963,964
DATED : Oct. 5, 1999
INVENTOR(S) : Nielsen

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims, in Claim 1, line 9, after the word "page" remove semicolon (;) and in the same claim, line 10, insert the semicolon (;) before the word "and". In Claim 6, line 12, remove the semicolon (;) after the word "page" and finally, in Claim 11, line 18, after the word "page" remove the semicolon (;).

Signed and Sealed this
Eleventh Day of April, 2000

*Attest:*

*Attesting Officer*

Q. TODD DICKINSON

*Director of Patents and Trademarks*