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(54) Abstract Title: **Navigation of hierarchical data**

(57) Apparatus for retrieving information from a hierarchically arranged information source comprises a display for displaying information and user selectable menu items corresponding to information available from said information source; a user input device for receiving user selections of displayed menu items; and a display controller. The display controller controls the display in dependence upon received user selections to display the menu items as history menu items and new menu items, and to display information corresponding to a most recently selected menu item. The history items indicate previously received user selections corresponding to navigation down levels of the hierarchy of said information source. The new menu items correspond to information available at a next level of the hierarchy of said information source.

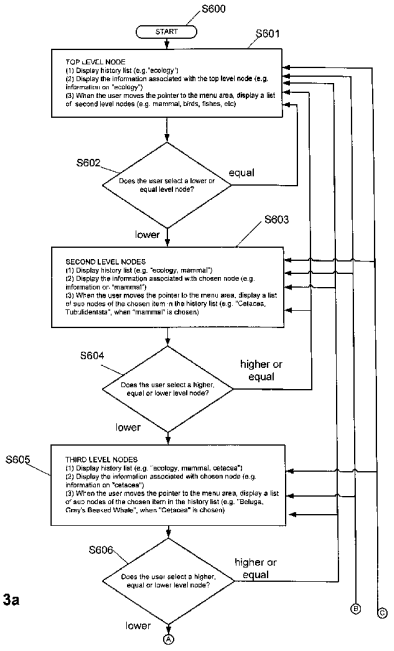

Figure 3a

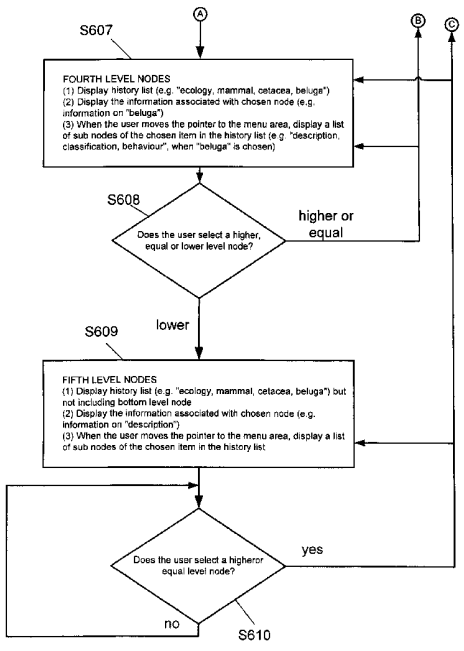

Figure 3b

GB 2 402 506 A

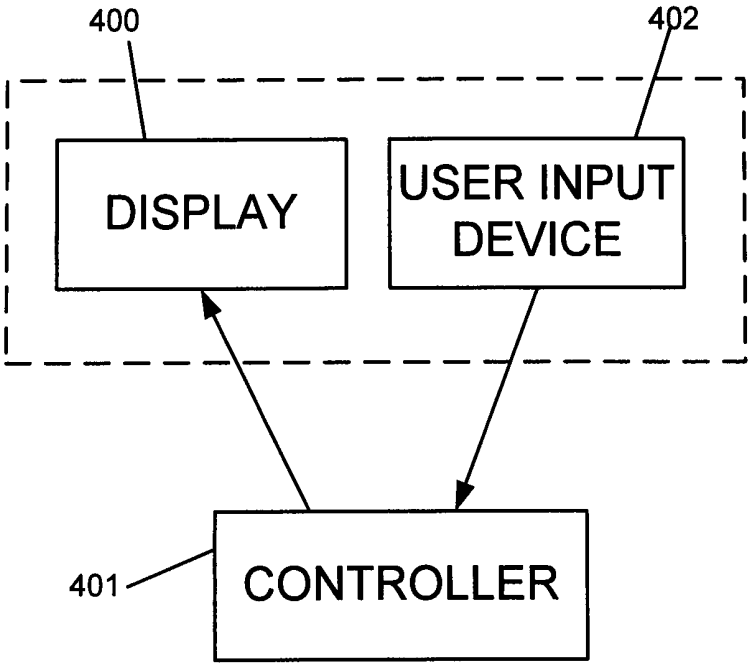

Figure 1

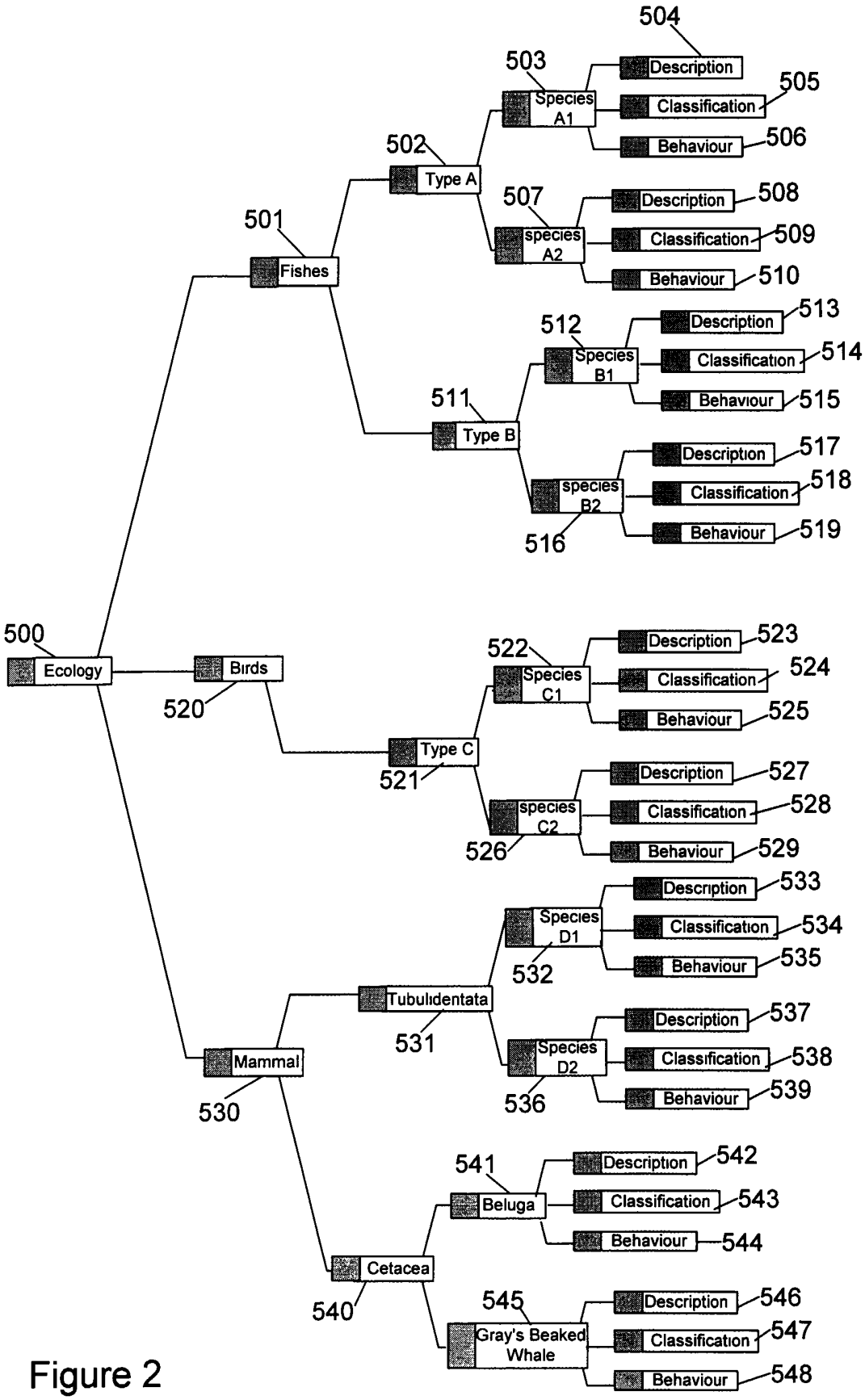
500
Ecology
501
Fishes
502
Type A
503
Species A1
504
Description
505
Classification
506
Behaviour
507
species A2
508
Description
509
Classification
510
Behaviour
511
Type B
512
Species B1
513
Description
514
Classification
515
Behaviour
516
species B2
517
Description
518
Classification
519
Behaviour
520
Birds
521
Type C
522
Species C1
523
Description
524
Classification
525
Behaviour
526
species C2
527
Description
528
Classification
529
Behaviour
530
Mammal
531
Tubulidentata
532
Species D1
533
Description
534
Classification
535
Behaviour
536
Species D2
537
Description
538
Classification
539
Behaviour
540
Cetacea
541
Beluga
542
Description
543
Classification
544
Behaviour
545
Gray's Beaked Whale
546
Description
547
Classification
548
Behaviour

Figure 2

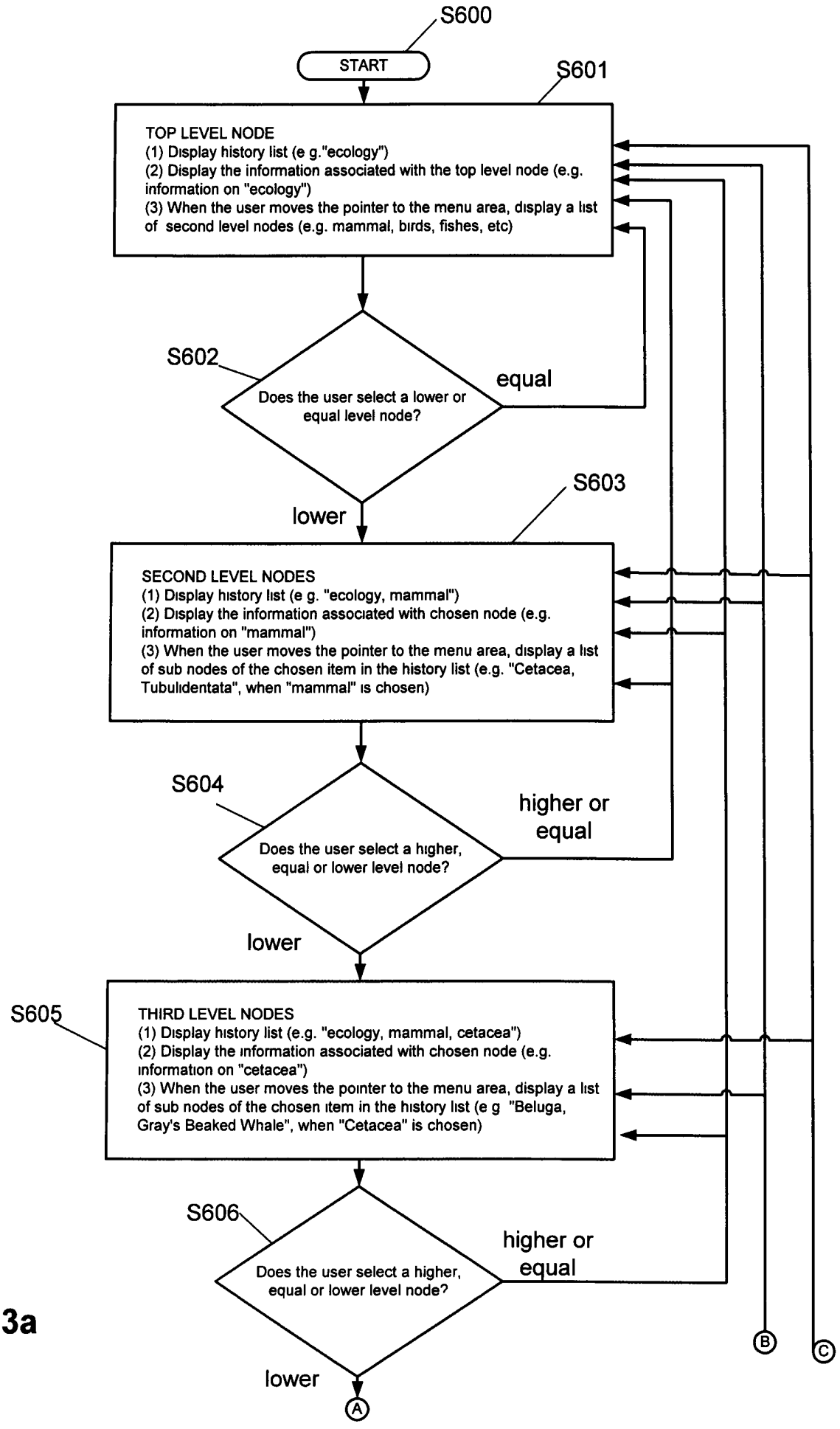
S600
START
S601
TOP LEVEL NODE
(1) Display history list (e g."ecology")
(2) Display the information associated with the top level node (e.g. information on "ecology")
(3) When the user moves the pointer to the menu area, display a list of second level nodes (e.g. mammal, birds, fishes, etc)
S602
Does the user select a lower or equal level node?
equal
lower
S603
SECOND LEVEL NODES
(1) Display history list (e g. "ecology, mammal")
(2) Display the information associated with chosen node (e.g. information on "mammal")
(3) When the user moves the pointer to the menu area, display a list of sub nodes of the chosen item in the history list (e.g. "Cetacea, Tubulidentata", when "mammal" is chosen)
S604
Does the user select a higher, equal or lower level node?
higher or equal
lower
S605
THIRD LEVEL NODES
(1) Display history list (e.g. "ecology, mammal, cetacea")
(2) Display the information associated with chosen node (e.g. information on "cetacea")
(3) When the user moves the pointer to the menu area, display a list of sub nodes of the chosen item in the history list (e g "Beluga, Gray's Beaked Whale", when "Cetacea" is chosen)
S606
Does the user select a higher, equal or lower level node?
higher or equal
lower
A
B
C

Figure 3a

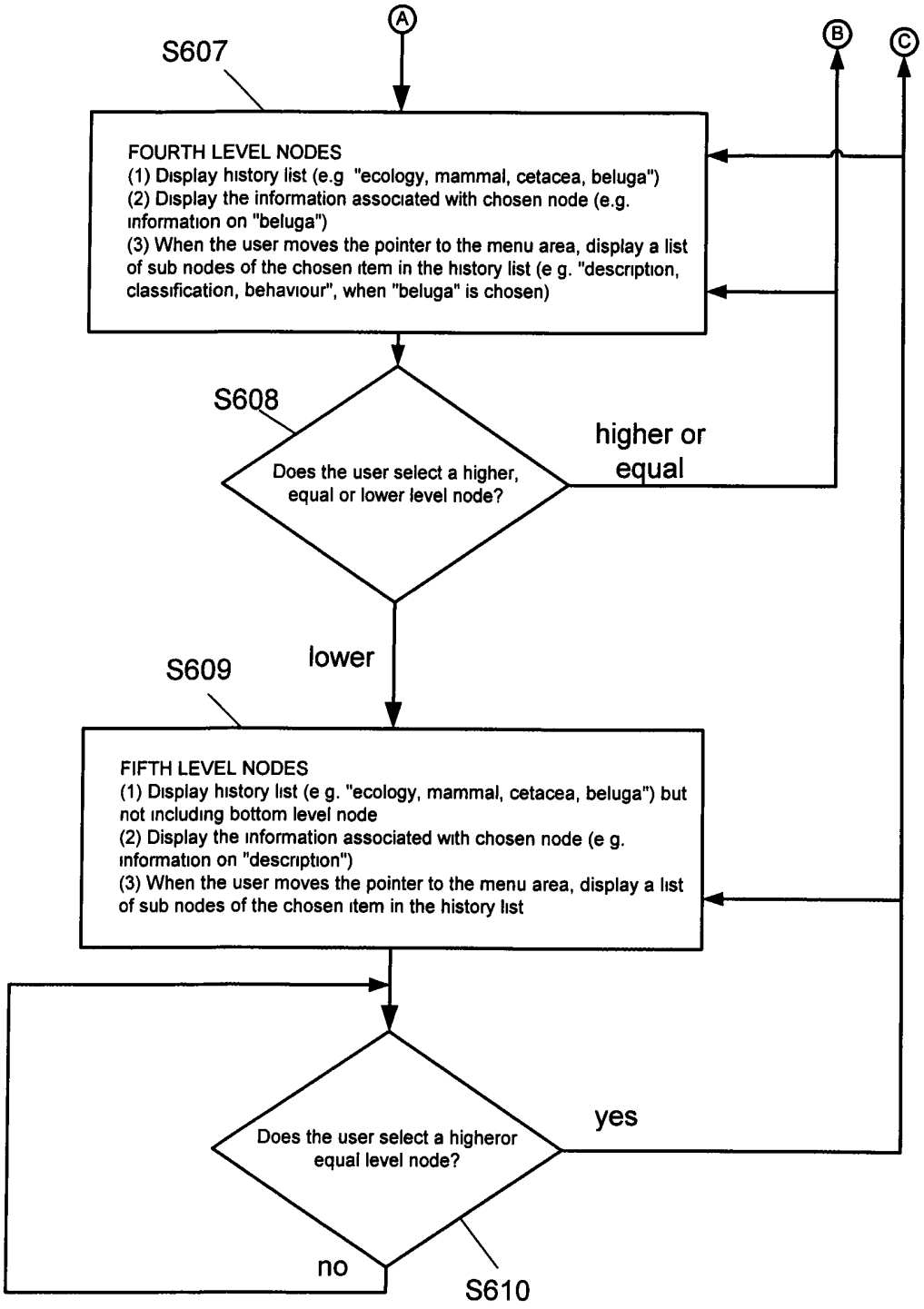
A
B
C
S607
FOURTH LEVEL NODES
(1) Display history list (e.g "ecology, mammal, cetacea, beluga")
(2) Display the information associated with chosen node (e.g. information on "beluga")
(3) When the user moves the pointer to the menu area, display a list of sub nodes of the chosen item in the history list (e g. "description, classification, behaviour", when "beluga" is chosen)
S608
Does the user select a higher, equal or lower level node?
higher or equal
lower
S609
FIFTH LEVEL NODES
(1) Display history list (e g. "ecology, mammal, cetacea, beluga") but not including bottom level node
(2) Display the information associated with chosen node (e g. information on "description")
(3) When the user moves the pointer to the menu area, display a list of sub nodes of the chosen item in the history list
Does the user select a higheror equal level node?
yes
no
S610

Figure 3b

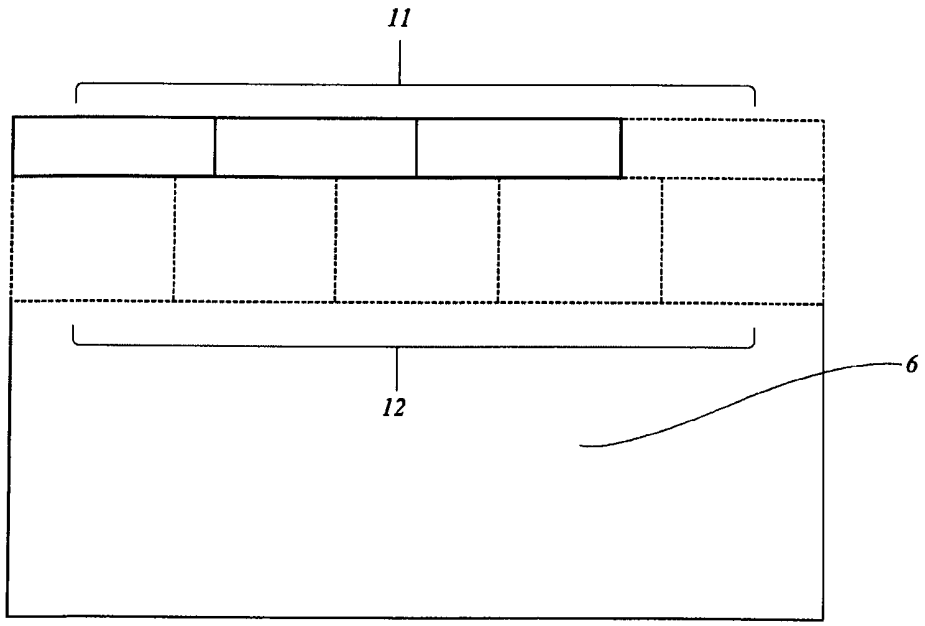

Figure 4

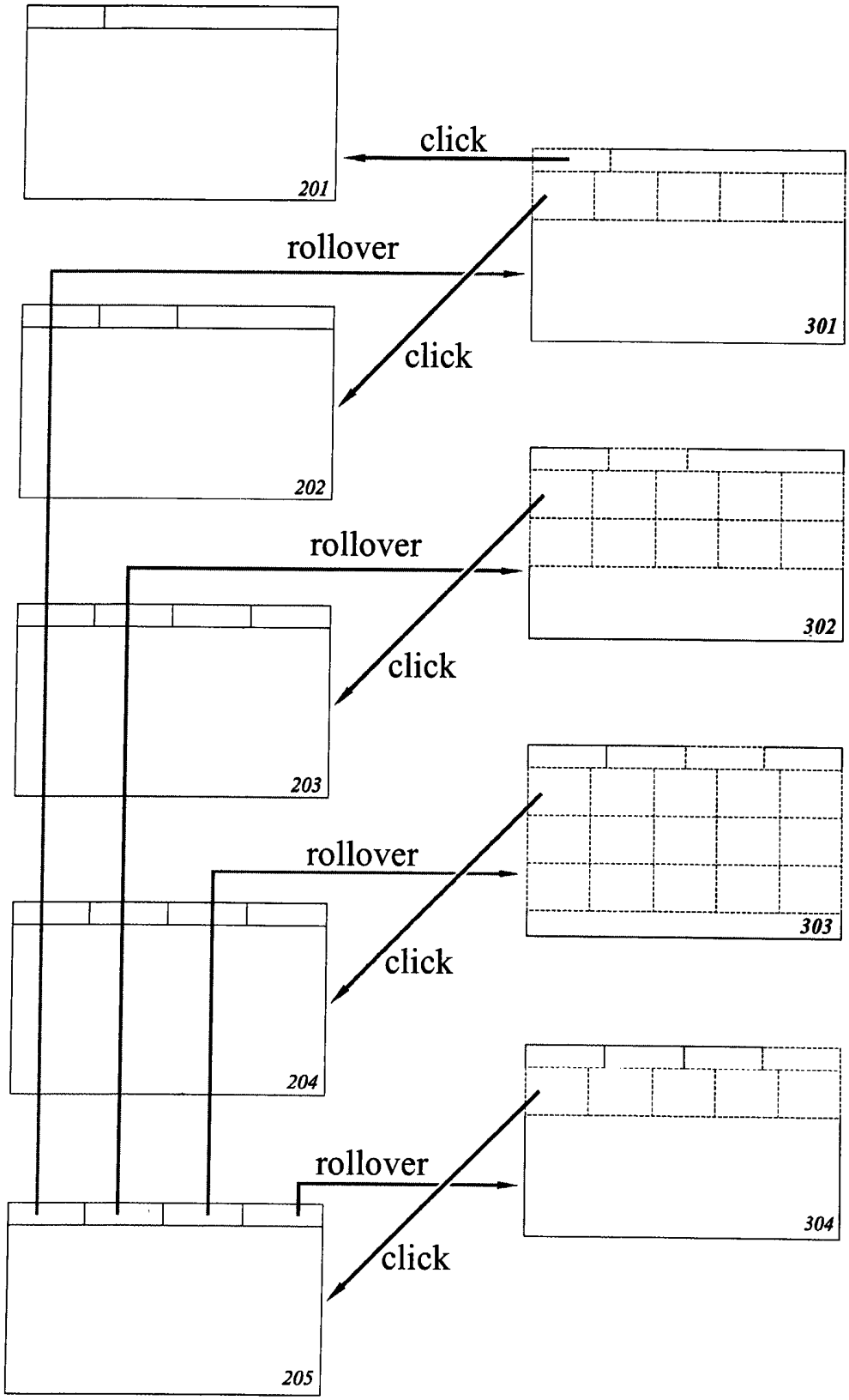
click
201
rollover
301
click
202
rollover
302
click
203
rollover
303
click
204
rollover
304
click
205

Figure 5

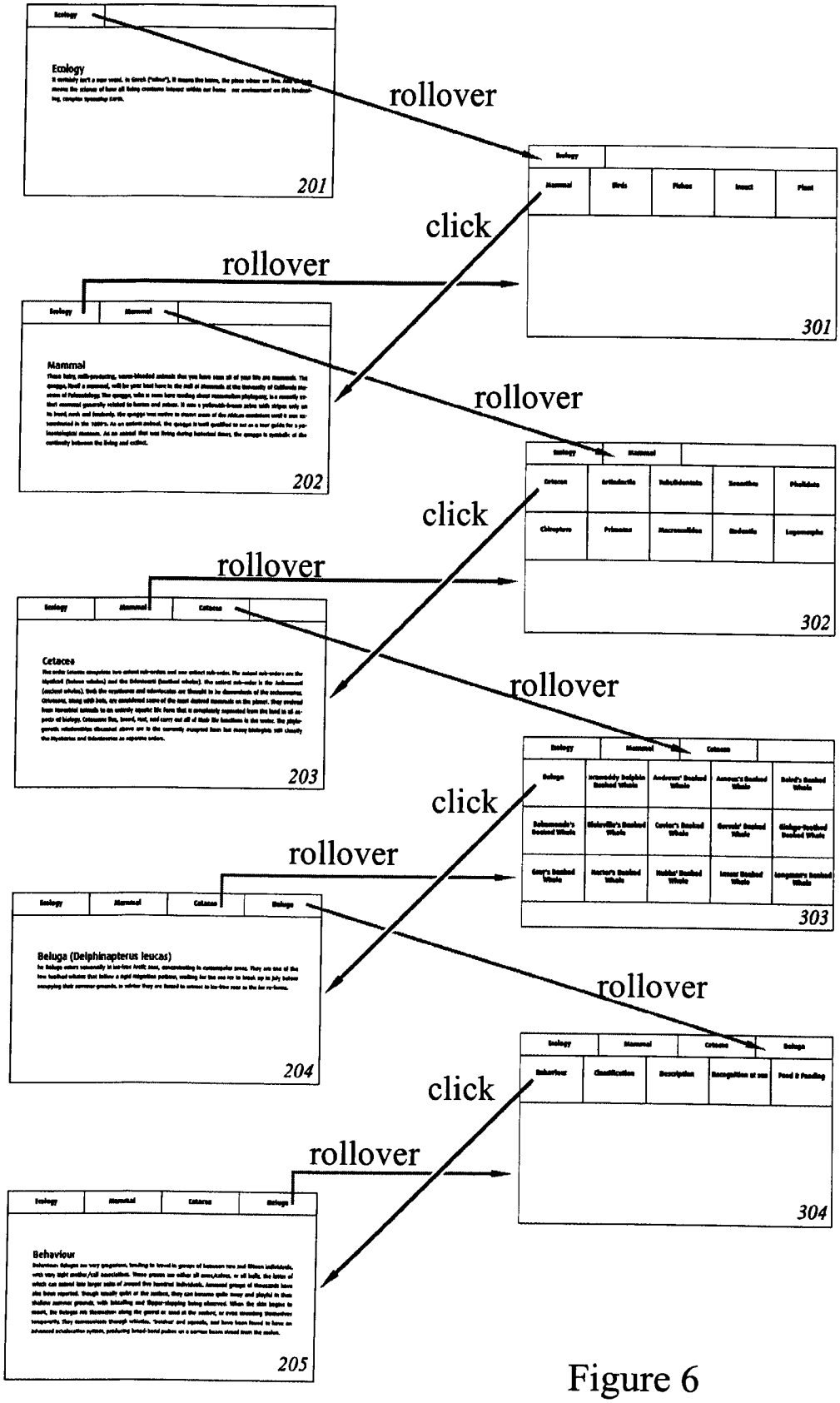
Ecology
201
rollover
click
301
rollover
Mammal
202
rollover
click
302
rollover
Cetacea
203
rollover
click
303
rollover
Beluga (Delphinapterus leucas)
204
rollover
click
304
rollover
Behaviour
205

Figure 6

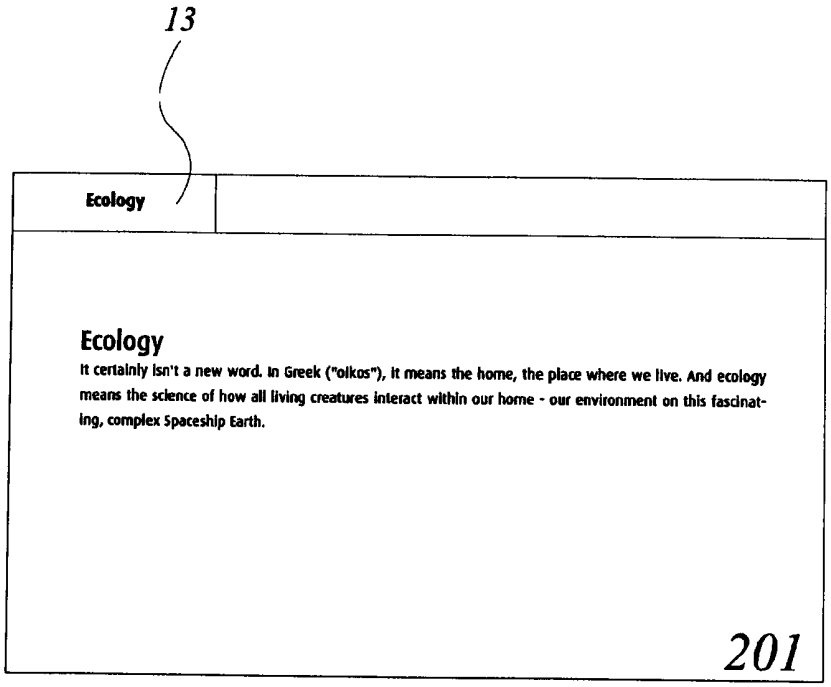

Figure 7

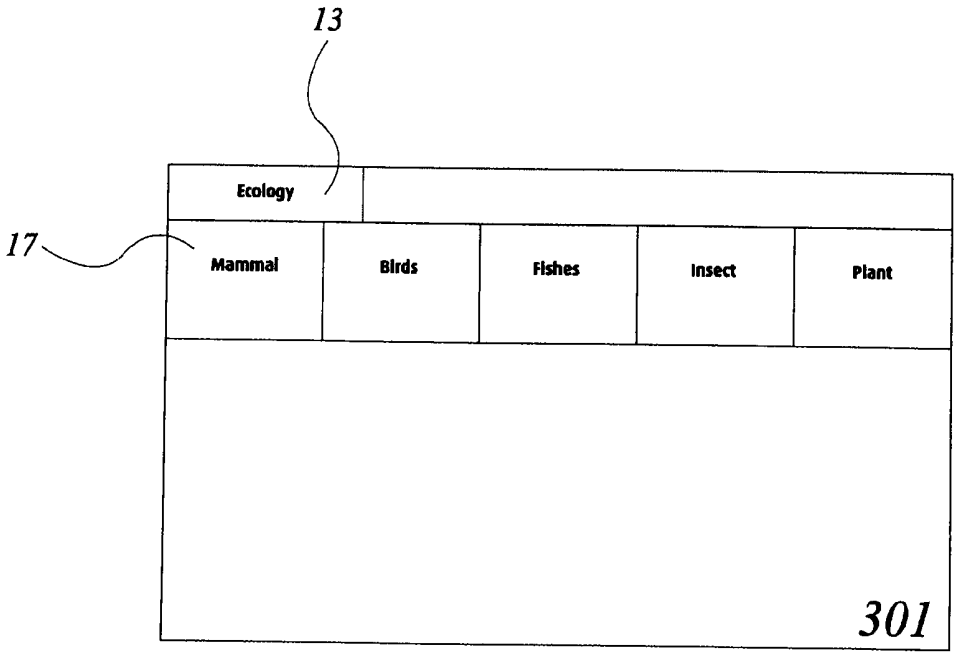

Figure 8

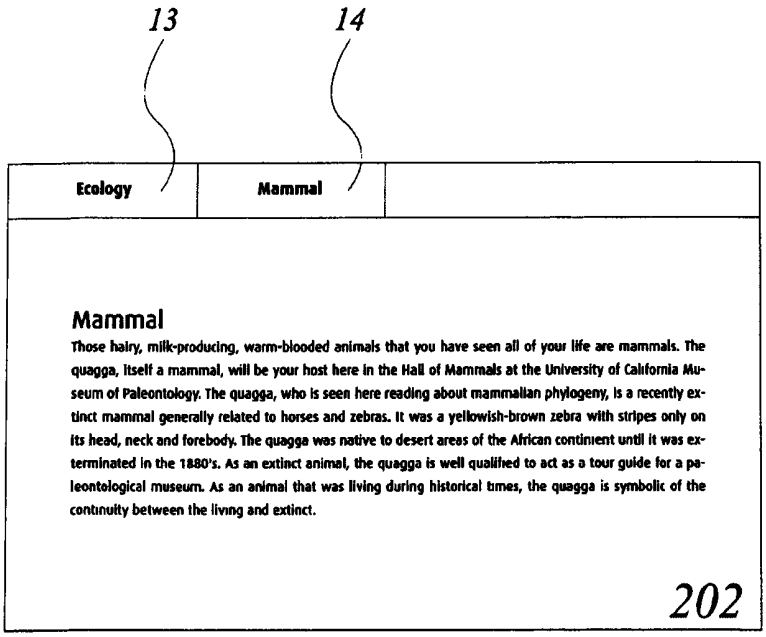

Figure 9

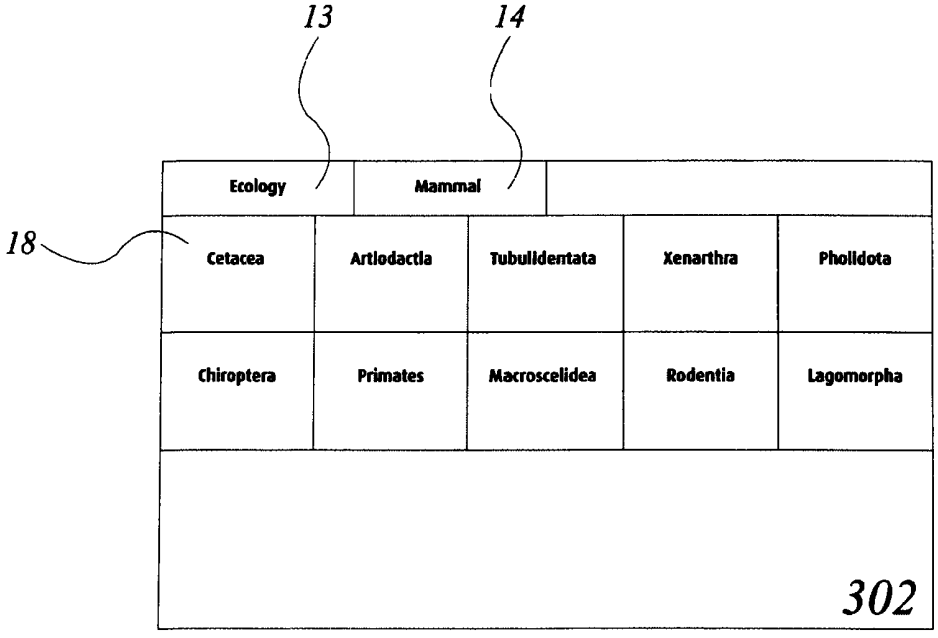

Figure 10

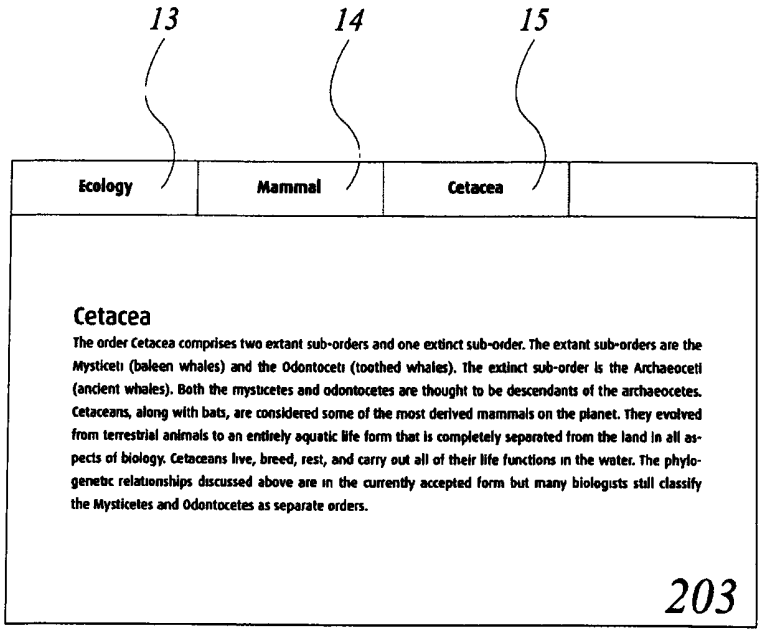

Figure 11

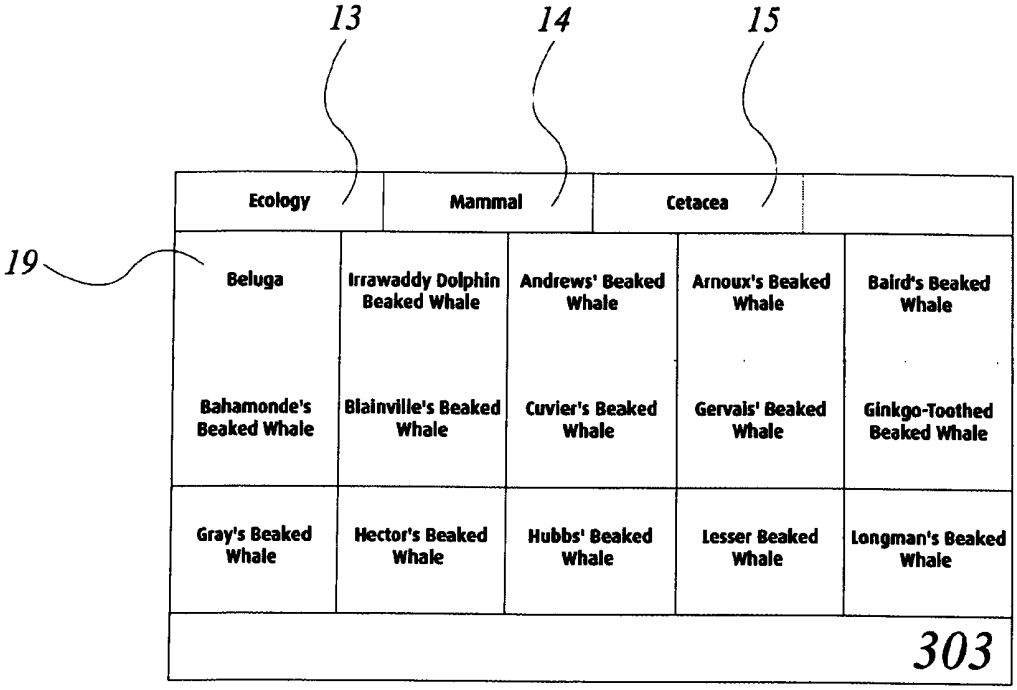

Figure 12

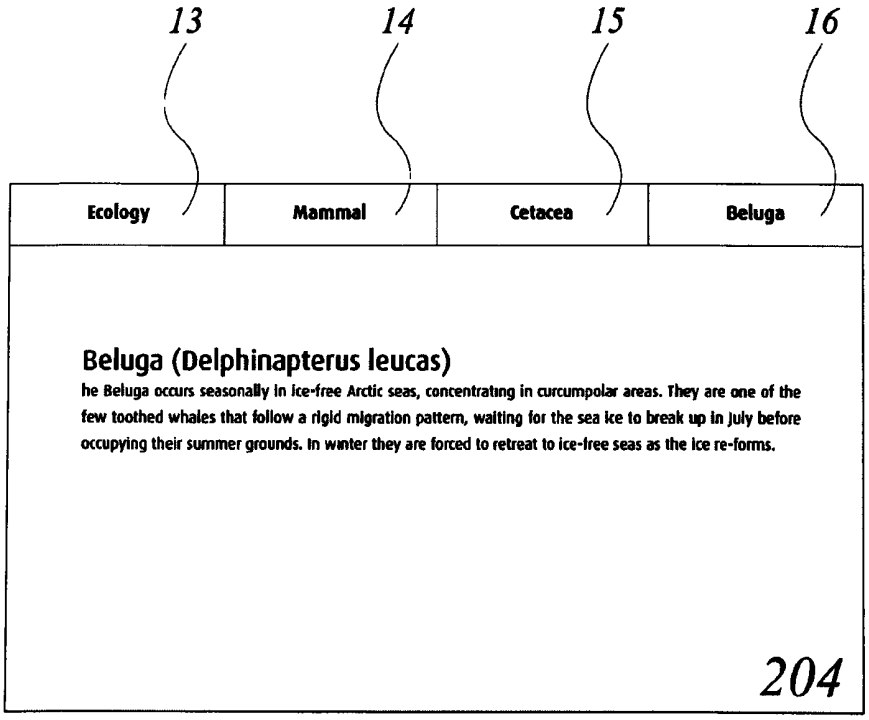

Figure 13

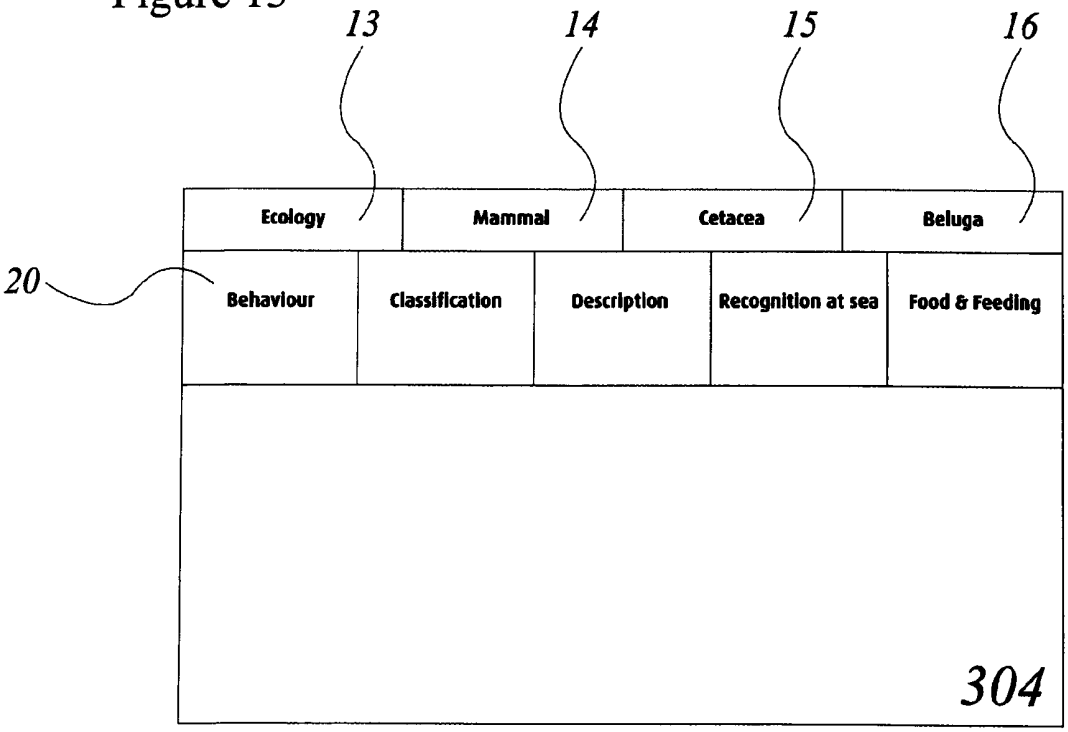

Figure 14

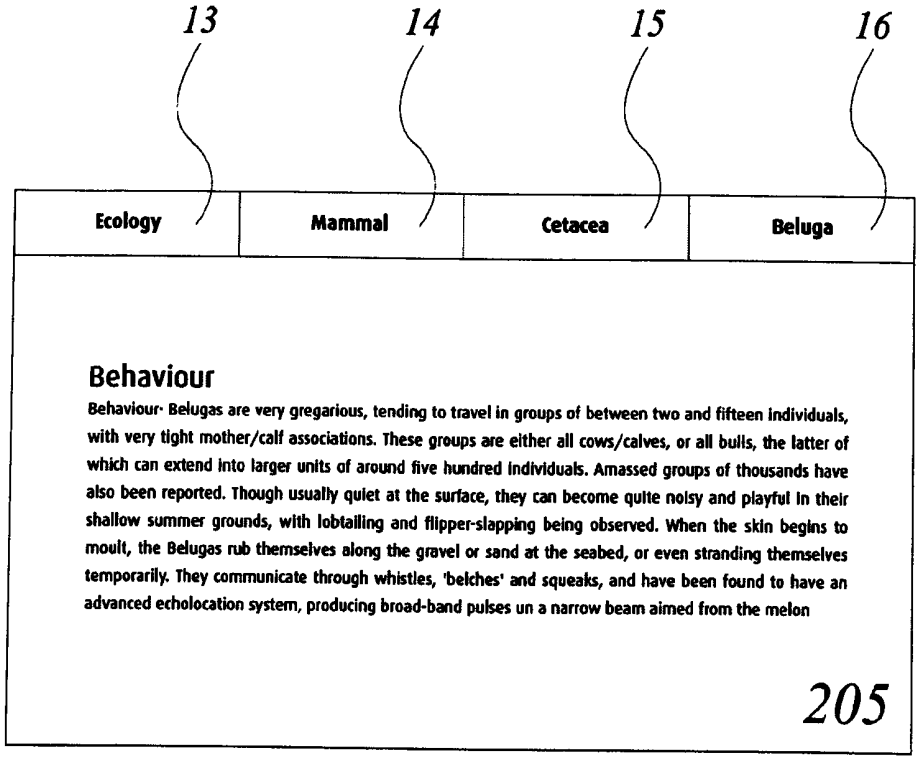
13
14
15
16
Ecology
Mammal
Cetacea
Beluga
Behaviour
Behaviour- Belugas are very gregarious, tending to travel in groups of between two and fifteen individuals, with very tight mother/calf associations. These groups are either all cows/calves, or all bulls, the latter of which can extend into larger units of around five hundred individuals. Amassed groups of thousands have also been reported. Though usually quiet at the surface, they can become quite noisy and playful in their shallow summer grounds, with lobtailing and flipper-slapping being observed. When the skin begins to moult, the Belugas rub themselves along the gravel or sand at the seabed, or even stranding themselves temporarily. They communicate through whistles, 'belches' and squeaks, and have been found to have an advanced echolocation system, producing broad-band pulses un a narrow beam aimed from the melon
205

Figure 15

Information Retrieval Apparatus and Method

The present invention relates to an apparatus and method for information retrieval, and in particular, to an apparatus and method for retrieving information from a source of hierarchically arranged information.

It is desirable to make it easy to navigate hierarchical data structures.

The present invention provides an apparatus for retrieving information from a source of hierarchical information, and an equivalent method. The apparatus has output means for outputting the information to the user and for outputting user selectable menu items to the user, input means for receiving a user selection of information to be displayed, and control means for controlling the output means to output both history items and new menu items to the user. The history items are previously received user selections, and the new menu items are a list of information available at a next level of the information hierarchy. The information corresponding to the most recently selected menu item is output to the user.

Thus the present invention provides a useful interface which allows for easy navigation of a hierarchically organised information store using the history menu as well as the new information menu.

In a specific embodiment, new menu items can be displayed either by selecting a history menu item, in which case the new menu items correspond to the next level of the hierarchy below the position in the hierarchy corresponding to the history menu item, or new menu items can be displayed for a next level of the hierarchy corresponding to the currently displayed information i.e. the most recently selected menu item.

The present invention has the advantage that it allows information relating to both general categories and very specific sub-categories to be displayed to the user. It thus

provides a useful tool for navigation and output of information from a hierarchical information source.

In the present invention, a display is configured to display the history list at the same time as displaying the information, allowing rapid and easy navigation through the directory structure, whilst simultaneously showing the selected information. In one embodiment of the present invention, separate screen areas are allocated to displaying the information, and displaying the history list.

The present invention may be used with any computer, including handheld devices such as PDAs (personal digital assistants), electronic book readers, mobile phones, digital audio players, GPS (global positioning satellite) receivers, etc. Where the present invention is used with a computer having a small screen, such as in a handheld device, an embodiment of the present invention provides the considerable advantage of allowing very efficient use of the limited display area available on the screen.

The apparatus of the present invention may include a touch sensitive screen, which may be activated using a variety of methods such as by a person's finger or using a stylus. The apparatus may include a loudspeaker, for playback of audio information.

Menu items may be selected using a pointer displayed on the display, for example, a pointer linked to a mouse or other input device. Alternatively, menu items may be selected without a pointer being displayed on the screen, e.g. by use of a touch sensitive screen, and touching the part of the screen corresponding to the menu item. Menus may be activated and items selected by the positioning of the pointer on the screen, and by clicking the pointer, or by single or multiple touches to a touch sensitive screen.

The source of hierarchically arranged information may be provided on a computer, together with code for configuring the computer as an apparatus according to the present invention, or the information source may be separate or remote from the apparatus, whereby the information is accessed by the apparatus e.g. over a communications link. Alternatively the information is provided separately or remotely from the apparatus and the apparatus accesses the information e.g. over a network.

In one embodiment, the information source includes information which is arranged in a network of hierarchically interlinked nodes. The individual items of information making up the information source are each associated with a node. The structure has a single top level node, which is interlinked to each node lower in the hierarchy. The top level node is interlinked to each node lower in the hierarchy via a unique path, or via a choice of alternative paths. The history menu will preferably show the route which has actually been taken by the user, rather than a different one of these alternative paths. Each node may be associated with a node reference which is used to identify the node, such as a node name, label or ID number.

The invention still has high utility even when the hierarchical information includes some nodes with no data. For those nodes, no information is shown, so the benefit of the invention is not achieved. However, the benefit of the invention is still achieved for the remainder of the nodes which do have associated information.

The hierarchically arranged information may include information which is not simply the node reference, and which relates to the configuration of the information hierarchy and/or to the presentation of the menus on the screen. The hierarchically arranged information may include information which relates to neither the configuration of the information hierarchy nor to the presentation of the menus on the screen. The information may include text, web pages, photographs, images or video images for displaying on a screen, and/or audio information, such as digital speech or music, for outputting through a speaker.

The present invention can be implemented by software or programmable computing apparatus. Thus the present invention encompasses a carrier medium carrying computer readable code for configuring a computer or number of computers as the apparatus of the invention. The carrier medium can comprise a transient medium, e.g. an electrical, optical, microwave, RF, electromagnetic, acoustic or magnetic signal (e.g. a TCP IP signal over an IP network such as the internet), or a carrier medium such as a floppy disk, CD ROM, hard disk, or programmable memory device.

Preferred embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram showing the apparatus according to an embodiment of the invention;

Figure 2 is a tree diagram showing the information structure of the information source used in a first embodiment of the invention;

Figures 3a and 3b are a flowchart showing a process for locating information according to an embodiment of the invention;

Figure 4 is a screen layout showing the layout of information on a computer display used in an embodiment of the invention;

Figure 5 shows a plurality of screen layouts for different stages in the navigation process in the embodiment of figure 4, and arrow indicate the way in which these screen layouts are interlinked;

Figure 6 shows the screen layouts of figure 5, when used with an example database;

Figure 7 is an enlarged computer screenshot for the top level information output, in the embodiment of figure 6;

Figure 8 is an enlarged computer screenshot for the top level drop-down menu, in the embodiment of figure 6;

Figure 9 is an enlarged computer screenshot for the second level information output, in the embodiment of figure 6;

Figure 10 is an enlarged computer screenshot for the second level drop-down menu, in the embodiment of figure 6;

Figure 11 is an enlarged computer screenshot for the third level information output, in the embodiment of figure 6;

Figure 12 is an enlarged computer screenshot for the third level drop-down menu, in the embodiment of figure 6;

Figure 13 is an enlarged computer screenshot for the fourth level information output, in the embodiment of figure 6;

Figure 14 is an enlarged computer screenshot for the fourth level drop-down menu, in the embodiment of figure 6; and

Figure 15 is an enlarged computer screenshot for the fifth and bottom level information output, in the embodiment of figure 6;

Figure 1 is a block diagram showing the apparatus according to an embodiment of the invention. The apparatus has a display 400, a controller 401, and a user input device 402. The display 400 and the user input device 402 are both connected to the controller 401, such that information passes from the controller 401 to the display 400, and from the user input device 402 to the controller 401. The user input device 402 may be integral with the display 400, or may be separate, as indicated by the dashed line surrounding both the display 400 and the user input device 402. Optionally the apparatus may include an information store storing the hierarchically organised information to be accessed. Alternatively the information store is not part of the apparatus and in this case the apparatus includes an interface for accessing the information store. The interface can comprise a port or connector to allow the apparatus to be connected in a computer apparatus to access the information store, or the interface can comprise a network interface.

Figure 2 shows a hierarchical information structure. The structure is a tree shape, with a top level directory 500, and a number of second level directories 501, 520, 530 linked to the top level directory 500 by branches. Each directory may be considered to be a node in the hierarchy, and the nodes are connected together by the branches. Second level

node 501 is connected to third level nodes 502, 511, second level node 520 is connected to third level node 521, and second level node 530 is connected to third level nodes 531 and 540. Each of these third level nodes is connected to two fourth level nodes 503, 507, 512, 516, 522, 526, 532, 536, 541, 545. Each fourth level node is connected to a fifth level node 504, 505, 506, 508, 509, 510, 513, 514, 515, 517, 518, 519, 523, 524, 525, 527, 528, 529, 533, 534, 535, 537, 538, 539, 542, 543, 544, 546, 547, 548, at the bottom of the hierarchical structure. Each node has a node name. Each node at each level of the hierarchy is associated with an item of information, which is represented in the figure by a grey shaded box adjascent to the node name. In the present example, the information relates to ecology, and the top level node 500 is named "Ecology". The second level nodes are name "Fishes", "Birds" and "Mammal". Similarly, the third level nodes are named as subsets of the second level nodes, and the fourth level nodes are named as subsets of the fourth level nodes. The fifth level nodes are named "description", "classification" or "behaviour", and in this example, the fifth level is the bottom of the hierarchy.

In the present invention, it is not essential that all bottom level nodes are all at the same level in the hierarchy, nor is it essential that the nodes above the bottom level have only one, two or three immediate sub-nodes.

Figures 3a and 3b show a flowchart of a process of navigation through a hierarchical information structure to find a required item of information. The process begins at step S600. At step S601, the apparatus presents the user with a history list containing only the name of the top level node 500 in the hierarchy, which is "ecology". The apparatus also displays the information relating to the top level node. If the user moves the pointer over "ecology" in the history list, a list of second level nodes 501, 520, 530 in the hierarchy is displayed. At step S602, the user may select one of these second level nodes. If the user selects the top level node, the process returns to step S601. However, if the user selects a second level node, the process proceeds to step S603.

At step S603, the apparatus presents the user with a history list containing the name of the top level node 500, and the selected second level node, e.g. "mammal" 530. The apparatus also displays the information relating to the selected second level node 530. If

the user moves the pointer over "ecology" in the history list, a list of second level nodes 501, 520, 530 in the hierarchy is displayed. If the user moves the pointer over "mammal" in the history list, a list of third level nodes 531, 540 in the hierarchy is displayed. At step S604, the user may select one of these second or third level nodes. If the user selects the top level node or a second level node, the process returns to the appropriate part of the flow chart. However, if the user selects a second level node, the process proceeds to step S605.

At step S605, the apparatus presents the user with a history list containing the name of the top level node 500, the selected second level node, e.g. "mammal" 530, and the selected third level node, e.g. "cetacea" 540. The apparatus also displays the information relating to the selected third level node 540. If the user moves the pointer over "ecology" in the history list, a list of second level nodes 501, 520, 530 in the hierarchy is displayed. If the user moves the pointer over "mammal" in the history list, a list of third level nodes 531, 540 in the hierarchy is displayed. If the user moves the pointer over "cetacea" in the history list, a list of fourth level nodes 541, 545 in the hierarchy is displayed. At step S606, the user may select one of these second, third or fourth level nodes. If the user selects the top level node, a second level node or a third level node, the process returns to the appropriate part of the flow chart. However, if the user selects a fourth level node, the process proceeds to step S607.

At step S607, the apparatus presents the user with a history list containing the name of the top level node 500, the selected second level node, e.g. "mammal" 530, the selected third level node, e.g. "cetacea" 540, and the selected fourth level node, e.g. "beluga" 541. The apparatus also displays the information relating to the selected fourth level node 541. If the user moves the pointer over "ecology" in the history list, a list of second level nodes 501, 520, 530 in the hierarchy is displayed. If the user moves the pointer over "mammal" in the history list, a list of third level nodes 531, 540 in the hierarchy is displayed. If the user moves the pointer over "cetacea" in the history list, a list of fourth level nodes 541, 545 in the hierarchy is displayed. If the user moves the pointer over "beluga" in the history list, a list of fifth level nodes 542, 543, 544 in the hierarchy is displayed. At step S608, the user may select one of these second, third, fourth or fifth level nodes. If the user selects the top level node, a second level node, a

third level node or a fourth level node, the process returns to the appropriate part of the flow chart. However, if the user selects a fifth level node, the process proceeds to step S609.

At step S609, the apparatus presents the user with a history list containing the name of the top level node 500, the selected second level node, e.g. "mammal" 530, the selected third level node, e.g. "cetacea" 540, and the selected fourth level node, e.g. "beluga" 541. However, the selected fifth level node is not displayed on the history list, as it has no further sub nodes. The apparatus also displays the information relating to the selected fifth level node e.g. on the "description" 542. If the user moves the pointer over "ecology" in the history list, a list of second level nodes 501, 520, 530 in the hierarchy is displayed. If the user moves the pointer over "mammal" in the history list, a list of third level nodes 531, 540 in the hierarchy is displayed. If the user moves the pointer over "cetacea" in the history list, a list of fourth level nodes 541, 545 in the hierarchy is displayed. If the user moves the pointer over "beluga" in the history list, a list of fifth level nodes 542, 543, 544 in the hierarchy is again displayed. At step S610, the user may select one of these second, third, fourth or fifth level nodes, and the process moves back up to the appropriate part of the flowchart.

Thus the user may quickly and easily navigate to any point in the information hierarchy.

Figure 4 shows a screen layout for a computer screen in a first embodiment of the invention. The screen is divided into an upper section 11 and a lower section 6. The upper section is reserved for displaying a history list to allow a user to navigate back upwards in the hierarchy to a location which they have previously visited. Each item in the history list is allocated a separate box or area of space within the upper section 11 of the screen. The lower section 6 of the screen is used to display the information to the user. When the user moves a pointer over an item on the history list, a sub-menu 12 is displayed, giving a list of information which is immediately below the currently selected information in the hierarchy. When the sub-menu is displayed, all of the information previously displayed in the lower section 6 of the screen may be deleted, or the information may simply be overwritten in the part of the lower section 6 of the screen which is used to display the sub-menu 12. When the pointer is moved away from

both the history list and the sub-menu, the sub-menu may remain on the screen, or it may be removed and replaced with the information which was previously displayed in its place.

Figure 5 shows the screen layout of figure 4 together with a number of other screen layouts which show different stages of navigation through different levels of the hierarchical information in the first embodiment of the invention. Arrows are shown connecting the screen layouts, to illustrate how to move from one screen layout to another by clicking the pointer or rolling the pointer over a particular area of the screen. It can be seen in this diagram that a user can navigate back to any level in the hierarchy using the history menu to display new menu items for the next level in the hierarchy below the selected history menu item.

Figure 6 shows screenshots using the screen layouts of figure 5 with an example information source containing information on ecology. This example information source contains information in the structure shown in figure 2, along with additional nodes which have not been shown in figure 2. Figure 6 also shows some additional arrows not shown in figure 5, to further illustrate how a user may move from one screen to another to navigate through the information hierarchy.

Figures 7 to 15 are enlarged views of the screenshots shown in figure 6. The method of navigating through the information hierarchy will now be described with reference to figure 6, and to these enlarged views of the screenshots.

The screenshot 201 on the top left hand side of figure 6 is the default starting screen display. It is also shown in figure 7. The history item "Ecology" 13 is shown in a box in the upper part 11 of the screen, and is the only item shown in the history list. "Ecology" is in fact the current item of information. In the lower section 6 of the screen, a piece of information relating to ecology, from the information source, is shown. When a user moves a pointer over the box containing the word "Ecology" 13, the screen display changes to the screenshot 301 shown in figure 8.

In figure 8, the upper part 11 of the screen is identical to that in figure 7. However, the information which had been shown in the lower part of the screen is no longer displayed, and a drop-down menu is displayed in the lower part 6 of the screen. The drop-down menu shows a list of the items of information which are immediately below "Ecology" in the hierarchy. These are "Mammal", "Birds", "Fishes", "Insect" and "Plant". Each item in the list is displayed in a box, and these boxes are laid out side by side across the entire width of the screen.

If a user clicks the pointer on "Ecology" 13, which is the only entry in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 201. If instead, a user clicks the pointer on one of the items in the drop-down menu, then that item is selected, and the screen display is updated accordingly. For example, if a user selects "Mammal" 17 in the drop-down menu, screenshot 202 is displayed.

Figure 9 shows screenshot 202. The history items "Ecology" 13 and "Mammal" 14 are shown in boxes in the upper part 11 of the screen. "Mammal" is the current item of information. In the lower section 6 of the screen, a piece of information relating to mammals is shown. When a user moves a pointer over the box containing the word "Ecology" 13, the screen display changes to the screenshot 301 shown in figure 8. When a user moves a pointer over the box containing the word "Mammal" 14, the screen display changes to the screenshot 302 shown in figure 10.

In figure 10, the upper part 11 of the screen is identical to that in figure 9. However, the information which had been shown in the lower part of the screen is no longer displayed, and a drop-down menu is displayed in the lower part 6 of the screen. The drop-down menu shows a list of the items of information which are immediately below "Mammal" in the hierarchy. These are "Cetacea", "Artiodactla", "Tubulidentata", "Xenarthra", "Pholidota", "Chiroptera", "Primates", "Macroscelidea", "Rodentia" and "Lagomorpha". Each item in the list is displayed in a box, and these boxes are laid out side by side in two rows across the entire width of the screen.

If a user clicks the pointer on "Ecology" 13 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 201. If a user clicks the pointer

on "Mammal" 14 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 202. If instead, a user clicks the pointer on one of the items in the drop-down menu, then that item is selected, and the screen display is updated accordingly. For example, if a user selects "Cetacea" 18 in the drop-down menu, screenshot 203 is displayed.

Figure 11 shows screenshot 203. The history items "Ecology" 13, "Mammal" 14 and "Cetacea" 15 are shown in boxes in the upper part 11 of the screen. "Cetacea" is the current item of information. In the lower section 6 of the screen, a piece of information relating to Cetacea is shown. When a user moves a pointer over the box containing the word "Ecology" 13, the screen display changes to the screenshot 301 shown in figure 8. When a user moves a pointer over the box containing the word "Mammal" 14, the screen display changes to the screenshot 302 shown in figure 10. When a user moves a pointer over the box containing the word "Cetacea" 15, the screen display changes to the screenshot 303 shown in figure 12.

In figure 12, the upper part 11 of the screen is identical to that in figure 10. However, the information which had been shown in the lower part of the screen is no longer displayed, and a drop-down menu is displayed in the lower part 6 of the screen. The drop-down menu shows a list of the items of information which are immediately below "Cetacea" in the hierarchy. These are "Beluga", "Irrawaddy Dolphin Beaked Whale", "Andrews' Beaked Whale", "Arnoux's Beaked Whale", "Baird's Beaked Whale", "Bahamonde's Beaked Whale", "Blainville's Beaked Whale", "Cuvier's Beaked Whale", "Gervais' Beaked Whale", "Ginkgo-Toothed Beaked Whale", "Gray's Beaked Whale", "Hector's Beaked Whale", "Hubbs' Beaked Whale", "Lesser Beaked Whale" and "Longman's Beaked Whale". Each item in the list is displayed in a box, and these boxes are laid out side by side in three rows across the entire width of the screen.

If a user clicks the pointer on "Ecology" 13 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 201. If a user clicks the pointer on "Mammal" 14 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 202. If a user clicks the pointer on "Cetacea" 15 in the history list, then the drop-down menu disappears, and the screen is updated with the

screenshot 203. If instead, a user clicks the pointer on one of the items in the drop-down menu, then that item is selected, and the screen display is updated accordingly. For example, if a user selects "Beluga" 19 in the drop-down menu, screenshot 204 is displayed.

Figure 13 shows screenshot 204. The history items "Ecology" 13, "Mammal" 14, "Cetacea" 15 and "Beluga" 16 are shown in boxes in the upper part 11 of the screen. "Beluga" is the current item of information. In the lower section 6 of the screen, a piece of information relating to Beluga is shown. When a user moves a pointer over the box containing the word "Ecology" 13, the screen display changes to the screenshot 301 shown in figure 8. When a user moves a pointer over the box containing the word "Mammal" 14, the screen display changes to the screenshot 302 shown in figure 10. When a user moves a pointer over the box containing the word "Cetacea" 15, the screen display changes to the screenshot 303 shown in figure 12. When a user moves a pointer over the box containing the word "Beluga" 16, the screen display changes to the screenshot 304 shown in figure 13.

In figure 13, the upper part 11 of the screen is identical to that in figure 12. However, the information which had been shown in the lower part of the screen is no longer displayed, and a drop-down menu is displayed in the lower part 6 of the screen. The drop-down menu shows a list of the items of information which are immediately below "Beluga" in the hierarchy. These are "Behavour", "Classification", "Description", "Recognition at sea" and "Food & Feeding". Each item in the list is displayed in a box, and these boxes are laid out side by side in a row across the entire width of the screen.

If a user clicks the pointer on "Ecology" 13 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 201. If a user clicks the pointer on "Mammal" 14 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 202. If a user clicks the pointer on "Cetacea" 15 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 203. If a user clicks the pointer on "Beluga" 16 in the history list, then the drop-down menu disappears, and the screen is updated with the screenshot 204. If instead, a user clicks the pointer on one of the items in the drop-down menu, then that

item is selected, and the screen display is updated accordingly. For example, if a user selects "Behaviour" 20 in the drop-down menu, screenshot 205 is displayed.

Figure 15 shows screenshot 205. The history items "Ecology" 13, "Mammal" 14, "Cetacea" 15 and "Beluga" 16 are shown in boxes in the upper part 11 of the screen. The current item of information, "Behaviour", is not shown in the history list, because it has no information below it in the information hierarchy, so there is no need for a drop-down menu to show a list of information lower in the hierarchy. In the lower section 6 of the screen, a piece of information relating to Behaviour is shown. When a user moves a pointer over the box containing the word "Ecology" 13, the screen display changes to the screenshot 301 shown in figure 8. When a user moves a pointer over the box containing the word "Mammal" 14, the screen display changes to the screenshot 302 shown in figure 10. When a user moves a pointer over the box containing the word "Cetacea" 15, the screen display changes to the screenshot 303 shown in figure 12. When a user moves a pointer over the box containing the word "Beluga" 16, the screen display changes to the screenshot 304 shown in figure 13.

Although specific embodiments of the invention have been described, further modifications are also possible. The code for each process in the methods according to the invention may be modular in the manner shown in the first and second embodiments. Alternatively, the code may be arranged in an alternative way to perform the same function. The methods and apparatus according to the invention are applicable to any computer with display means, and not just a handheld device.

While the invention has been described in terms of what are at present its preferred embodiments, it will be apparent to those skilled in the art that various changes can be made to the preferred embodiments without departing from the scope of the invention, which is defined by the claims.

CLAIMS:

1. Apparatus for retrieving information from a hierarchically arranged information source, the apparatus comprising:

a display for displaying information and user selectable menu items corresponding to information available from said information source;

a user input device for receiving user selections of displayed menu items; and

a display controller for controlling said display in dependence upon received user selections to display said menu items as history menu items indicating previously received user selections corresponding to navigation down levels of the hierarchy of said information source and new menu items corresponding to information available at a next level of the hierarchy of said information source, and to display information corresponding to a most recently selected menu item.

2. Apparatus as claimed in claim 1, wherein the display controller is adapted to control the display to display new menu items for a new level of the hierarchy when the user input device receives a history menu item as a user selection.

3. Apparatus as claimed in claim 2, wherein said user input device is adapted to move a pointer, and said display controller is adapted to control the display to display new menu items when a pointer is moved over a history menu item.

4. Apparatus as claimed in any preceding claim, wherein the display is a touch sensitive screen and the user input device comprises an input component of said touch sensitve screen.

5. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display history menu items in a first area of the display, and information in a second area of the display.

6. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display history menu items as allocated areas of the display arranged in a series.

7. Apparatus as claimed in claim 6, wherein said display controller is adapted to control the display to display the history menu items arranged along an upper area of the display, with the information in a lower area of the display.

8. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display the history menu items in a first area of the display, and a new menu item in a second area of the display when the user input device receives a history menu item as a user selection.

9. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display a new menu item in a lower area of the display when the user input device receives a history menu item as a user selection.

10. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display new menu items overlaying the information displayed on the display.

11. Apparatus as claimed in any preceding claim, wherein said display controller is adapted to control the display to display new menu items replacing the information displayed on the display.

12. A hand held device comprising the apparatus claimed in any preceding claim and said information source.

13. A carrier medium carrying code for configuring a programmable apparatus as the apparatus of any preceding claim.

14. A method of retrieving information from a hierarchically arranged information source, the method comprising:

displaying information and user selectable menu items corresponding to information available from said information source;

receiving user selections of displayed menu items; and

controlling the display of the menu items and the information in dependence upon received user selections to display said menu items as history menu items indicating previously received user selections corresponding to navigation down levels of the hierarchy of said information source and new menu items corresponding to information available at a next level of the hierarchy of said information source, and to display information corresponding to a most recently selected menu item.

15. A method as claimed in claim 14, wherein new menu items are displayed for a new level of the hierarchy when the user input device receives a history menu item as a user selection.

16. A method as claimed in claim 15, wherein said user selections are received by detecting a pointer position, and displaying new menu items when the pointer is detected over a history menu item.

17. A method as claimed in any one of claims 14 to 16, wherein said information and user selectable menu items is displayed on a touch sensitive screen and said user selections are received from an input component of said touch sensitive screen.

18. A method as claimed in any one of claims 14 to 17, wherein the history menu items are displayed in a first display area, and the information is displayed in a second display area.

19. A method as claimed in any one of claims 14 to 18, wherein history menu items are displayed in allocated display areas arranged in a series.

20. A method as claimed in claim 19, wherein the history menu items are displayed arranged along an upper display area, and the information is displayed in a lower display area.

21. A method as claimed in any one of claims 14 to 20, wherein the history menu items are displayed in a first display area, and a new menu item is displayed in a second display area when the user input device receives a user selection of a history menu item.

22. A method as claimed in any one of claims 14 to 21, wherein a new menu item is displayed in a lower display area when the user input device receives a user selection of a history menu item.

23. A method as claimed in any one of claims 14 to 22, wherein new menu items are displayed overlaying the displayed information.

24. A method as claimed in any one of claims 14 to 23, wherein new menu items are displayed to replacing the displayed information.

25. A method as claimed in any one of claims 14 to 24, further comprising

retrieving said information from an information source stored on a handheld device;

displaying said information and user selectable menu items on said hand held device; and

receiving said user selections on said handheld device.

26. A carrier medium carrying code for configuring a programmable apparatus to perform the method of any one of claims 14 to 25.

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Application No: GB 0312629.9 **Examiner:** Phil Osman
Claims searched: 1,14 **Date of search:** 24 September 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 4, 5, 6, 13, 14, 18, 19, 20, 26	US 6,381,611 B1 (ROBERGE et al) See abstract
X	1, 4, 5, 6, 12, 13, 14, 18, 19, 20, 25, 26	US 2002/059210 A1 (MAKUS et al) See Figs 3-5
X	1, 4, 5, 6, 13, 14, 18, 19, 20, 26	US 6,167,396 (LOKKEN) See Figs 3, 4, 6

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

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Worldwide search of patent documents classified in the following areas of the IPC[7]:

G06F

The following online and other databases have been used in the preparation of this search report:

EPODOC, Internet, JAPIO, WPI