US007640517B2

(12) **United States Patent**
Moehrle

(10) **Patent No.:** **US 7,640,517 B2**
(45) **Date of Patent:** **Dec. 29, 2009**

(54) **ACTIVE PATH MENU NAVIGATION SYSTEM**

(76) Inventor: **Armin Moehrle**, 1824 N. Milwaukee Ave., Chicago, IL (US) 60647

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 372 days.

(21) Appl. No.: **11/625,314**

(22) Filed: **Jan. 20, 2007**

(65) **Prior Publication Data**

US 2007/0157127 A1 Jul. 5, 2007

Related U.S. Application Data

(63) Continuation of application No. 10/164,520, filed on Jun. 6, 2002, now Pat. No. 7,191,411.

(51) **Int. Cl.**

G06F 3/01	(2006.01)
G06F 3/05	(2006.01)
G06F 17/30	(2006.01)

(52) **U.S. Cl.** **715/855**; 715/829; 715/853; 715/854; 715/847

(58) **Field of Classification Search** 715/855, 715/829, 853, 854, 847
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,801,702	A	9/1998	Dolan	
6,236,400	B1 *	5/2001	Guerrero	715/841
6,240,410	B1	5/2001	Wical	
6,256,028	B1	7/2001	Sanford	
6,462,762	B1	10/2002	Ku	
6,597,377	B1	7/2003	MacPhail	
6,621,532	B1	9/2003	Mandt	
6,633,316	B1	10/2003	Maddalozzo, Jr. et al.	
6,832,350	B1	12/2004	Bates et al.	
6,990,638	B2	1/2006	Barksdale	

FOREIGN PATENT DOCUMENTS

EP	0947921 A	10/1999

OTHER PUBLICATIONS

Bowler D et al, Navigation Bars for Hierarchical Web Sites, Student HCI Online Research Experiments, Onine! 2001, pp. 1-23 XP002286023 University of Maryland, US.
RFC 1738 Dec. 1994, Internet RFC/STD/FYI/BCP Archives pp. 1 and 4.
Sun Microsystems Inc: "Quick Start to Using OpenStep Desktop", Online! Sep. 1996, XP00228624 pp. 51 to 5-9.
IBM: Fully Navigatable Breadcrumb Trails Research Disclosure, Keeth Mason Publications, Hampshire GB, vol. 46', No. 130, Sep. 2002, XP007131244, ISSN:0374-4353.

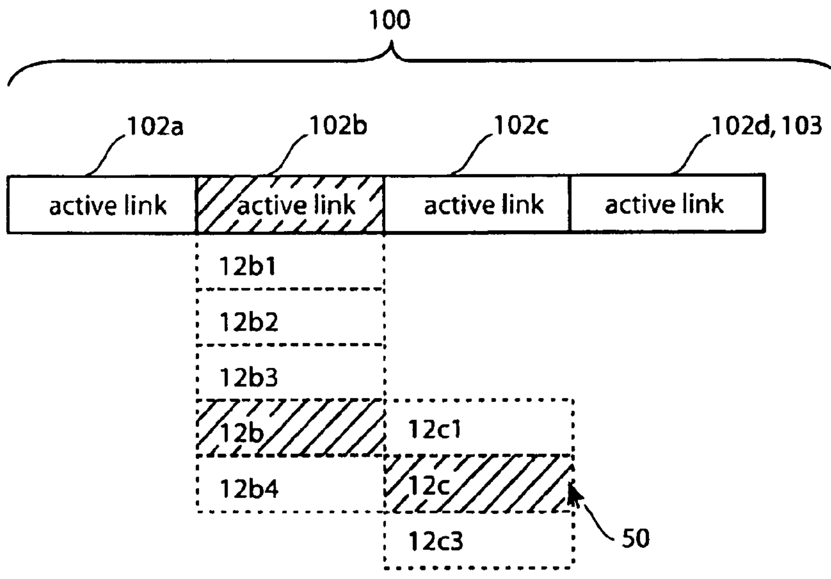
* cited by examiner

Primary Examiner—Namitha Pillai
(74) *Attorney, Agent, or Firm*—Jonathan Feuchtwang

(57) **ABSTRACT**

A method for navigating within a multi-level hierarchical collapsing menu structure is disclosed. Each level in the menu structure contains plural items, each item being at least one of a function, a pointer to a location, and a pointer to another level. The method of the present invention includes a step of providing a graphical user menu system displaying the items of a given level and enabling selection thereof, wherein access of the given level requires sequential access of each of the levels preceding the given level in the hierarchy. An Active Path is dynamically constructed as a sequence of active links as items are selected using the graphical user menu system, with one active link correspond to each of the items selected. The active links provide direct access to a function corresponding level or menu item without the need to navigate using the graphical user menu system.

7 Claims, 6 Drawing Sheets



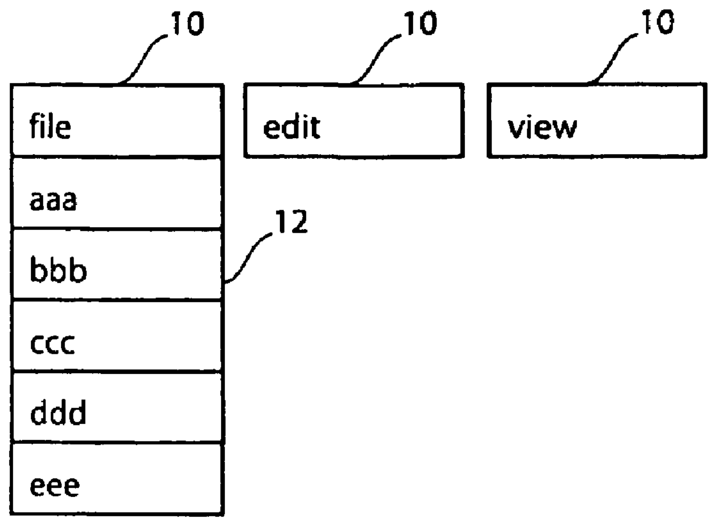

10
10
10
file
edit
view
aaa
bbb
12
ccc
ddd
eee

fig. 1a

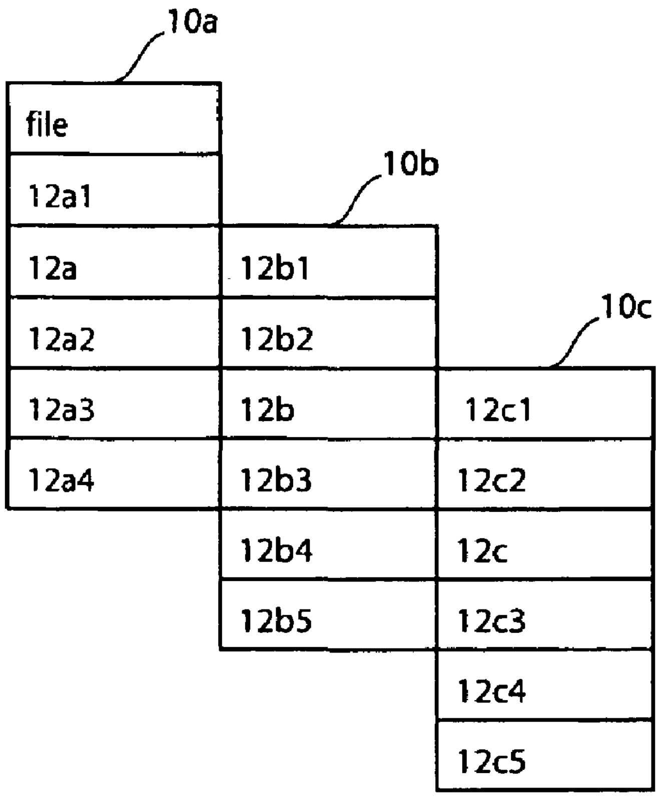

10a
file
12a1
10b
12a
12b1
12a2
12b2
10c
12a3
12b
12c1
12a4
12b3
12c2
12b4
12c
12b5
12c3
12c4
12c5

fig. 1b

c:\windows\applications\temp\help.doc

20

fig. 2a

http://www.uspto.gov/patents/applications

fig. 2b

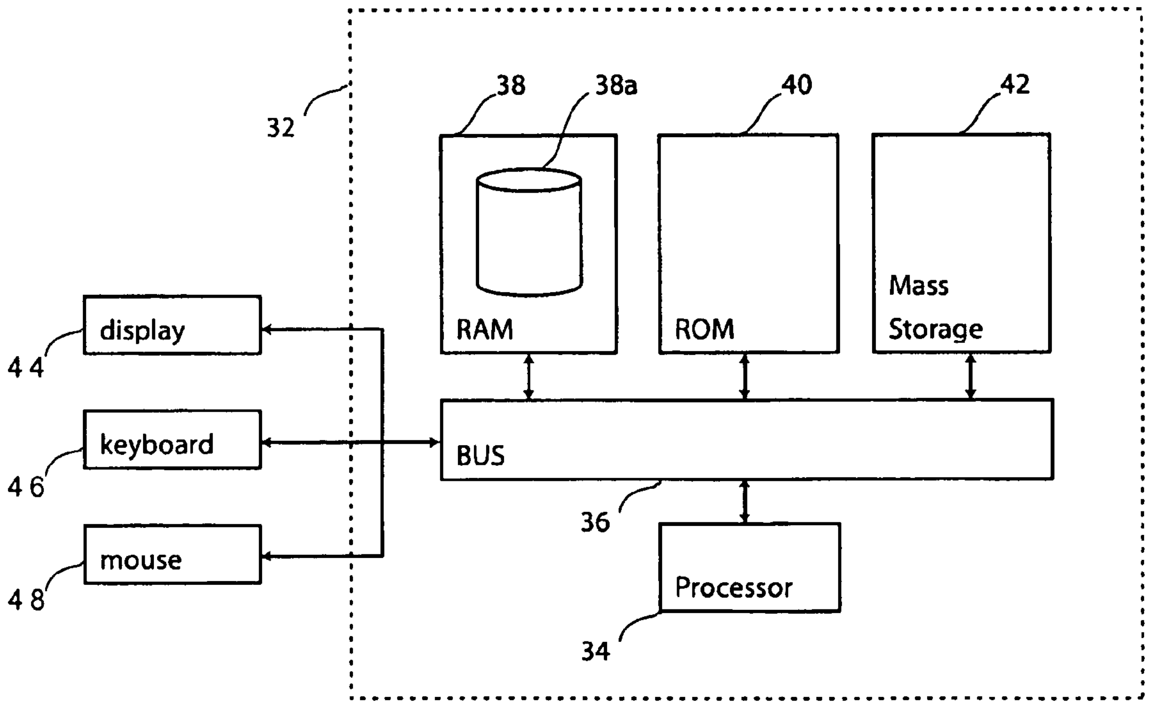


fig. 3

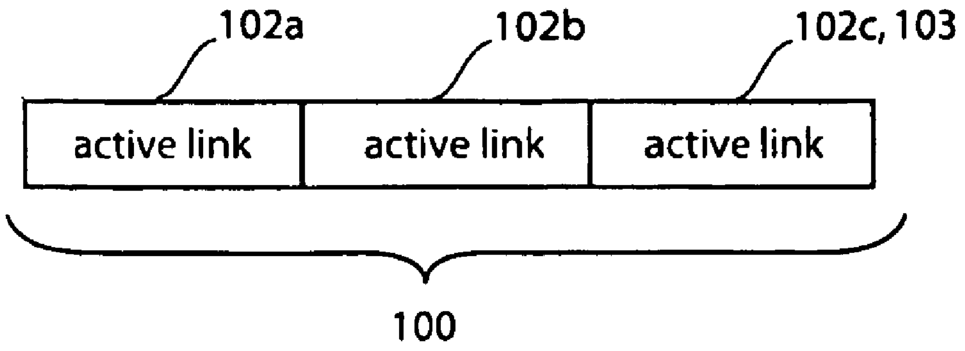

102a
102b
102c, 103
active link
active link
active link
100

fig. 4

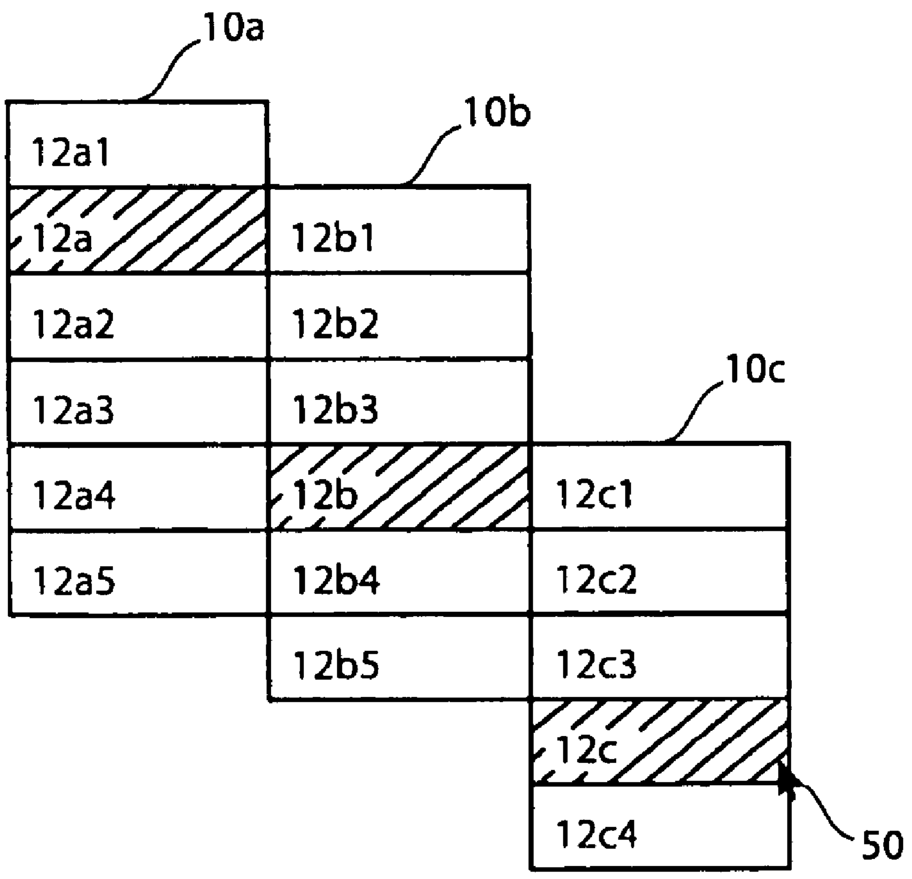

10a
10b
10c
12a1
12a
12a2
12a3
12a4
12a5
12b1
12b2
12b3
12b
12b4
12b5
12c1
12c2
12c3
12c
12c4
50

fig. 5a

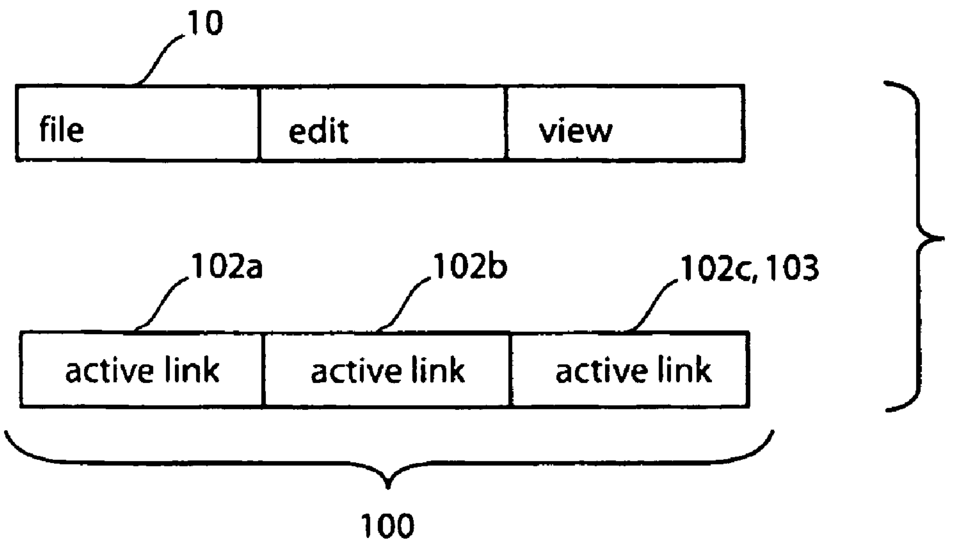

10
file
edit
view
102a
102b
102c, 103
active link
active link
active link
100

fig. 5b

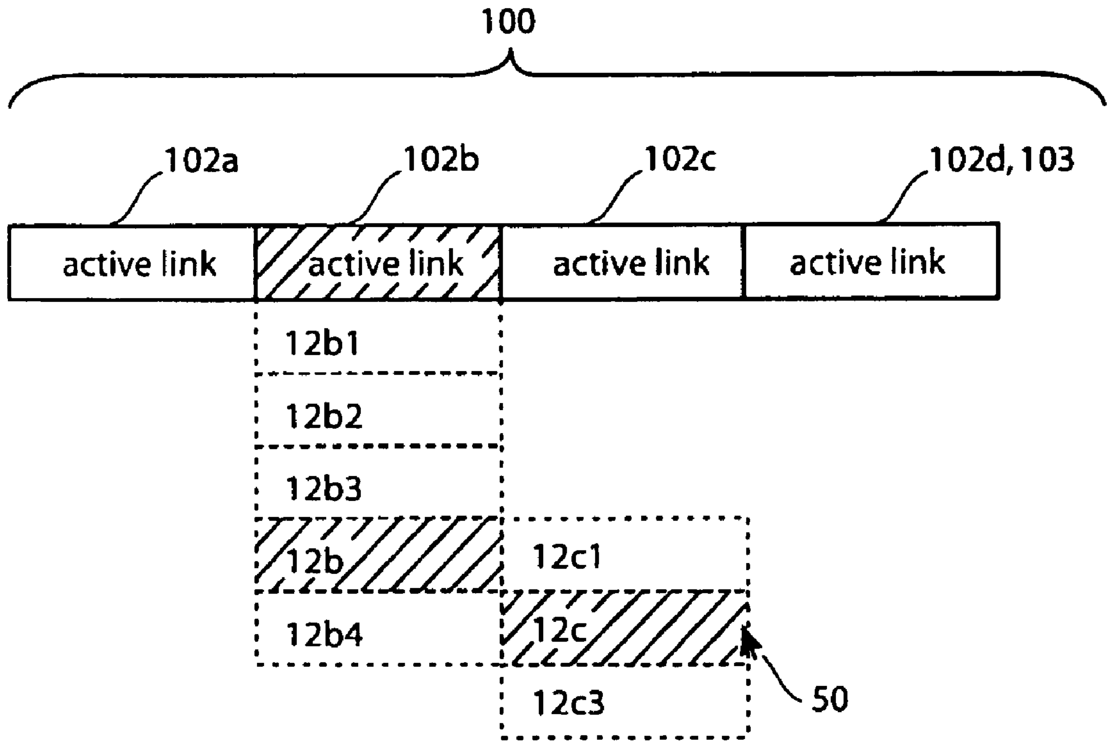

100
102a
102b
102c
102d, 103
active link
active link
active link
active link
12b1
12b2
12b3
12b
12b4
12c1
12c
12c3
50

fig. 5c

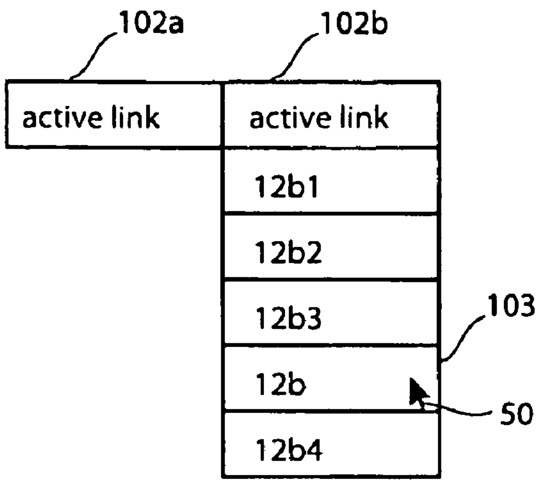

102a
102b
active link
active link
12b1
12b2
12b3
103
12b
50
12b4

fig. 5d

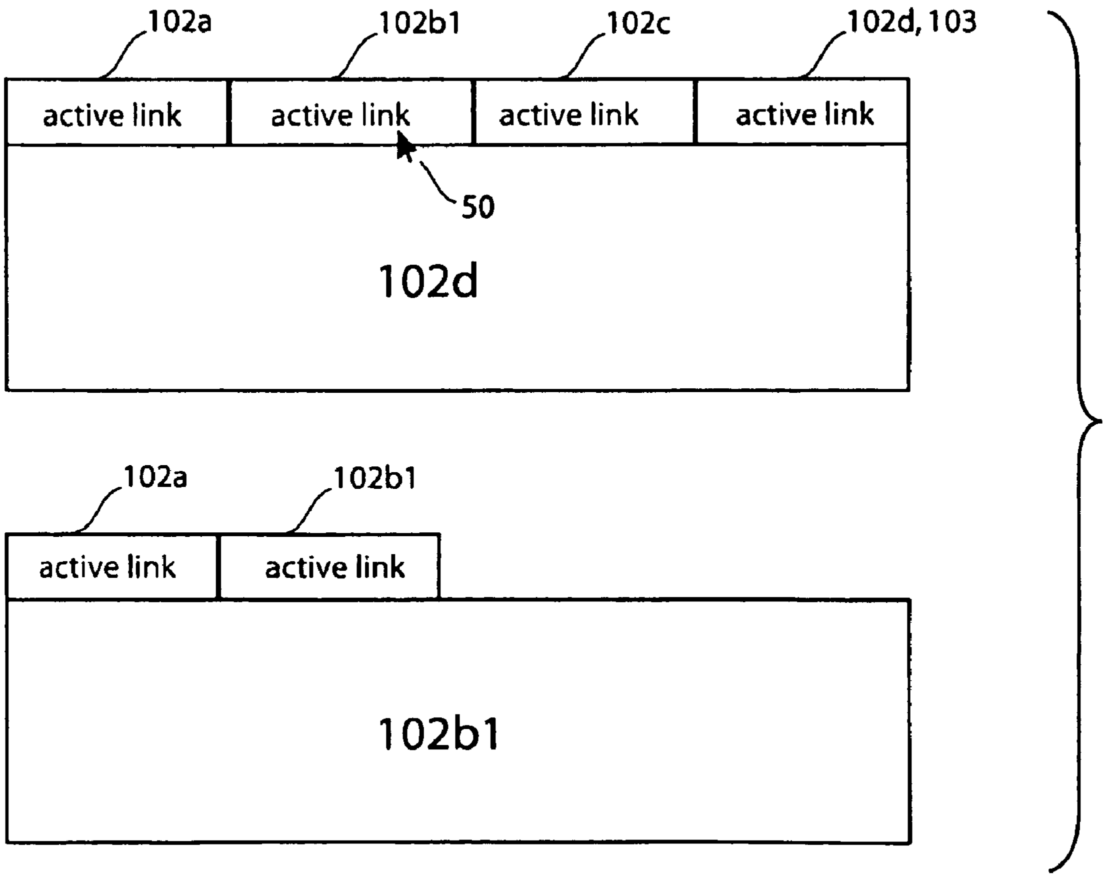

102a
102b1
102c
102d, 103
active link
active link
active link
active link
50
102d
102a
102b1
active link
active link
102b1

fig. 5e

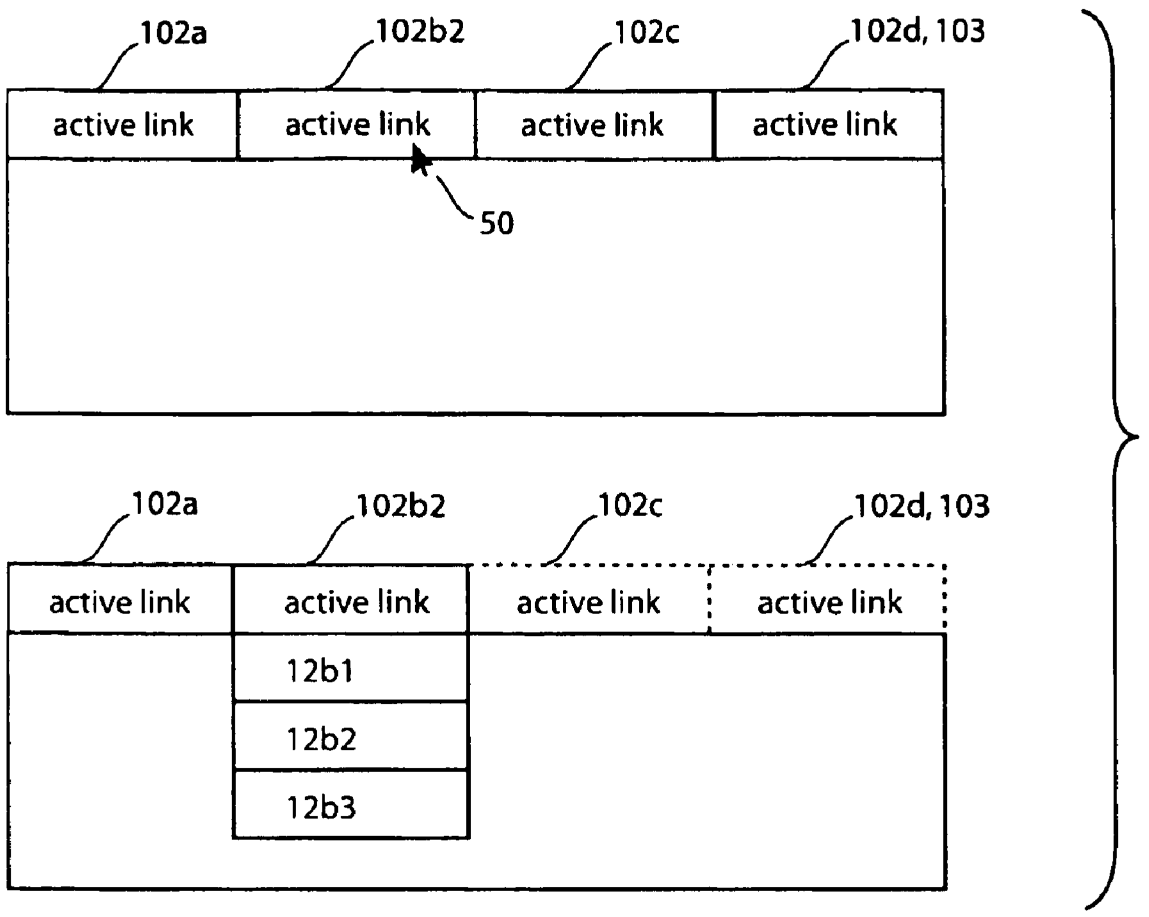

102a
102b2
102c
102d, 103
active link
active link
active link
active link
50
102a
102b2
102c
102d, 103
active link
active link
active link
active link
12b1
12b2
12b3

fig. 5f

ACTIVE PATH MENU NAVIGATION SYSTEM

This application is a continuation of application Ser. No. 10/164,520 filed Jun. 6, 2002, issued as U.S. Pat. No. 7,191,411.

FIELD OF THE INVENTION

The present invention generally relates to a navigation system used to navigate a hierarchical menu such as a directory structure or a pull-down menu. The menu navigation system of the present invention may be implemented in software executing on a standalone software program or on a client server application. More particularly, the menu navigation system of the present invention allows a user to access different levels in a hierarchical menu system without retracing back to the top level of the hierarchy.

BACKGROUND OF THE INVENTION

Hierarchical systems are used to organize items by function or theme in order to facilitate efficient locating of functions or locations. Hierarchical systems are used to organize documents into directories or folders and to organize functions into pull-down menus.

Conventionally one of two navigation systems are used to navigate through the various levels of a menu tree. By far the most popular menu navigation system is the so-called collapsing menu system which, for example, is used by many traditional personal computer applications. The distinguishing characteristics of this system are that the navigation always commences from the initial or root level and that the menu collapses or disappears after a selection is made.

Computer software frequently includes dozens of functions. The sheer number of features makes it desirable to organize the functions into a hierarchy of categories to facilitate efficient searching. In a collapsing menu system each level in the hierarchy is presented as a level in the pull-down menu.

FIG. **1**A shows a top or root level **10** of a hypothetical menu. Each level **10** of the menu provides a list of menu choices **12**. Each menu choice **12** could be an end node such as a function whose selection initiates some action, or the menu choice **12** could lead (point) to another level **10** providing a further list of menu choices **12**. Selection of an end node will cause the pull-down menu to collapse back to the root level.

FIG. **1**B shows the pull-down menu of FIG. **1**A with several levels of the hierarchical menu expanded. The menu structure of FIG. **1**B collapses back to the root level shown in FIG. **1**A once an end node is selected. The defining characteristic of such a conventional navigation system is that navigation is one-way, and always starts from the root level to an end node. This method of navigation becomes cumbersome if the desired function or destination is buried several levels down from the root directory.

To address this shortcoming, conventional operating systems such as Microsoft Windows® provide short-cuts in the form of pre-defined function keys or icons. Such short-cuts enable the user to directly access the desired function associated with the short-cut.

In the absence of a pre-defined short-cut, the user must resort to navigating the menu structure. The problem with the collapsing menu system is that navigation must always commence from the root level. Consequently more experienced users are unable to take advantage of their knowledge of the hierarchical structure to directly access a given level.

FIG. **2**A shows a conventional path menu system **20** used to navigate through the directory structure of a disk. Similarly, FIG. **2**B shows a conventional universal resource locator (URL) command which operates similarly to the DOS path command of FIG. **2**A. The conventional disk operating system (DOS) uses a path menu system **20** to navigate between various folders. Each folder represents a different level in the hierarchy. A given folder may contain one or more sub-folders. To access a target or destination level the user must know the path, i.e., the names of the each of the folders from the root folder to the target folder. A system of displaying the contents of each folder is provided to guide the user through the hierarchy. Namely, by typing a command such as DIRECTORY (DIR) the user is provided with the contents of the present folder and the path leading to the present folder. The user may proceed to a sub-level in the hierarchy or may retrace his/her steps to a preceding level by knowing the path.

Navigation using the path menu system requires the user to memorize and enter complex hierarchical sequences. This method of navigation is time consuming not suitable for users who have not memorized the path. Moreover, this method becomes extremely cumbersome as the number of levels increases. Accordingly, one object of the present invention is to provide a more efficient way of navigating hierarchical menu systems.

SUMMARY OF THE INVENTION

A method for navigating within a multi-level hierarchical collapsing menu structure is 15 disclosed. Each level in the menu structure contains plural items, each item being at least one of a function, a pointer to a location, and a pointer to another level.

The method of the present invention includes a step of providing a graphical user menu system displaying the items of a given level and enabling selection thereof, wherein access of the given level requires sequential access of each of the levels preceding the given level in the 20 hierarchy. An Active Path is dynamically constructed as a sequence of active links as items are selected using the graphical user menu system, with one active link correspond to each of the items selected. The active links provide direct access to a function corresponding level or menu item without the need to navigate using the graphical user menu system.

According to a further aspect of the invention, pre-defined short-cuts are provided which enable direct access to a given menu item. The Active Path is dynamically constructed when one of the pre-defined short-cuts are executed, with one active link corresponding to each of the menu items necessary to access the given menu item using the graphical user menu system.

Navigation using the Active Path is accomplished by at least of one of rolling over and selecting an active link using a pointing device. Rolling over a given active link triggers the display of sibling menu items on the level associated with the given active link. Selecting a given active link triggers the execution of a function associated with the given active link.

These and other aspects of the present invention will be explained with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B are view of a conventional collapsing menu system;

FIG. **2**A is a view of a conventional path menu system;

FIG. **2**B is a view of a conventional universal resource locator address;

FIG. **3** is a block diagram of a conventional computer architecture;

FIG. **4** is a view of the Active Path menu system of the present invention;

FIGS. **5**A and **5**B are views showing how the Active Path is assembled as the user navigates the collapsing menu system; and

FIGS. **5**C-**5**F are views showing how the Active Path is used to navigate.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **3** is a block diagram of a computer **32** on which the software of the present invention operates. In the preferred embodiment, the main logic of the computer **32** is embodied by a general-purpose, programmable microprocessor **34**, which in conventional practice will have an on-board memory cache (not shown) and which may be associated with one or more mathematics or other special-purpose coprocessors (not shown).

The processing logic generally represented by processor **34** is connected by a bus structure **36** to the various other components of the computer **32**. The schematic representation of bus **36** is shown in FIG. **3** as a simple and unitary structure, but in conventional practice, as is known to those in the art, there usually are several buses and communication pathways **36**, operating at different speeds and having different purposes. Further, bus **36** may be segmented and controlled by respective bus controllers, as is also known in the art.

Computer **32** will also have a random access memory unit or units **38** connected to the bus **36**. RAM **38** (which may be DRAM, SDRAM or other known types) typically has loaded into it the operating system of the computer **32** and executable instructions for one or more special applications designed to carry out the invention. Computer **32** also has electronic read-only memory **40** for storing those programs such as the BIOS which are non-volatile and persist after the computer **32** is shut down.

In alternative embodiments of the invention, one or more components of the invention's logic may be "hard-wired" into the ROM **40** instead of loaded as software instructions into RAM **38**. ROM **40** can consist of or comprise electrically programmable read-only memory (EPROM), electrically erasable and programmable read-only memory (EEPROM) of either flash or nonflash varieties, or other sorts of read-only memory such as programmable fuse or antifuse arrays.

In a typical architecture, a computer program suitable for carrying out the invention will be stored on a mass storage device **42**, such as an optical disk or magnetic hard drive. Bus **36** connects mass storage device **42** to RAM **38**. The computer **32** is connected to various peripheral devices used to communicate with an operator, such as display **44**, keyboard **46**, and pointing device (mouse) **48**.

In operation, operating system software such as Microsoft Windows® executes on the computer **32**, and the user interacts with the operating system using the display **44**, keyboard **46**, and pointing device (mouse) **48**.

FIG. **4** shows the Active Path menu system **100** of the present invention which is visually similar to the conventional (DOS) path menu system of FIG. **2**. However, whereas the conventional DOS path is merely a passive display of the hierarchical levels, the Active Path **100** is a graphical user interface enabling the user to directly access any of the hierarchical levels in a given path. Moreover, the Active Path **100** enables the user to directly re-execute the last function without the need to navigate to the function through the menu system, and without the need for a pre-defined short-cut.

As will be explained below, the Active Path **100** may be used in conjunction with a conventional navigation system such as the above-described collapsing menu system or path **20** menu system.

The Active Path **100** consists of a sequential listing of active links **102**, each active link **102** providing direct access to a corresponding level in the hierarchical path and to all of the menu items on the level (sibling menu items). The last active link **102** in the Active Path **100** is termed an end link **103**. The Active Path **100** is dynamically assembled and displayed as the user navigates using the conventional menu screens. The Active Path **100** is assembled automatically without the need for any additional user interaction as the user navigates using the collapsing menu system.

In contrast, a conventional short-cut such as a function key, icon, or the like is static in that it only provides access to a single pre-defined item (function allocation) within a given level and does not provide the user with the full range of items available within a given level. Moreover, the definition of a short-cut requires user interaction. The Active Path **100** is automatically constructed as the user navigates between the various levels **10** of the conventional collapsing menu system. The first active link **102** corresponds to the root level, and each subsequent active link **102** corresponds to a user selected menu item **12** which may be a location or a classification (sublevel) of functions. As will be explained below, the end link **103** points either to a function or a location. The Active Path **100** of the present invention may be used in place of the menu system **10** to navigate through classes of functions and execute a selected function. Moreover, the Active Path **100** may also be used to navigate to a desired location such as a web address or directory folder.

FIGS. **5**A-**5**E show how the Active Path **100** may be used to navigate to classes of functions. In the embodiment depicted in FIGS. **5**A-**5**D the Active Path **100** is used in conjunction with a conventional collapsing menu system. One of ordinary skill in the art will appreciate that the location of the Active Path **100** in relation to the collapsing menu system **10** and its graphical representation are not critical to the operation of the Active Path **100**.

By manner of illustration, FIG. **5**A shows how the Active Path **100** is sequentially assembled as menu items **12**-*a*, **12**-*b*, and **12**-*c* are selected from the collapsing menu system. Active link **102**-*a* corresponds to menu item **12**-*a* selected from the initial or root level **10**-*a*. Likewise, active link **102**-*b* corresponds to menu item **12**-*b* selected from level **10**-*b*, and active link **102**-*c* corresponds to menu item **12**-*c* selected from level **10**-*c*. Construction of the Active Path **100** occurs automatically as the user navigates through the menu system **10**. It should be noted that active link **102**-*c* is the end link **103** in the Active Path **100**.

Turning now to FIG. **5**B, the menu system (pull-down menu tree) **10** collapses when the user selects end node **12**-*c* whereas the Active Path **100** persists. As will be described, the active links **102** enable the user to directly access levels **10**-*b* and **10**-*c*, without having to navigate from the root level **10**-*a*. Moreover, end link **103** enables the user to re-execute the function associated with **12**-*c* directly without the need for a pre-defined short-cut.

In operation, the active links **102** of Active Path **100** are accessed using the mouse **48** and mouse buttons **48***a*, **48**-*b* (FIG. **3**).

Each of the active links **102** in the Active Path **100** may be accessed by either rolling over the active link **102** with the pointer of the pointing device **38**, or by immediately selecting the active link **102**. As shown in FIG. **5**C rolling over the active **102** simply entails manipulating the mouse **48** to position the software pointer **50** over the active link **102**. Rolling over an active link **102**-*b* causes the sibling menu items on the level corresponding the active link **102**-*b* to be displayed. It should be noted that simply rolling over an active link **102** does not alter the Active Path **100**, it merely causes the sibling menu items to be displayed.

Selection of an active link **102** is accomplished by, for example, positioning the software pointer **50** over the active link **102** and actuating (and releasing) one of the mouse buttons **48**-*a*, **48**-*b*. Selection of an active link **102** causes different results depending on whether or not the selected active link **102** is the end link **103** in the Active Path **100**. If the selected active link **102** is not the end link **103**, then selection will cause the sibling menu items **12** on the associated level **10** to be displayed and will trigger the construction of a new Active Path **100**. For example, selection of menu item **12**-*b* in FIG. **5**C will result in the generation of the Active Path **100** shown in FIG. **5**D.

Selection of an end link **103** will cause the immediate execution of the associated function (last function executed). Thus, the last executed function may be re-executed by simply selecting the end link **103** in the Active Path **100** (FIG. **5**C).

As described above, the Active Path **100** is dynamically constructed as the user navigates the collapsing menu system, and is subsequently retained after the menu tree collapses back to the root level. In addition, the Active Path **100** may optionally be constructed each time a short-cut such as a function key or the like is used. This requires the use of a look-up table **38***a* (FIG. **3**) stored in RAM **38**. The look-up table **38***a* stores each of the pre-defined shortcuts and the associated data necessary to create the active path **100**. According to a presently preferred embodiment, the Active Path **100** constructed is the same as would be constructed by accessing the function through the collapsing menu system.

In operation, the look-up table **38***a* would originally be created by the software developer during initial definition of each of the pre-defined short-cuts (function keys). Moreover, as will be explained, the look-up table **38***a* may be updated by the user to reference newly created short-cuts.

According to a further aspect of the present invention, the Active Path **100** may be used to define a short-cut on-the-fly. Once the Active Path **100** has been constructed, for example, by navigating the conventional collapsing menu system, the user may store the end link **103** as a shortcut within the lookup table **38***a*. According to a presently preferred embodiment, this is accomplished by a combination of commands. Thus, for example, the user could be prompted to define a short-cut identifier by clicking mouse button **48**-*b* over end link **103**. The Active Path **100** then stores the association between the function (or location) and the user-selected shortcut in the rewriteable table **38***a*.

As noted previously, the Active Path **100** of the present invention may similarly be used to navigate to a location. Notably, the Active Path **100** is created in the same manner regardless of whether the menu items **12** are functions or locations. The difference in using the Active Path **100** to navigate to locations arises after the Active Path **100** has been generated when the user selects an active link **102**. More particularly, the difference is only manifested if the selected active link **102** is not the end link **103**.

Notably, in the case of navigating to a location, selecting an active link **102** (other than the end link **103**) triggers the access of the associated location. In contrast, when navigating to a class of functions, selection of an active link **102** (other than the end link **103**) merely triggers the display of the sibling menu items on the associated level. See, FIG. **5**C.

By manner of illustration, FIG. **5**E shows a user selecting a location **102***b***1** by manipulating the pointing device **48** to position the pointer **50** over **102***b***1** and actuating the mouse key **48***a* (or **48***b*). As shown, the selection of a location results in the creation of a new active path **100**.

FIG. **5**F shows a user selecting an active link **102***b***2** where the active link **102** points to a classification of items, i.e., to a sublevel in the hierarchy. Notably, in FIG. **5**E **102***b***1** was a location, and its selection within the active path **100** results in the direct navigation to the associated location. In contrast, in FIG. **5**F **102***b***2** is a classification of functions, and its selection results in the display of the sibling menu items. Again, the selection of active link **102***b***2** is accomplished by selecting a location **102***b***2** by manipulating the pointing device **48** to position the pointer **50** over **102***b***2** and actuating the mouse key **48***a* (or **48***b*).

One of ordinary skill in the art will appreciate that the Active Path **100** of the present invention may be used in standalone applications such as operating systems, word processors, spreadsheets or the like. Moreover, the Active Path may also be used in a client-server environment. Notably, the Active Path **100** may be used to navigate functions provided on a web site or to navigate between different web addresses.

In standalone applications, a range of Windows Application Programming Interface functions such as "CreateWindow" and other graphics library function calls may be used to create the graphic components of the Active Path. Any combination of mainstream programming languages such as Visual Basic, Java, C, or Delphi may be used to create the dynamic components and rollover effects.

In client server applications, the code for the Active Path may be part of the initial HTML file in form of a JavaScript/DHTML combination or separate JavaScript files (.js) containing the arrays describing the Active Path **100** and Cascading Style Sheets files (.css) containing the graphic attributes of the Active Path **100**. This data may be cached locally after the initial server call.

For internet browser applications, such as Internet Explorer or Mozilla the referred embodiment foresees a replacement of the address bar with the Active Path **100** to avoid redundancy, allow the user to focus on the content and make browsing more efficient. For Internet Explorer, this would involve utilizing its custom Explorer Bars integration feature.

In standalone applications, a range of Windows Application Programming Interface functions such as "CreateWindow" and other graphics library function calls may be used to create the graphic components of the Active Path. Any combination of mainstream programming languages such as Visual Basic, Java, C, or Delphi may be used to create the dynamic components and rollover effects.

Windows Explorer may replace the Address Bar with the Active Path. This could make the display of the folder window redundant. The user may better take advantage of the screen real-estate by rolling over and "browsing" through the levels of the collapsing menu system.

In client server applications, the code for the Active Path may be part of the initial HTML file in form of a JavaScript/DHTML combination or separate JavaScript files (.js) containing the arrays describing the Active Path and Cascading Style Sheets files (.css) containing the graphic attributes of the Active Path. This data may be cached locally after the initial server call.

For internet browser applications, such as Internet Explorer or Mozilla the preferred embodiment foresees a replacement of the address bar with the Active Path to avoid redundancy, allow the user to focus on the content and to make browsing more efficient. For Internet Explorer, this would involve utilizing its custom Explorer Bars integration feature.

The Active Path of the present invention may also be used to navigate audio interfaces. A preferred embodiment for audio interfaces would allow users to navigate to the end point of a path. A certain input command, such as pressing a certain key, would read the sequence and level of the selected path. Users can then select any level of the path and navigate to a new endpoint.

Although a preferred embodiment of the Active Path navigation system of the present invention has been specifically described and illustrated, it is to be understood that variations or alternative embodiments apparent to those skilled in the art are within the scope of this invention. Since many such variations may be made, it is to be understood that within the scope of the following claims, this invention may be practiced otherwise than specifically described.

The invention claimed is:

1. A method for navigating within a hierarchical menu structure where each level in the menu contains plural items, said method comprising the steps of:

providing a graphical user menu system displaying the items of a given level and enabling selection thereof, wherein access of said given level requires sequential access of each of the levels preceding said given level in the hierarchy;

constructing an Active Path as a sequence of hierarchical active links as items are selected using the graphical user menu system, with one said active link corresponding to each of the items selected, each said active link providing direct access to the hierarchical level from which the corresponding item was selected without using said graphical user menu system; and

displaying the Active Path as an alternative to the graphical user menu system for navigating the menu structure after the user has finished selecting items using the graphical user system such that the Active Path is displayed;

wherein rolling over a given active link with the pointer of a pointing device triggers the display of menu items on the hierarchical level associated with said given active link without disturbing the displayed Active Path.

2. The method for navigating according to claim **1**, further comprising:

providing pre-defined short-cuts enabling direct access to a given menu item; and

automatically constructing the Active Path when a pre-defined short-cut is executed, with one said active link corresponding to each of the menu items necessary to access said given menu item using said graphical user menu system.

3. The method for navigating according to claim **1**, wherein a given active link is browsed by rolling over the given active link with a pointing device to trigger the display of sibling menu items on the level associated with said given active link.

4. The method for navigating according to claim **3**, wherein browsing a given active menu item triggers the display of subordinate menu items.

5. The method for navigating according to claim **1**, wherein selecting a given active link triggers the execution of a function associated with said given active link.

6. The method for navigating according to claim **1**, wherein selecting a given active link triggers display of information associated with said given active link.

7. The method according to claim **1**, wherein a user-defined short-cut is defined on the-fly by storing a short-cut identifier and an associated plurality of active links in a look-up table.

* * * * *