

WE 1.0 User's Manual

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A TextLab Report

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Chapter 1

An Introduction to WE

WE is a comprehensive Writing Environment designed to help professionals write more efficiently and effectively. It supports all phases of the writing process, from gathering and organizing ideas to writing and editing text. Like other structure editors, WE allows you to create and edit the structure of a document independent of the text that makes it up. WE also includes a conventional text editor for writing and editing the text itself.

1.1 The Strategic Method

The structure of WE is based on a particular approach to writing, called *A Strategic Method for Writing*, developed by John B. Smith at the University of North Carolina and Catherine F. Smith at Syracuse University [UNC Dept. of Comp. Sci. Technical Report TR87-023]. The Smiths' method views writing as a process that transforms information from one structural form into another. The process includes several steps in which the writer uses a number of different cognitive skills in addition to linguistic encoding:

1. Exploring - A writer begins with the content of his document scattered in his long term memory or in external sources such as books or other

people's heads. He must draw ideas from this loose associative network and record them in a form in which they can be organized and developed. During this step, the writer may also begin to cluster related ideas.

2. Organizing - The writer makes decisions about which ideas to include in the document and begins to construct a single integrated structure, usually a hierarchy, for the document. He may borrow clusters of ideas from his exploration as well as work on the hierarchy directly.

3. Writing - The writer encodes ideas into prose, graphs, or other forms. He may complete his hierarchy first, then fill in its content, or he may *write* small parts of the document in combination with exploring and organizing.

4. Editing - The writer refines his document by rearranging parts of it and clarifying sentences and paragraphs.

Some writers choose to follow these steps sequentially, while others jump back and forth among them. In either case, the goal is to move toward greater organization of ideas and greater precision of expression as the process continues.

1.2 WE Supports the Strategic Method

WE supports the Smiths' Strategic Method with a multimodal, graphics-based user interface. Each of four windows on the screen contains a mode - Network Mode, Tree Mode, Edit Mode, and Text Mode - related to one of the steps in the Strategic Method.

In Network Mode you can collect ideas during the early exploration stages of writing and see them represented visually; then you can group related concepts into clusters, draw associations between related pairs of concepts, and link concepts into a network.

Move into Tree Mode to create a hierarchy, or tree, for your document. Ideas from the exploration stage can be moved from Network Mode to Tree

Mode and incorporated into the hierarchy, if desired. You can easily see the relationships between parts of your hierarchy since it is represented visually. Unbalanced branches or holes in the tree stand out much more clearly than they would in a traditional outline form.

Tree Mode is also useful for editing the structure of your document. Several structure editor functions allow you to rearrange the tree, which automatically rearranges the content of the document.

Edit Mode allows you to write or edit text associated with a node of the tree or network. (Some editing capability is available in Text Mode, too.)

Text Mode presents the sequence of ideas and/or text as represented by your tree or network. This mode is helpful for editing the content of the document for continuity and consistency.

All of these features are part of a tool designed to make you a better writer, to help you create more readable documents that get your ideas across to your readers.

1.3 Contents of This Manual

Chapter 2 contains a tutorial for WE, intended for the first-time user. Commands essential for gathering thoughts, creating a hierarchy, and filling in text are covered. The tutorial should take approximately 30-45 minutes to complete and should prepare you to use the system to explore and structure your ideas and to transform them into text.

Chapter 3 provides complete details of the system. All system commands are listed and explained. You can read through this section for a comprehensive understanding of WE or use it as a reference guide.

1.4 User Description

WE is currently implemented on Sun Workstations. While the system can be run on a Sun-2, the user is strongly recommended to use a Sun-3 because of speed. The user is assumed to be familiar with login procedures and mouse-driven interfaces.

Chapter 2

A Tutorial for the Writing Environment

2.1 INTRODUCTION

This tutorial covers basic features of the system illustrated by simple examples. After completing this chapter, you should be able to use the system to explore, group, and structure your ideas and then transform them into a document.

2.2 GETTING STARTED

To start the Writing Environment System (at UNC-Chapel Hill), first login to a Sun-3 Workstation with 4MB of memory and then type:

```
% /usr/projects/textlab/bin/we
```

The loading process normally takes 15 - 30 seconds and produces several "error messages" that you can ignore.

2.2.1 Appearance and Modes

The default layout for WE contains four windows, as shown in Fig. 2.1, called Network Mode, Tree Mode, Edit Mode, and Text Mode.

Modes are working areas. Each mode is related to one of the steps in the writing process. Network Mode lets you explore your ideas; Tree Mode lets you organize them; Edit Mode lets you input and edit small blocks of text; Text Mode lets you read and edit the blocks concatenated into the continuous document.

On top of each mode is a menu bar with three pull down menus. They control the mode and provide information about it. Essential functions are introduced in the tutorial; the rest in Chapter 3.

Some special features of the system need to be mentioned. First, this is a one-button-mouse system; although the Sun's mouse has 3 buttons, you can click with any of them. To use a pop-up menu, press any one of the mouse buttons. The system will display the menu at the cursor position and highlight the selected option when you move the cursor. Release the mouse button when the command you want to issue is highlighted.

Second, to work in a new mode, you must move the cursor inside that mode. At the beginning of a session you must click once to activate WE itself.

2.2.2 Selecting Your Work Space

After you click the mouse button once, the whole system is activated. The system assumes you want to work on a new empty work space. If you have an existing work space and want to continue that work, go to the menu bar at the top of the screen and click once to activate it. Point the cursor at the Work Space bar and press the mouse button. From the menu that appears, select the **Change WS** command and select the name under which you saved it last time in the sub-menu.

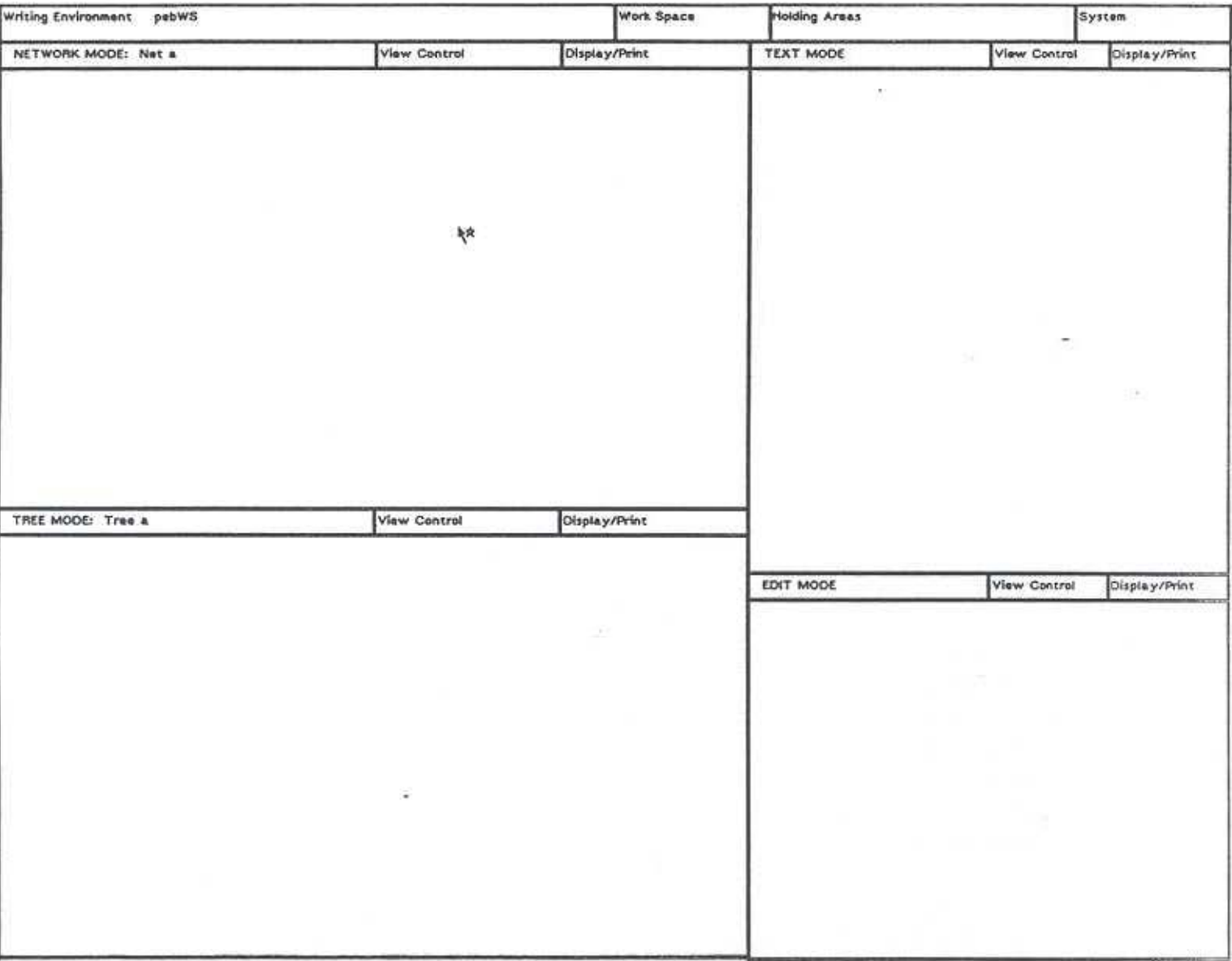


Figure 2.1: Standard layout of the WE system

2.3 USING THE SYSTEM

2.3.1 Example Document

Suppose you want to write a brief document which introduces UNC to a visitor. Let's make it a "UNC Visitor's Guide." It should contain general information about the school, such as the places to see, where to park, where to eat, ..., etc. It should be about three or four pages long and well structured so that the reader will find it helpful and pleasant to read.

2.3.2 Network Mode

Exploration

Assume that you already know most of the information that will go into the document. The first thing to do, then, is to explore your own ideas. Move the cursor into the Network Mode. Now think about the topics or information that might be included, such as *Parking*, which is very important to a newcomer at UNC. It should be put into the visitor's guide. To do so, press down the mouse button inside the Network Mode and select the **Create Node** option in the pop-up menu, as shown in Fig. 2.2.

The system will ask for the name of the new node by displaying an input box right beside the cursor. In response, type *Parking* and a carriage return. A node with *Parking* will be displayed where you invoked the background menu. Add more ideas to create a screen as shown in Fig. 2.3.

Clustering Ideas

After you run dry of ideas, stop and look at the collection of nodes/ideas you have created. As you do so, you might want to gather related nodes into groups. WE not only provides a way to see your ideas, but also ways

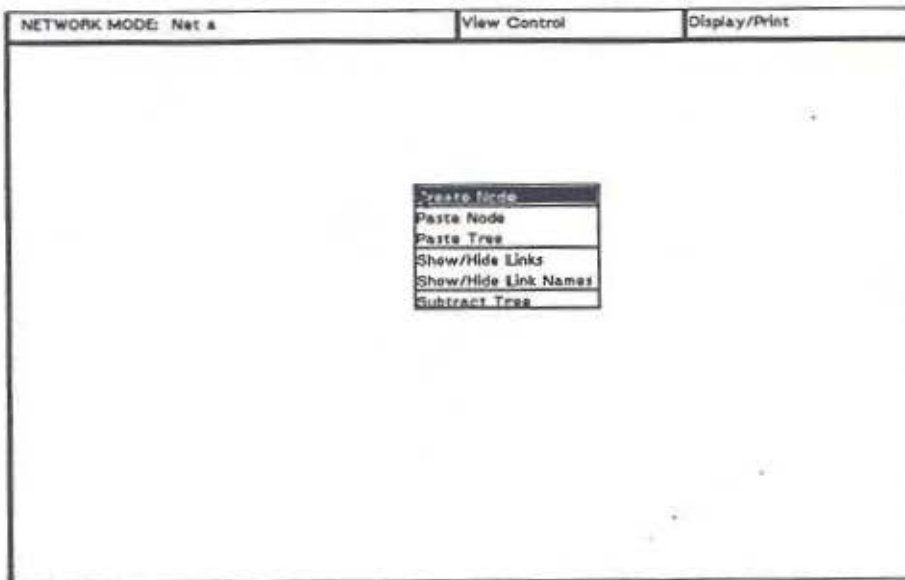


Figure 2.2: Create nodes

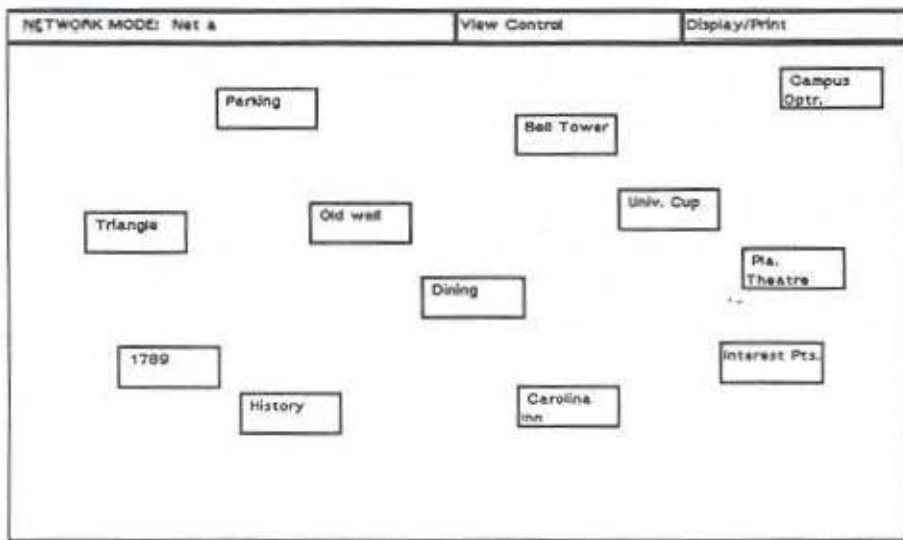


Figure 2.3: Add more nodes.

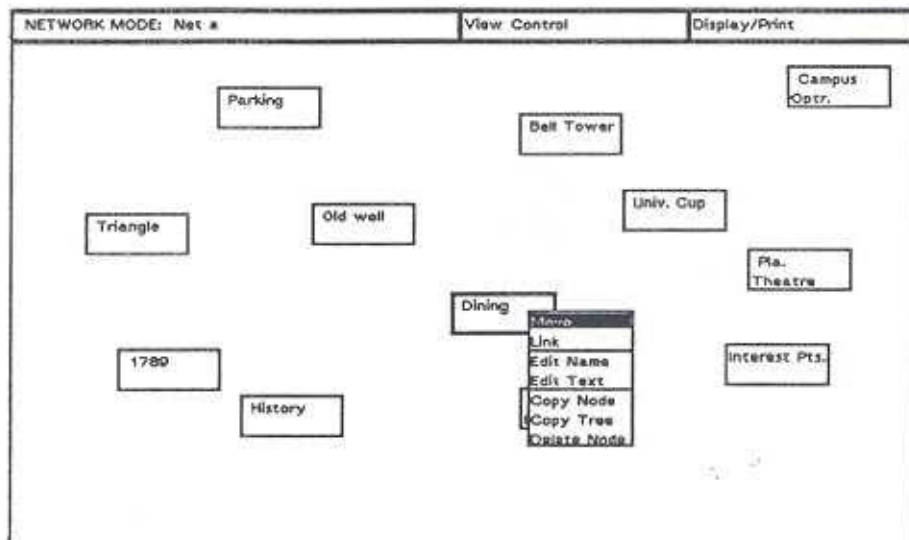


Figure 2.4: Move nodes

to manipulate them. You can move a node by pointing the cursor at it and pressing the mouse button. Select the menu item *Move*, as shown in Fig. 2.4. Then move the cursor to the place where you want the node to be and click the button to put it there.

Cluster the ideas as shown in Fig. 2.5, then look at each group. Ideas missing from the group become clear. For example, you can see that there should be a node named *Find your way* in the group in the upper right corner. Use the *Create Node* command, as shown in Fig. 2.5, to add it.

Linking Ideas

Clustering ideas spatially indicates a general relationship among the nodes in a group. To make the relationships more precise, you can add links between nodes. Suppose you consider the node *1789* to be subordinate to *History*. To draw a directional link from *History* to *1789*, invoke the node menu by

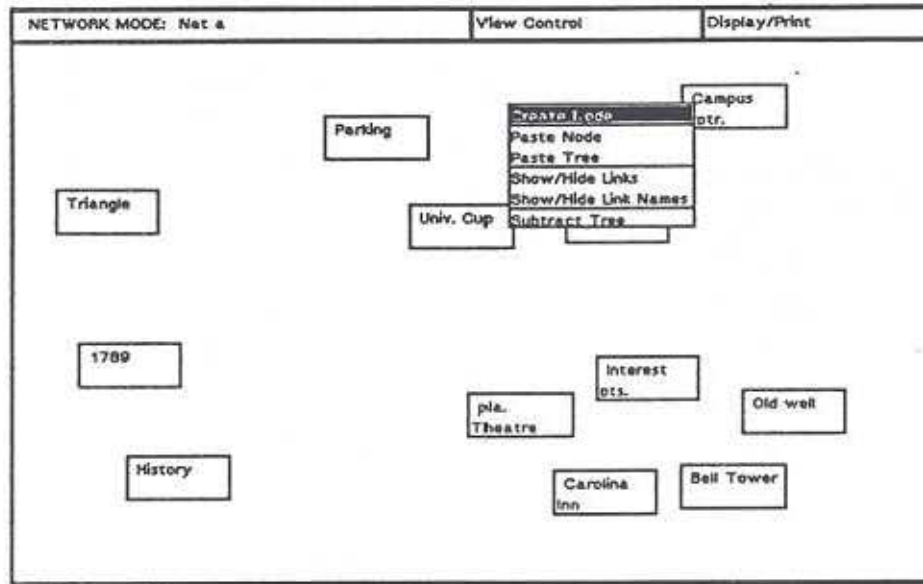


Figure 2.5: Put in the missing parts

moving the cursor into the *History* node and pressing the mouse button. Select the Link command. You will then see a “rubber band” connecting the node and the cursor when you move it. Now, move the cursor inside *1789* node and then click the mouse button. This will produce an associative link between the two, as the “rubber band” changes to a solid line with an arrow in the middle, see Fig. 2.6.

Deleting Ideas

Linking clarifies the relationships among nodes and perhaps the structure of ideas in your mind. You may find that some nodes on the screen simply can't be linked with any other nodes. This may indicate that the node is irrelevant to your topic; or on the other hand, you may need to explore this part of the topic more. In the example, you have a *Triangle* node which represents the “Research Triangle Park.” It is not part of UNC and is too far away to be included in a campus tour. So, on second thought, you decide to discard it. To do so, invoke the node menu and select Delete Node.

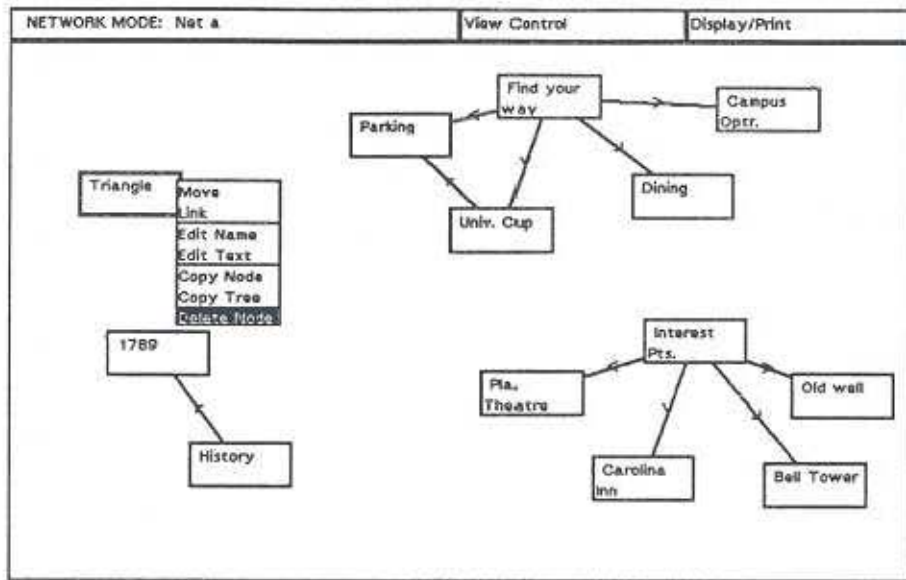


Figure 2.6: Delete irrelevant node

Editing Ideas

As you take a final glance at the Network Mode, you find that you prefer to talk about the development of UNC instead of the history. To change the name from *History* to *Development*, move the cursor to that node and invoke the node menu by pressing the mouse button. Select the Edit Name command. A small input box appears just as it did when you created the node. The only difference is that the node name also appears in the box so that you can edit it. Use the keyboard to enter the new name, *Development*, and then press the carriage return.

Deleting Links

Since you've changed the node from *History* to *Development*, the 1789 node which represents the idea of "First state university in the United States" is no longer subordinate to *Development*. To get rid of that link, point the

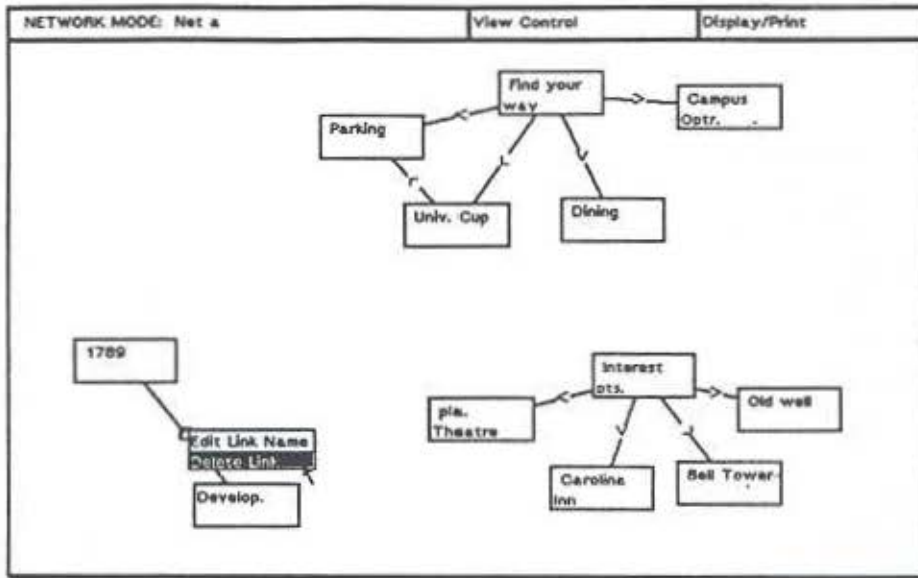


Figure 2.7: Delete the meaningless link

cursor at the arrow in the middle of the link, press the mouse button to invoke the link menu, and select the **Delete Link** command, as shown in Fig. 2.7.

2.3.3 Tree Mode

As pointed out earlier, a hierarchical structure is a particularly effective form of organization for many documents. WE provides a separate mode or environment designed especially for creating and editing trees. Other functions, which will be explained below, also let you move nodes and structures created in Network Mode to Tree Mode.

When represented as a tree, a hierarchical document's title could logically be the name of the root node. The chapters would then correspond to the branches of the tree. The sections in each chapter would be sub-branches. And, at the lowest level, the leaves of the tree correspond to manageable blocks of content, such as a paragraph.

1. Introduction
 - 1.1. 1789
 - 1.2. Development
2. Interest Points
 - 2.1. Playmakers' Theater
 - 2.2. Old Well
3. Find your
 - 3.1.

The tree is equivalent to an outline. However, a tree offers several advantages. The most important one is that the graphical tree lets you see literally the whole structure of your document. Consequently, you can locate parts of your structure that are inconsistent, need development, or are disproportionately large.

Creating the Root

Go to the Tree Mode to generate the tree structure of your document. Move the cursor into the Tree Mode. When you push the mouse button again, a pop-up menu will appear. Select the **Create Tree** command, as shown in Fig. 2.8. The system will prompt you for the name of the root. Enter the name *UNC V. Guide* as you did in the Network Mode.

The system can only display a limited number of characters within a node. If the name of a node is too long, only part of it will be displayed in the box (although the system still remembers the full name). Consequently, you may wish to use abbreviations in naming your nodes.

Creating a Child Node

As you think about the structure of the *UNC Visitor's Guide*, you decide that an introduction is necessary. You can do this by putting a child node under the root to represent the introduction section. However, in Tree Mode you can't use the background menu to create a node and link it later with

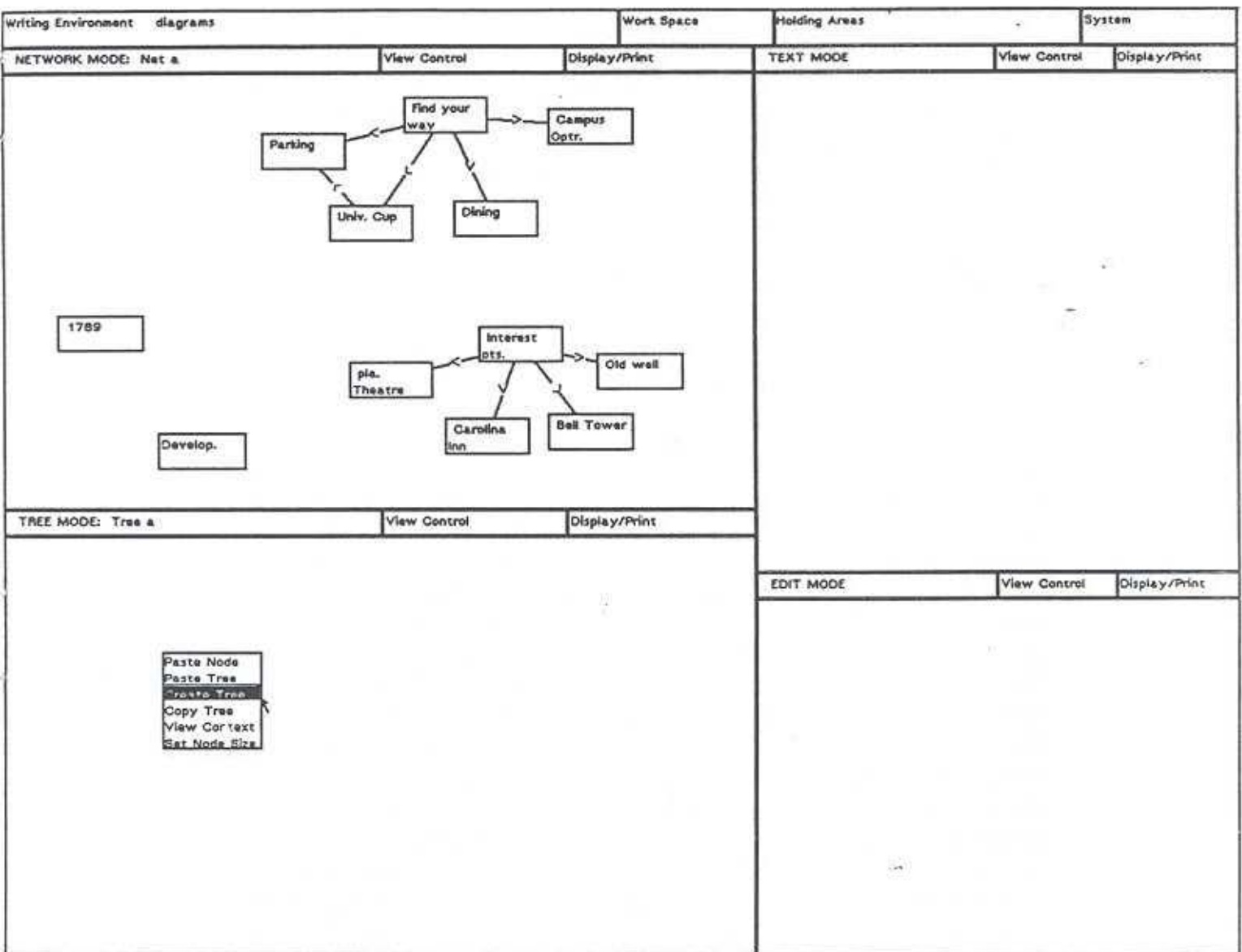


Figure 2.8: Create the document tree

its father like you did in the Network Mode. Instead, nodes will be linked to the tree when they are created. For example, move the cursor into the father node, invoke the node menu, and select the **Add Node: Child** command. The system will prompt you for the name of the child node. Type *Introduction* and hit carriage return. The screen should look like Fig. 2.9.

Copying Nodes from Network Mode

After you've created the root of the tree, you may want to copy some of your ideas/nodes from the Network Mode into your tree. Suppose you decide that both the *1789* and *Development* nodes should go into the introduction. You can transfer a copy of them from Network Mode to Tree Mode. First, activate the Network Mode; then move the cursor to the *1789* node, invoke the node menu, and select the **Copy Node** command, as in Fig. 2.9. The system will then copy the node into an holding area. Now move the cursor back to the Tree Mode and click the mouse in the background. Select the **Paste Node** option from the menu. A special box cursor will replace the original cursor. When you move the box cursor inside the *Introduction* node, it will change to a small arrow in the box pointing upwards, downwards, or to the right depending on the position of the cursor within the node. (Move the cursor around to see the small arrow change.) The upward arrow indicates that the incoming node will be drawn immediately above this node as a sibling, and the downward arrow indicates it will be placed below the node, also as a sibling. If the arrow points to the right, the incoming node will be attached to this node as a child. Click the mouse button when the indicated location of the incoming node corresponds to your intended destination for it. In this example, click when the small arrow points to the right, as shown in Fig. 2.10. In the same way, copy the *Development* node and "Paste" it as a child node of the *Introduction* node.

Copying a Tree Structure

You can also copy an entire structure, such as the whole group of ideas linked to *Interest pts.* in the Network Mode. To copy a structure rather than a

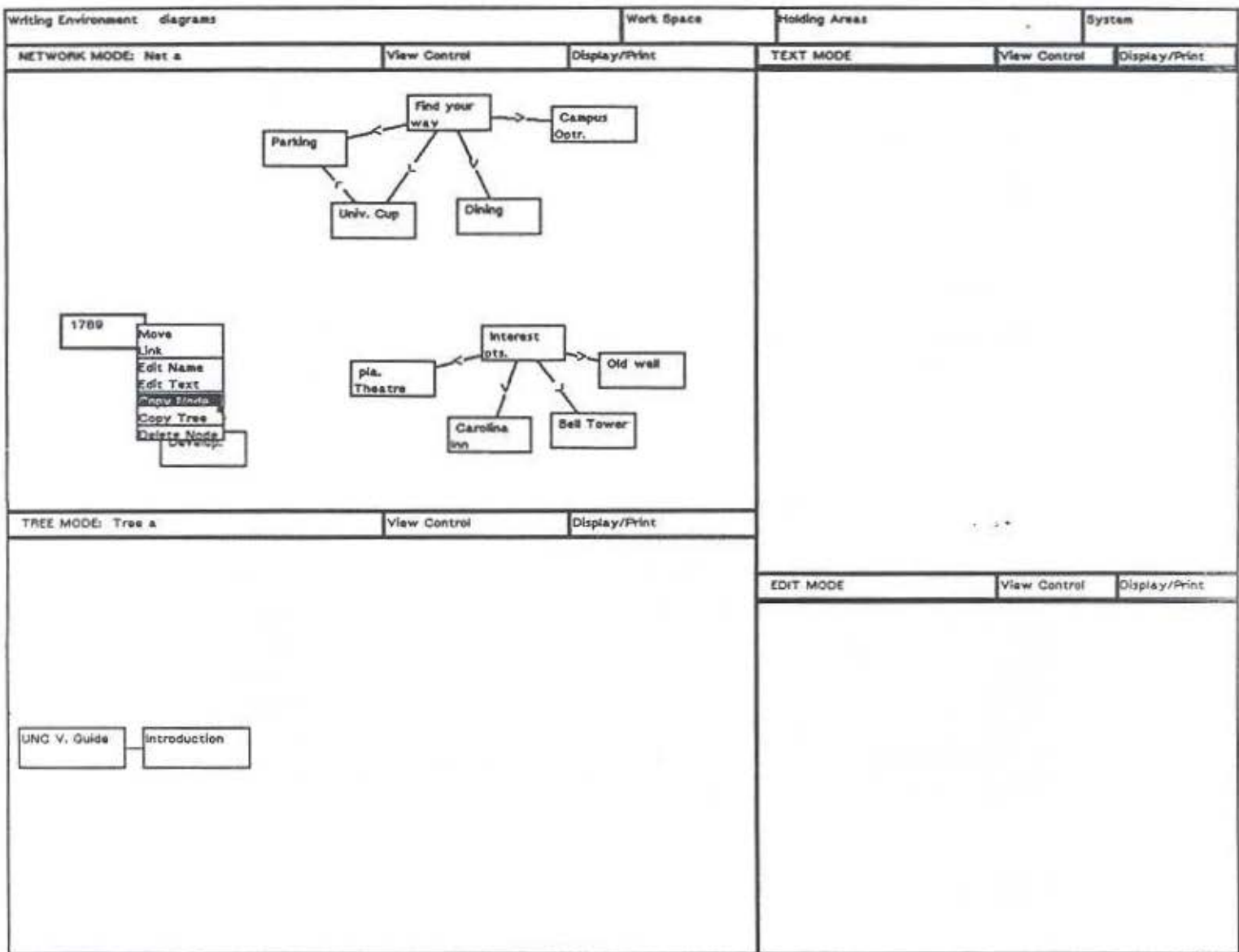


Figure 2.9: Copy a node from Network Mode

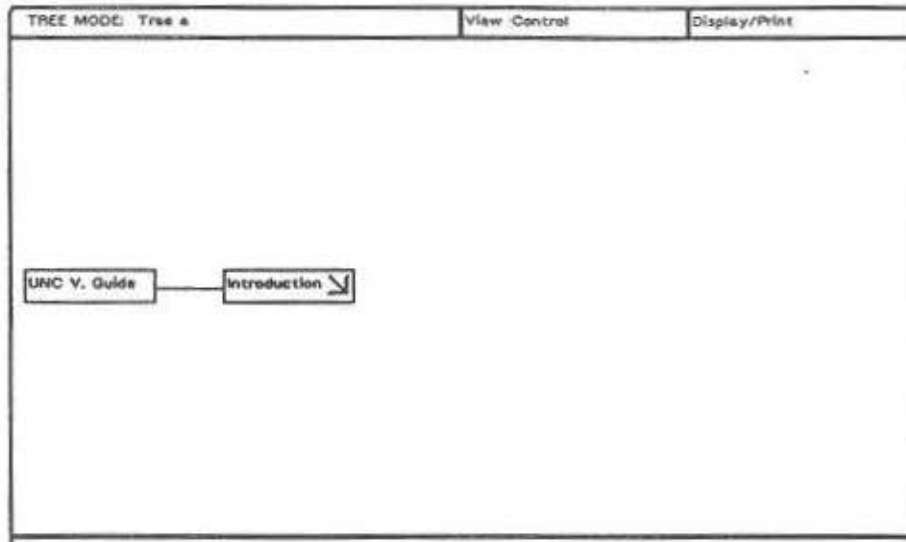


Figure 2.10: The box cursor

single node, go to the Network Mode and select the Copy Tree command from the node menu of the *Interest pts.* node. Note that this node is the root of that idea cluster, as seen in Fig. 2.11. Go back to Tree Mode and select the Paste Tree command in the background menu. This time you have two ways to “Paste”: one is to go to the *UNC V. Guide* node and click the button when the small arrow of box cursor points to the right; the other is to click when the small arrow in the *Introduction* node points down. Either way, you will end up with a screen that looks like Fig. 2.12.

Copying a Network Structure

Next, try copying the *Find your way* cluster, shown in Fig. 2.12. This structure is different from the previous one. One of the links in the Network cluster is left out of the tree. The Copy Tree command in the Network Mode copies the largest verified tree beginning at the node where you invoked the node menu. The internal algorithm of the system that does this first inspects the structure which it is going to copy. If it's a valid tree, it is

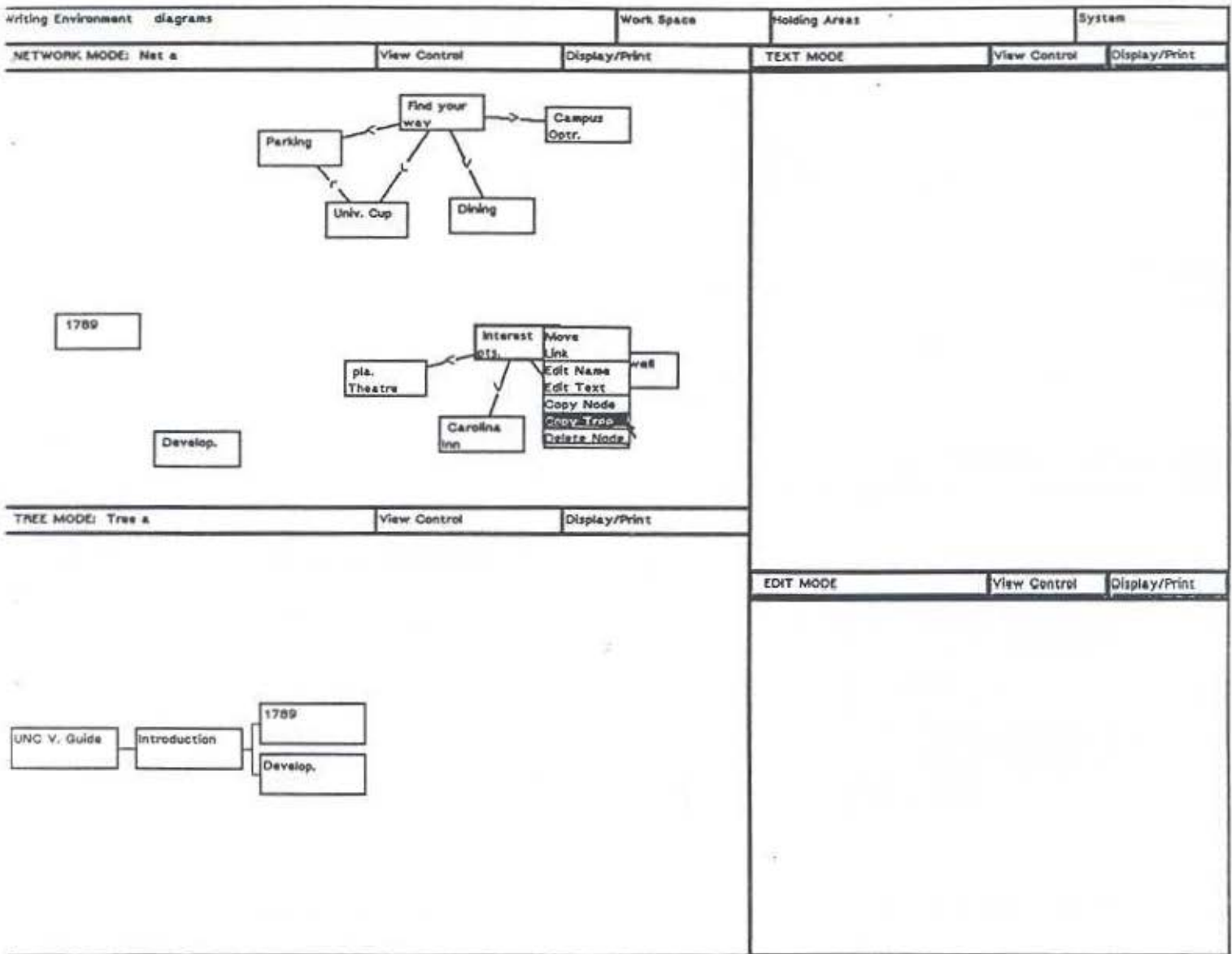


Figure 2.11: Copy tree

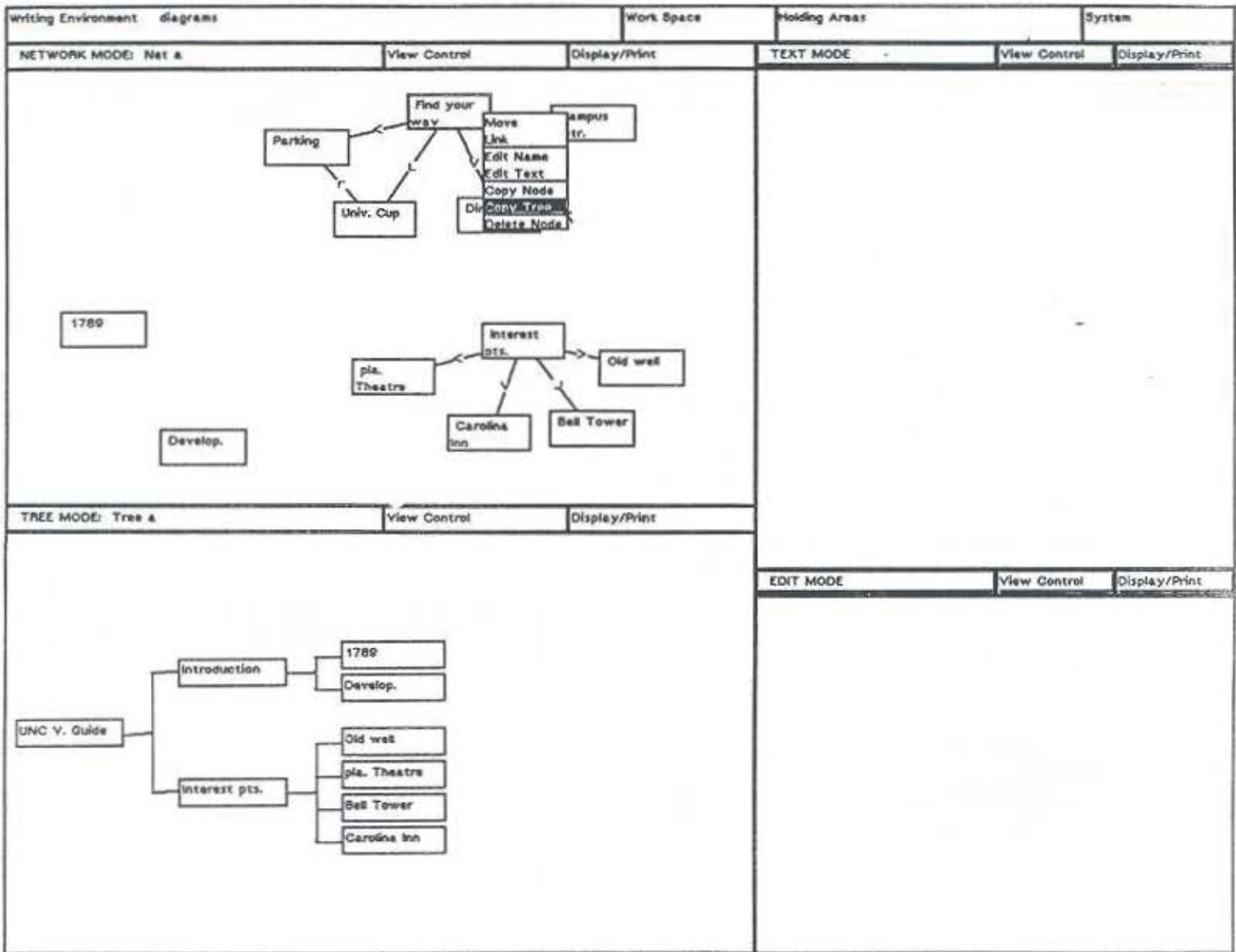


Figure 2.12: Copy a valid tree from a network

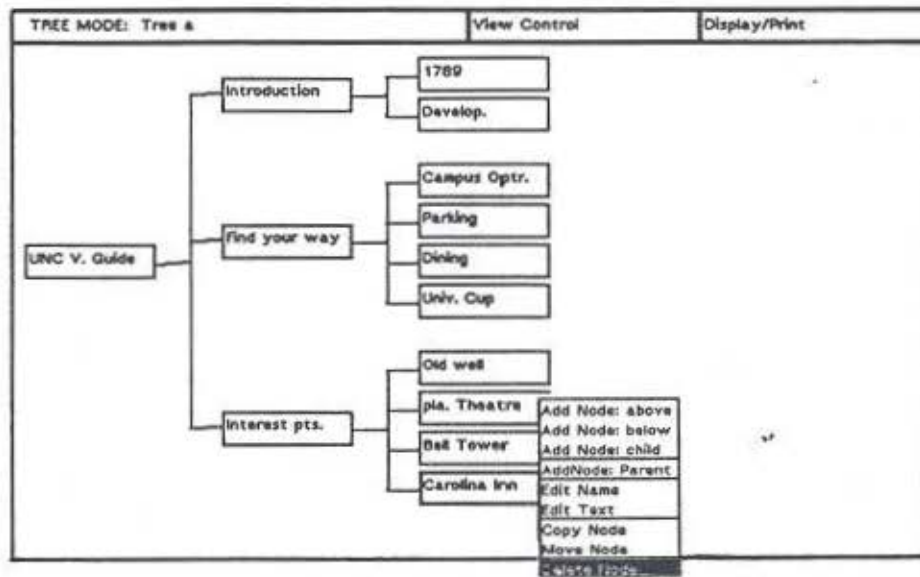


Figure 2.13: Deleting a node from the tree

put into the buffer to await your paste operation (previous example). If it is not a valid tree, such as the *Find your way* cluster which contains a cycle, the system reduces the structure to a valid tree, thereby getting rid of the link between *Univ. cup* node and the *Parking* node. It then copies what is now a legitimate tree structure to the holding area. Since the algorithm searches breadth-first for the largest verified tree, it broke the link between the *Parking* node and *Univ. cup* node instead of the link between *Find your way* and *Parking*.

Deleting Nodes

As you inspect the tree, suppose you decide that *Carolina Inn* should not be a point of interest. You can delete it in Tree Mode just as you did in the Network Mode, as shown in Fig. 2.13. If the node appears in both Network Mode and Tree Mode (as it would if you copied and pasted it), deleting it in one mode does not delete it in the other. However if the name is changed in one mode, that change will be reflected in the other mode.

Moving and Deleting a Subtree

Suppose you decide that the positions of the *Interest pts.* section and the *Find your way* section should be reversed. To do this, move the cursor into the area between the *Interest pts.* node and its children nodes. The branches among them together with the lower part of the *Interest pts.* node will be highlighted. Press the mouse button to bring up the menu and select the **Move Subtree** command. The selected subtree's nodes will disappear from the screen when you release the mouse button, leaving only the branches which connected them. Again, the cursor will change to the box shape. Move the subtree just as you did to paste a subtree copied from Network Mode; that is, place the box above the *Find your way* node and click the button to complete the move. You can also delete a subtree by selecting the corresponding command in the same menu.

Adding a Node

Suppose a new idea comes to mind: "How about adding the Smith Center to the interest points section?". You decide to put it under the *Bell Tower* node. Pick the **Add Node: Below** command from the node menu of the *Bell Tower* node to create a new node and then name it *Smith Center*, as shown in Fig. 2.14.

As you have probably noticed, there are three **Add Node** options in the node menu. The **Add Node: Above** command is similar to the **Add Node: Below** except that it produces a new node above the original node. The **Add Node: Child** creates a new node as the new bottom child of the selected node. In the above example, you could also select the **Add Node: Child** command inside the *Interest pts.* node to do the same thing.

Editing Text

At any time during the process, you can write text that will be associated with a node. You can wait until you have finished the tree, but you can also

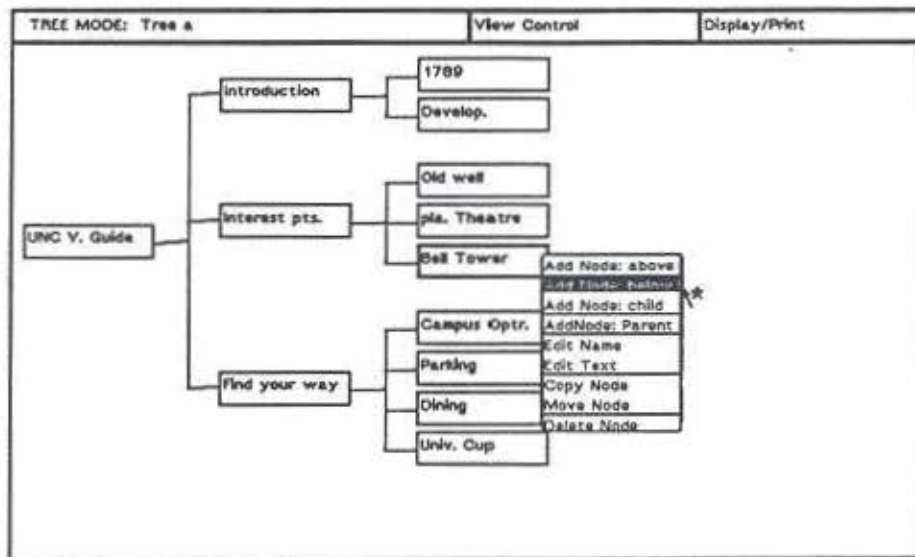


Figure 2.14: Add node

do it while you are still working on it. To invoke the editor, select a node (e.g. *1789*) and then select the Edit Text option from the node menu.

2.3.4 Edit Mode

The editor provided by the system is the standard Smalltalk editor. This mouse driven editor is described in detail in Goldberg's *Smalltalk-80: The Interactive Programming Environment*. Here only the functions you will need for basic text editing are introduced.

Since the editor is the Smalltalk editor, the meaning of each mouse button is different from what we previously defined.

Insertion Point

When you move the cursor into the Edit Mode, you will see a small caret (an invert “v”), that indicates where the input from the keyboard will go. Type a paragraph as shown in Fig. 2.15.

Then move the cursor to any of the other characters and click the left mouse button. The caret should appear at that cursor location. Pointing to a place in the text and clicking the left mouse button will insert the caret at that position. Use this feature when you want to insert text.

Text Selection

Text is selected using the cursor and the left mouse button. Move the cursor to one end of a passage of text and press the left mouse button. While holding the button down, move the cursor to the other end of the passage and release the button. The selected text will be highlighted. The passage will remain highlighted until you perform another operation, as shown in Fig. 2.15.

Moving and Copying Text

To move text, first select the text to be moved and then press the middle button. From the menu that appears choose cut. The cut command deletes the selected text but leaves it in a hidden buffer where it can be retrieved by the paste command. Now select the destination position, press the middle button, and choose the paste command to complete the move.

A copy is done by copy and paste, analogous to cut and paste, but does not delete the original text.

Writing Environment diagrams		Work Space		Holding Areas		System	
NETWORK MODE: Net a		View Control		Display/Print		TEXT MODE	
TREE MODE: Tree a		View Control		Display/Print			
				EDIT MODE Introduction >		View Control Display/Print	
				<p>The University of North Carolina at Chapel Hill, the nation's first state university to accept and graduate students, welcome you to its campus. Charters in 1789; Carolina opened its doors on Jan. 15, 1795</p>			

Figure 2.15: Type a paragraph and select text

Replacing Text

To replace a passage of text, first select it and then type the replacement. The first keystroke deletes the selected text. To insert between characters, place the caret under the gap between the characters and then type the insertion. To delete a passage of text (i.e. to replace it with nothing), select it and cut it.

Scroll Bar

The scroll bar is a rectangular area adjacent to the left side of the Edit Mode, as shown in Fig. 2.16. The length of the scroll bar represents the length of the entire block of text that can be examined. Inside the area is another rectangular area that is light gray. The length of this gray area represents the height of the screen window, (as illustrated in Fig. 2.16). The gray area is located within the scroll bar at a point relative to the location of the window within the overall block of text: if the gray area begins at the top of the scroll bar, then the window is at the beginning of the block. If the gray area fills the entire scroll bar, then the whole block is displayed (see Fig. 2.17).

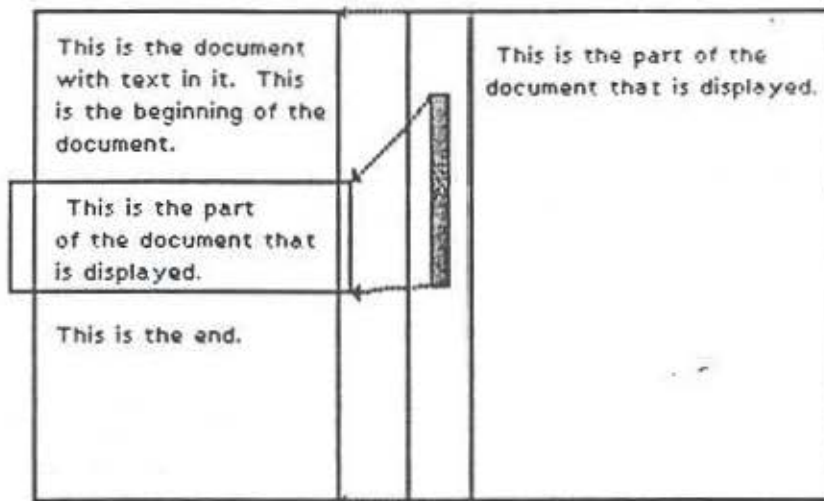


Figure 2.16: The mapping between scroll bar and text

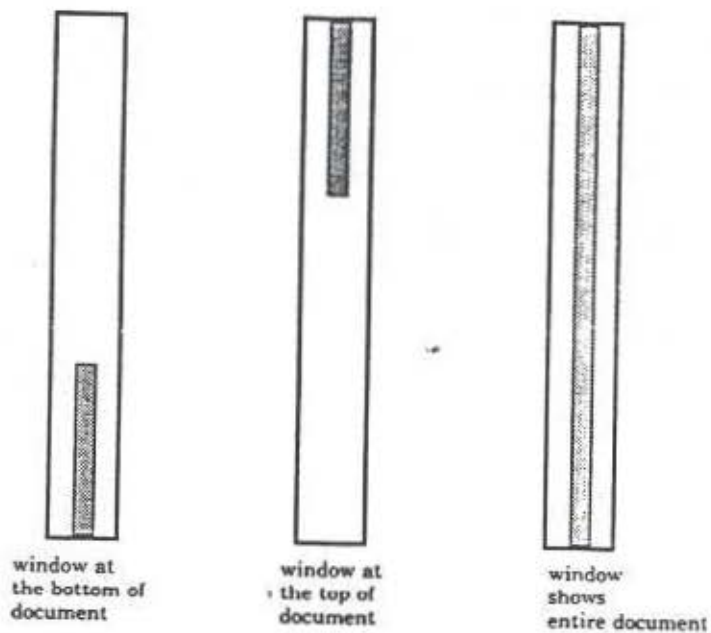


Figure 2.17: Window position

You can change the portion of text displayed by moving the window relative to the block. This is done in one of the three ways:

- Move the cursor into the scroll bar area, in the right one-third of the rectangle and outside of the gray area. The cursor shape becomes an up arrow. Click the left mouse button.
- Move the cursor into the scroll bar area, in the left one-third of the rectangle and outside of the gray area. The cursor shape becomes a down arrow. Click the left mouse button.
- Move the cursor into the scroll bar area, in the middle one-third of the rectangle and outside of the gray area. The cursor shape becomes a right arrow. Press the left mouse button and hold. The gray area moves to the cursor location and then tracks the cursor until the left mouse button is released. The displayed portion of text will be from that relative position in the whole block. While the left button remains pressed, a lighter gray image is left in the scroll bar to indicate the previous position of the gray area.

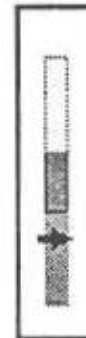
scroll next



scroll previous



jump



Leaving the Edit Mode

To leave Edit Mode, simply move the cursor out of the area of the mode. Don't worry about saving the text. The system will automatically save the content of the Edit Mode whenever you leave it.

2.4 SOME USEFUL FEATURES

2.4.1 Help Support

If you can't remember what a menu command does, you can press the SHIFT LEFT key while selecting that command. The system will display the help message for the command.

2.4.2 Screen Control

Each mode of the system has a menu bar at the top. It contains the View Control pull-down menu. One of the commands of that menu is Switch Size. This option lets you expand the screen area of that mode to a larger window. If you have lots of nodes in the Network Mode or a big tree in the Tree Mode, you can select this command to enlarge that particular working area. Selecting this option a second time from the full screen window will shrink the window back to its original size.

2.5 SAVE AND LEAVE

2.5.1 Saving your work

To save your work before leaving the system, go to the menu bar at the top of the screen and click once to activate it. Point the cursor at the Work Space bar and press the mouse button. From the menu that appears, select the Save WS command, as shown in Fig. 2.18. The system will then prompt you for a name. If this is the first time you are saving your work, type a name for your workspace and then type a carriage return. If you have saved your work previously, the name of the work space will be displayed in the input area. If you want to save your work space under that name, type a carriage return; the old version will be replaced by the new version. If you give a new name, the old version will be left unaltered under the old name and your work will be stored under the new name. All your work spaces are stored in your home directory.

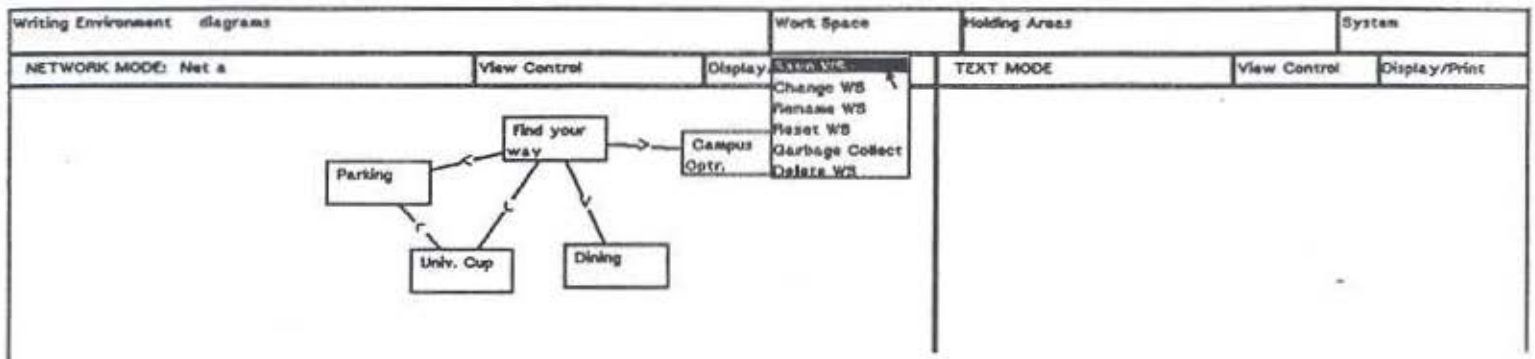


Figure 2.18: Work space menu bar

2.5.2 Leaving the System

After you are sure your work has been safely stored, you can go to the Writing Environment menu bar, press the mouse button to pull down the menu, and select Quit to leave the system. If you forgot to save your work, the system will ask you to save it. This is your last chance. Be sure to save before you leave if you want your work to be available sometime in the future.

Chapter 3

System Functions

3.1 INTRODUCTION

You should have a general idea of how to produce a document in the WE environment after completing the tutorial. This section provides a detailed, systematic description of the system. You can read through the entire section for an overview of WE's capabilities, or you can use it as a reference guide to clarify a command you are unfamiliar with or have forgotten.

The organization of this section is by menu. The Control Panel bar which extends horizontally across the top of the screen is covered first. The commands from each of its four pull-down menus are explained in detail. Next are the three menus from the mode menu bar common to all four mode windows. Finally, menus from each of the four individual mode windows are explained in detail.

3.2 THE CONTROL PANEL

The Control Panel contains commands which affect the system as a whole rather than a specific mode. It is divided into four sections - *Writing Environment*, *Workspace*, *Holding Areas*, and *System*. A pull-down menu is associated with each section.

3.2.1 Writing Environment Menu

Title
General Help
Users' Manual
Redraw All
Default Layout
Quit

- **Title**
Displays a copyright notice.
- **General Help**
Displays information about the capabilities and use of the Control Panel itself. (This item has yet to be implemented.)
- **Users' Manual**
Accesses an on-line version of this manual. Presents a tree with nodes representing manual sections. Click on the node you desire, and the corresponding User Manual text is displayed in the Edit Mode window. (This item has yet to be implemented.)
- **Redraw All**
Redraws the entire screen, eliminating any blips that may have appeared.
- **Default Layout**
Restores the window to the default layout. Useful if you have used

the `Resize` command from the View Control Menu (see Section 3.3.2) to change the size and/or position of any of the windows.

- **Quit**
Quits from the WE System into the Unix environment. If you have not saved your current workspace, you will be prompted to do so. Any unsaved data will be lost.

3.2.2 Work Space Menu

Save WS
Change WS
Rename WS
Reset WS
Garbage Collect
Delete WS

The Work Space includes all current data from the modes. When you save your Work Space, you store a *picture* of the current information in each mode.

- **Save WS**
Saves the current workspace. You will be prompted for the workspace name and given the old name as the default. Simply press *RETURN* if you wish to save under the given name; this will overwrite the old version with the current version. To save under a new name, enter it in response to the prompt; in this case, the old version will be left unaltered. If this is the first time you are saving your work, you must type a name for your file, followed by a carriage return.
- **Change WS**
Changes to a different workspace. If the current workspace has not been saved, you will be prompted as in `Save WS` above. A list of workspaces from which to choose will be presented; the list is taken from the current working directory and includes all workspaces which

you own or on which you have read and write permission. The *empty workspace* included in the list is a new WS used to start from scratch. Click on the desired selection.

- **Rename WS**
Changes the name of the current workspace. You will be prompted with the old name given as a default. Type in the new name and press *RETURN* or simply press *RETURN* if you do not want to change the name. Once the name is changed, the old name will no longer be recognized by the system.
- **Reset WS**
Restores the workspace to the state it was in when last saved. Any work done after the last save is lost.
- **Garbage Collect**
Invokes a garbage collection routine to clear out unnecessary data and make more room for your workspace. Garbage collection is automatic each time you save your workspace; otherwise you should invoke this command every 10-15 minutes to ensure adequate space for the system.
- **Delete WS**
Erases the selected workspace. A list of your workspaces from the current working directory will be presented when you invoke this command. Click on the workspace you want to delete, then confirm *yes* or *no* in response to the prompt. Use this command carefully because a deletion is permanent.

3.2.3 Holding Areas Menu

Show Nodes Show Trees

WE permits you to move nodes and trees between Tree and Network modes. This is done by first using one of the copy commands to make a copy of the desired node or tree in the holding area and then using paste to move the copy into a new location.

This invisible holding area is, in reality, two holding areas - one for trees and one for nodes. Each holding area is implemented as a LIFO (last in, first out) stack. For nodes, **Copy Node** places a reference to the selected node on the top of the node stack or holding area. The next **Paste Node** removes this node from the top of the stack and moves it into the new location. If you copy several times without **pasting**, there will be more than one node on the stack. The tree stack behaves the same way, for copied and **pasted** trees rooted at the selected node.

The commands in this menu allow you to make the stacks visible so that you can check the node or tree on top, change the order of the stack, delete items from the stack, or clear the stack entirely.

- **Show Nodes**

Presents a list of nodes in the holding area. The top of the list corresponds with the top of the stack. You can view the list, or you can manipulate the stack using commands from pop-up menus found in the Node List bar and in the list itself.

If you move the cursor into the Node List bar and hold down the mouse button, a single-item menu will appear. Select this **Clear** command if you wish to clear out the stack.

You can also move the cursor down the list of nodes to select one, then hold down the mouse button to see a two-item menu. Select **Delete** to remove the selected node from the stack. **Top Stack** moves the selected node to the top of the stack. (See Figure 3.1.)

Deletions affect only the holding area stack, not the nodes in the modes.

Note: Don't worry about erasing the Node List when you finish; the system does this automatically when you execute the next command.

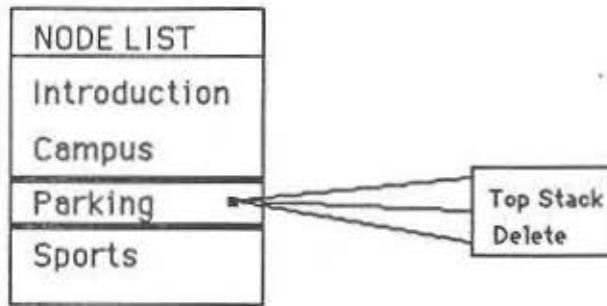


Figure 3.1 A Selected Node and Its Pop-up Menu

- Show Trees

Presents a list of trees in the holding area. The top of the list corresponds with the top of the stack. Trees are listed as *tree from [root name]*, where *root name* refers to the node name for the root of the actual tree or subtree in the list. Just as with the Show Nodes command, you can view the list or use the pull-down menu to manipulate the stack. Again, any deletions here do not affect structures in the modes.

3.2.4 System Menu

ScreenDump
Snapshot
Prompt Before Saving Text
Printing Options
Change WS Directory
Create WS Directory
Suspend
To Smalltalk

Take care when your cursor wanders into this section of the Control Bar. The System Menu is not part of the basic system and is intended for advanced users only. Two commands, Snapshot and To Smalltalk should not be used unless you are a WE System programmer.

- **ScreenDump**

Sends an exact image of the current screen to a laser writer. Before you select this command, you can use the Printing Options command from the System Menu to check for the current output location or to change it.

Notes: A 30-second delay is built in to the ScreenDump command to ensure uninterrupted transfer of data.

This command is not affected by the printing option Auto Send, explained later in this section. The screendump image is always sent directly to the laser writer and never held in an intermediate file.

- **Snapshot**

Makes a new image of the entire Smalltalk system. This option is password-protected since it requires an enormous amount of storage space and should only be used by WE programmers.

- **Prompt Before Saving Text**

This toggle controls the automatic saving mechanism in Edit Mode. By default, WE will save text automatically while leaving Edit Mode. Switching the toggle disables this automatic save and, instead, prompts

you to choose whether or not to save. You can, of course, select this command again to go back to automatic saving.

The position of this toggle is not saved when you quit the system. The default automatic saving is active when you first initiate WE.

- **Change WS Directory**

Changes from the current directory to one you specify. You will be prompted for a pathname. Thereafter, the system will act as if it is running in the specified directory. Databases will be read from and saved to this directory. (Do not use this feature before you fully understand it)

- **Printing Options**

Accesses a four-item menu containing the following commands:

- **Laser Writer**

Prompts with the name of the laser writer currently used for output. To change it, type in the name of the laser writer you wish to use, then press *RETURN*.

- **Lineprinter**

Prompts with the name of the lineprinter currently used for output. To change it, type in the name of the lineprinter you wish to use, then press *RETURN*.

- **File Name**

Prompts with a default file name and allows you to enter the name you wish to use for intermediate output files. Such files are created when the *Send to Line Printer* (Section 3.3.3) or *TeX Output* (Section 3.3.3) command is invoked while the *Auto Send* toggle is disabled. You only need to enter the root file name with this command since *.line* or *.tex* is automatically appended to it by the system.

- **Auto Send**

Enables, disables the automatic printing of output files from the *Send to Line Printer* and *TeX Output* commands (see Section 3.3.3). When this toggle is enabled (the default is disabled), selection of either of the previous commands results in hard copy output from a line printer or a laser writer. Disabling the *Auto*

Send feature results in the creation of intermediate files when either of the commands is selected. A *.line* or *.tex* file is created, and you must process it (in the case of *.tex*) and print it yourself.

- **Create WS Directory**
Creates a new Unix directory. You will be prompted for a pathname. You must use the **Change WS Directory** command to change to this directory. (Do not use this feature before you fully understand it)
- **To Smalltalk**
Exits the WE system and enters the Smalltalk environment. This command should be used only by WE programmers, but if you accidentally select it, you can reenter the current database by selecting **resumeWE** from the menu you get by pressing the middle mouse button while the cursor is pointing to the background.

3.3 MODE MENU BAR

Each mode window has a similar menu bar across the top. The first bar section contains the title of that particular mode. The other two sections, *View Control* and *Display/Print* are the same for all modes. Pull-down menus are also the same for all modes, except where indicated below.

TREE MODE	View Control	Display/Print
-----------	--------------	---------------

Figure 3.2 The Mode Menu Bar from Tree Mode

3.3.1 Mode Title Menu

General Help Undo

- **General Help**
Presents a paragraph of information about the purpose and functions of the mode. (This has yet to be implemented.)
- **Undo**
Undoes the last command, including itself. (This has yet to be implemented.)

3.3.2 View Control Menu

Redraw Resize Switch Size Roaming
--

- **Redraw**
Redraws the current mode, eliminating any blips that may have appeared.
- **Resize**
Allows you to change the default size and position of the mode window. Select this command from the *small* window to change its size, or toggle over to the *large* window with **Switch Size** and then use **Resize** to change it.

- **Switch Size**

Toggles between *large* and *small* default window sizes for the mode. The default screen layout for the system includes a *small* window for each of the four modes. Selecting this command when the window is *small* switches to a full screen window for that mode. You can reduce the window to its original size by selecting **Switch Size** from the View Control Menu for the full screen window.

Note: You can use the **Resize** command to change the default values for *large* and *small* windows. You will be given a prompt at the lower right corner of the window. You can use this prompt to move and resize the window for the current mode. Click the mouse button to fix the corner's position, then hold down the button and stretch the rectangle to the desired size. This is an advanced feature which should be used only if you are familiar with windowing.

- **Roaming (available only in Tree and Network Modes)**

Allows you to zoom in or out and to pan over the mode window. When you select the **Roaming** command, a small roaming window appears in the upper left hand corner of the mode window.

The roaming window represents a portion of the theoretically infinite space available for the mode. Depending on the number of nodes and the size of the roaming window, the entire content of the given mode may or may not be currently visible in the window. The entire content is accessible, however, since the roaming window can be positioned over any portion of the underlying space.

The roaming box inside the window contains the view, or the part of the picture which is currently visible in the mode window. In Fig. 3.3 below, the root of the tree is currently out of view in the mode window, but can be seen in the roaming window.

By using the mouse to manipulate the roaming window and roaming

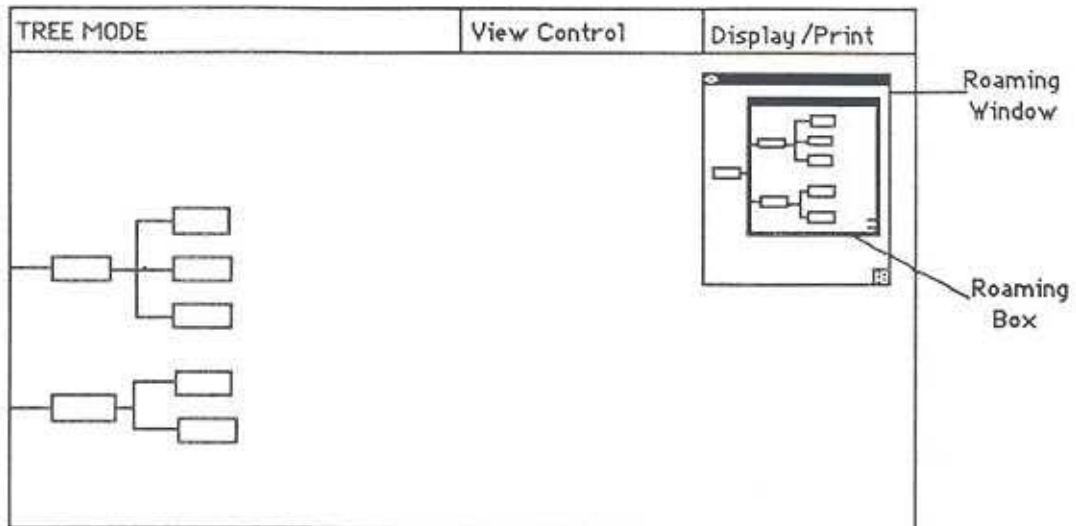


Figure 3.3 Tree Mode Window with the Roaming Window Activated

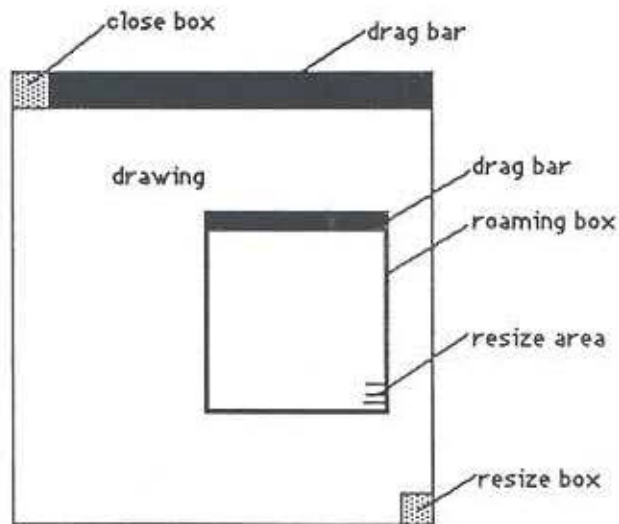


Figure 3.4 Parts of the Roaming Window

box, you can perform several operations:

1. Roaming (panning) - To change the view's position in the entire space, place the cursor inside the roaming box's drag bar, hold down the mouse button, and drag the box over the drawing to the desired position. When you release the mouse button, the view inside the roaming box is displayed in the mode window.
 2. Zooming - Make the roaming box, or viewport, larger to *zoom out* on the entire space or make it smaller to *zoom in*. Place the cursor in the resize area of the roaming box, hold down the mouse button, and drag the corner in or out to change the size of the box. Release the button, and the view is changed.
 3. Changing the size of the entire drawing - You can provide more room for the entire mode drawing by enlarging the roaming window. Hold the mouse button down with the cursor in the window's resize box and drag the corner in or out. The roaming window stretches in all four directions but will not stretch outside the mode window.
 4. Changing the part of the drawing in the roaming window - If the roaming window's size has been reduced, part of the drawing may not be visible. You can drag hidden parts of the drawing into view using the roaming box. Hold down the mouse button with the cursor in the roaming box, then drag the box within the roaming window. The view inside the box sticks with it so that hidden parts of the drawing are pulled into view in the roaming window.
 5. Moving the roaming window - Place the cursor in the drag bar, hold the mouse button down, and drag the window to the desired position in the mode window.
 6. Closing the roaming window - Click the mouse button inside the close box.
- Close Down (available only Text Mode)
This option (if enabled) blanks out the text mode area when the area is not in use in order to speed up the system by eliminating unnecessary redraws.

3.3.3 Display/Print Menu

Show in Text Mode Send to Line Printer TeX Output

- **Show in Text Mode** (available only in Tree and Network Modes)
Displays in linear text format the contents of the nodes in the mode. The node titles and any associated text appear in the Text Mode window. The ordering of nodes from Tree Mode results from a preorder traversal of the tree, but the ordering of nodes from Network Mode is arbitrary and unpredictable. (See Appendix A for an explanation of preorder tree traversal.)
- **Send to Line Printer**
Sends the contents of the nodes in linear text format to the lineprinter currently designated for system output. To determine its location or change to another lineprinter, select the Printing Options command from the System Menu. (Cf. 3.2.4) Ordering of the nodes is the same as in the Show in Text Mode command above.
- **TeX Output**
Formats the content of the nodes into a `.tex` file, runs this file through TeX, and sends the output to the laser writer currently designated for system output. To determine its location or change to another laser writer, select the Printing Options (Cf. 3.2.4) command from the System Menu. Ordering of text is the same as for the two previous commands.

Note: This command produces a document which reflects the paragraph structure. Node names are used as section headings.

3.4 NETWORK MODE

Network Mode contains three menus which are accessed by holding down the mouse button with the cursor in one of three designated areas. A Background Menu is accessed anywhere in the Network Mode background. The Node Menu is accessed from inside any node and the Link Menu from the arrow box on a link.

3.4.1 Background Menu

Create Node
Paste Node
Paste Tree
Show/Hide Links
Show/Hide Link Names
Subtract Tree

- **Create Node**
Creates a node at the cursor position and prompts for a name.
- **Paste Node**
Pastes the node from the top of the node holding area into this mode at the cursor position. The pasted node is removed from the holding area stack. (See Section 3.2.3 for an explanation of the node holding area.)
- **Paste Tree**
Pastes the tree from the top of the tree holding area into this mode with the root at the cursor position. All links and nodes belonging to the tree are automatically drawn. The pasted tree is removed from the holding area stack. (See Section 3.2.3 for an explanation of the tree holding area.)
- **Show/Hide Links**
Toggles between visible and invisible links in the network drawing. If

links are visible, this command makes them invisible. Similarly, if links are invisible, this makes them visible.

- **Show/Hide Link Names**

Toggles between visible and invisible link names in the network drawing. When this feature is enabled, link names appear whenever the cursor enters the arrow area in the middle of a link. (For any link that does not have a name, the default name *none* will appear.) Subsequent selection of this command makes link names invisible even when the cursor enters the arrow area. Selecting this command when link names are visible makes them invisible. Note that even the status of the link names are visible, the system displays the name of a link only when the cursor moves into the small rectangle area which contains the arrow in the middle of a link.

- **Subtract Tree**

Takes the tree on the top of the holding area stack and removes from the network drawing all links and nodes common to the two. This is useful for removing from Network Mode those nodes which have already been transferred to Tree Mode. Simply copy the tree from Tree Mode and do a Subtract Tree in Network Mode.

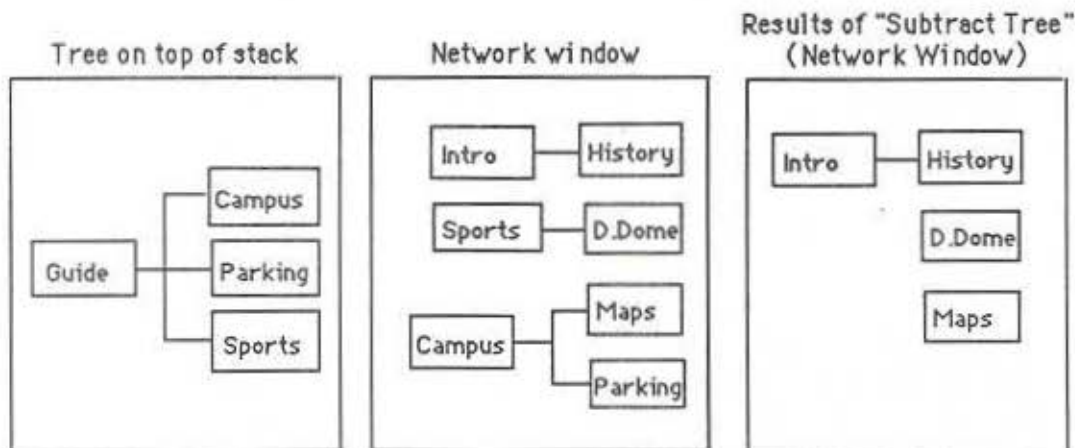


Figure 3.5 Illustration of "Subtract Tree"

Nodes in the network drawing do not have to be linked in the same manner as those in the tree; any node present in the tree and the network is removed whether or not links are present or are the same for the two nodes. Also, the tree may contain nodes which are not in the network drawing.

Subtract Tree removes the tree from the top of the holding area stack. (See Section 3.2.3 for an explanation of the tree holding area.)

3.4.2 Node Menu

Move
Link
Edit Name
Edit Text
Copy Node
Copy Tree
Delete Node

- **Move**
Allows you to drag the node until you release the mouse button. Any links attached to the node are adjusted and moved with it.
- **Link**
Draws a link from this node to another node in the network window. After selecting the command, move the cursor from the current node (the link's starting point) into the node that is the link's endpoint. Click the mouse button to set the link.
- **Edit Name**
Names or renames the node. A prompt will give you the current name, if one exists.
- **Edit Text**
Activates the Edit Mode to allow you to write or edit text in associa-

tion with the current node. Any text already associated with the node is shown in the Edit Mode window so that you can modify it.

- **Copy Node**
Places a copy of this node on the top of the node holding area stack. (See Section 3.2.3 for an explanation of the node holding area.)
- **Copy Tree**
Places a copy of the largest verified tree beginning at this node on the top of the tree holding area stack. The tree is verified with a breadth-first search of all the links leading out from the root. (See Section 3.2.3 for an explanation of the tree holding area and Appendix A for an explanation of tree verification.)
- **Delete Node**
Removes this node and any associated links from Network Mode.

3.4.3 Link Menu

Edit Link Name Delete Link

- **Edit Link Name**
Names or renames the link. A prompt will give you the current name or the default name *none*.
- **Delete Link**
Removes this link.

3.5 TREE MODE

Tree Mode contains three menus which are accessed by holding down the mouse button with the cursor in the designated area. A Node Menu is accessed from inside any mode. You can access the Subtree Menu in the rectangular area between

any node and its sons. This area becomes shaded any time the cursor enters it. (See Figure 3.7) The Background Menu is accessed anywhere in the Tree Mode background other than the subtree area.

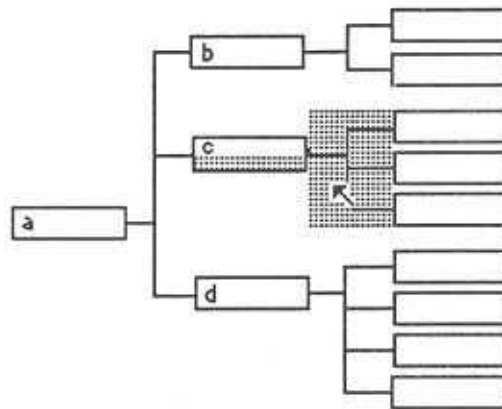


Figure 3.7 Shaded area for subtree with root at node "c"

3.5.1 Background Menu

Paste Node
Paste Tree
Create Tree
Copy Tree
View Context
Set Node Size

- **Paste Node**

Pastes the node from the top of the node holding area stack into this mode at the position indicated by the cursor. When this command is selected, a special box cursor appears. This cursor becomes an arrow when placed inside an existing node; the direction of the arrow indicates where the incoming node will be placed in relation to the

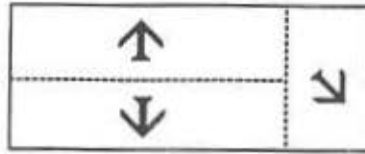


Figure 3.6
Direction of special arrow cursor in
different parts of a node

existing node. Moving the cursor around in different parts of the node will change the shape and direction of its arrow symbol. In the upper half of the node, the arrow points up, in the lower half it points down, and in the right end it points downward and to the right.

When you click the mouse button in one of these areas, the incoming node will be placed: (1) as a sibling immediately above the existing node for an upward arrow, (2) as a sibling immediately below the existing node for a downward arrow, or (3) as the existing node's bottom child for an arrow pointing down to the right. (See Section 3.2.3 for an explanation of the node holding area.)

- **Paste Tree**
Pastes the tree from the top of the holding area stack into this mode with its root at the position indicated by the cursor. Position the root in the same manner as in *Paste Node* above. Once the root is positioned, the rest of the tree will be drawn accordingly. (See Section 3.2.3 for an explanation of the tree holding area.)
- **Create Tree**
Creates a root node in the Tree Mode window and prompts you for a name. If nodes are already present, this command is ignored.
- **Copy Tree**
Copies the entire tree from Tree Mode onto the tree holding area stack. All parts of the tree are included, even those which may not be visible in the current mode window. This command is especially useful with

the Subtract Tree command in Section 3.4.1. You can use the two commands in sequence to remove nodes from Network Mode which have already been included in Tree Mode.

- **View Context**

Makes one higher level of the tree visible. The Display Subtree command from the node menu allows you to hide all of the tree except the subtree beginning with the current node as its root. View Context undoes this action one level at a time.

- **Set Node Size**

Allows you to change the default size for nodes. You will be given a corner prompt. Move it anywhere on the screen, hold down the left mouse button, and drag the node rectangle until the desired size is reached. Release the button, and the size is set.

3.5.2 Node Menu

Add Node: Above
Add Node: Below
Add Node: Child
Add Node: Parent
Edit Name
Edit Text
Copy Node
Move Node
Delete Node

- **Add Node: Above**

Adds a node as a sibling immediately above the current node and prompts you for a name.

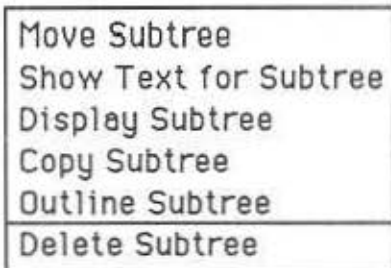
- **Add Node: Below**
Adds a node as a sibling immediately below the current node and prompts you for a name.
- **Add Node: Child**
Adds a node as the new bottom child of the current node and prompts you for a name.
- **Add Node: Parent**
Adds a node as the parent of the current node and specified siblings. When you select this command, the cursor changes to a box shape to remind you to specify which siblings will be included as children of the new parent. Do this by moving the cursor to the desired sibling and clicking. The new node will then be drawn as the parent of the current node, the selected sibling, and any siblings in between. Finally, you will be prompted for a name for the new node.
- **Edit Name**
Names or renames a node. A prompt will give you the current name, if one exists.
- **Edit Text**
Activates the Edit Mode to allow you to write or edit text in association with the current node. Any text already associated with the node is shown in the Edit Mode window so that you can modify it. Although this command automatically activates Edit Mode, it does not move the cursor into the Edit Mode window. You must either move it manually or click where you are to re-activate Tree Mode.
- **Copy Node**
Places a copy of this node on the top of the node holding area stack. (See Section 3.2.3 for an explanation of the node holding area.)
- **Delete Node**
Removes this node from the tree. Any children move up to become children of the selected node's father.
- **Move Node**
Moves the current node to the position you indicate with a special box cursor which appears when you select this command. Move the special

cursor inside another node, and it becomes an arrow which points up, down, or down to the right depending on its position in the node. (See Figure 3.6)

Clicking the mouse button with an arrow visible causes the moved node to be placed: 1) as a sibling immediately above the current node for an upward arrow, 2) as a sibling immediately below the current node for a downward arrow, or 3) as the current node's bottom child for an arrow pointing down and the right.

Former children of the moved node do not move with it but rather move up to take its place. A single child occupies the moved node's former position while multiple children move up to that position as siblings.

3.5.3 Subtree Menu



The Subtree Menu is accessed in certain parts of the Tree Mode background found between any node and its son(s). This subtree area is shaded in by the system whenever the cursor enters it. The shading extends into the lower half of the node which is considered to be the root of the subtree.

- **Move Subtree**

Moves the subtree as its root to a different location in the tree. You will be given the special box cursor to indicate the new location for the root just as in the **Paste Node** and **Paste Tree** commands in Section 3.5.1.

- **Show Text for Subtree**
Displays in linear text format the contents of the nodes in the subtree. The node titles and any associated text appear in the Text Mode window. The ordering of the nodes results from a preorder traversal of the subtree. (See Appendix A for an explanation of preorder tree traversal.)
- **Display Subtree**
Makes all of the tree invisible except the subtree. The View Context command from the background menu can be used to undo this one level at a time.
- **Copy Subtree**
Copies the subtree as its root onto the holding area stack. (See Section 3.2.3 for an explanation of the tree holding area.)
- **Outline Subtree**
Sends the node titles, in outline form, to the laser writer currently designated for system output. Ordering of the nodes in the outline results from a preorder traversal of the tree. (See Appendix A for an explanation of preorder tree traversal.)
- **Delete Subtree**
Permanently erases the subtree from the Tree Mode.

3.6 EDIT MODE

In this mode, the Smalltalk text editor is used to write and edit blocks of text associated with a node selected in Network, Tree, or Text Mode. The editor is a simple one. Most operations are performed by selecting text with the mouse and then choosing the desired command from a pull-down menu:

Again
Undo
Copy
Cut
Paste
Save text
Reset text

- **Again**
Repeats the last replace, copy, or cut command. For example, suppose you just selected word1 from your text and replaced it with word2. Invoking the `again` command would cause the system to search for the next instance of word1 and replace it with word2.
- **Undo**
Undoes the last command.
- **Copy**
Places a copy of the selected text into a buffer.
- **Cut**
Deletes the selected text and places it into a buffer.
- **Paste**
Replaces the current selected text with text from the buffer.
- **Save text**
Saves the current contents of Edit Mode. Since saving is done automatically when you leave Edit Mode, this command is useful for saving text during a long editing session.
- **Reset text**
Restores the text to the state it was in when it was last saved. All changes made since that time are lost.

Note that in the editor, unlike the rest of the system, the mouse buttons have different meanings. The left button selects text, the center button activates the menu, and the right button is not used. This is because the editor is part of the Smalltalk environment, not WE.

3.7 TEXT MODE

Text Mode is accessed from the Display/Print Menu of Network and Tree Modes and also from the Node Menu in Tree Mode. This mode constructs a view of your document from the tree or network and writes out the node names and any

associated text so that you can get a sense of how the parts fit together as running text. You will see alternating areas of node titles and text when you activate this mode. Moving the cursor from the title area to the left causes a large scroll bar extending down the left side of the window to appear. You can use this to scroll through the nodes.

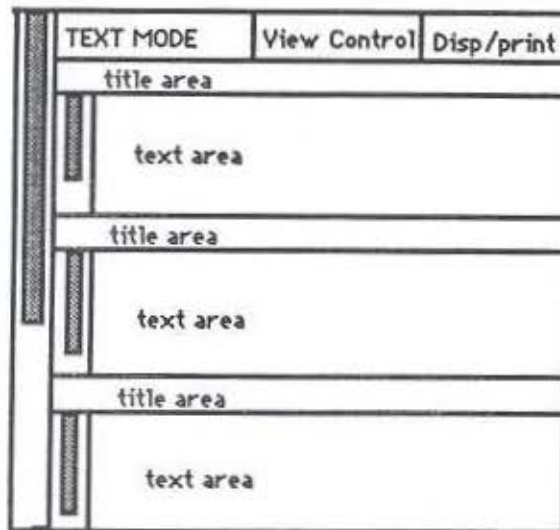


Figure 3.8 Format of the Text Mode Window

When you access Text Mode from Tree Mode, the order of nodes reflects the structure of your tree. Nodes are displayed in the sequence defined by a preorder traversal of the tree. Although the node order is arbitrary when coming from Network Mode, Text Mode can still be useful for obtaining an unordered list of all nodes and text.

The text areas of this mode operate under the Smalltalk text editor just as in Edit Mode above. Since the size of these areas is fixed, the complete text associated with a node may not fit. Consequently, each section has its own small scroll bar to allow you to look through the text for that node. (The scroll bar appears when you move the cursor into the text area. You can edit text here if you like, although you won't have as much space as in Edit Mode.)

Each title area contains a short pull-down menu which allows you to edit the title itself or copy the node contents into Edit Mode where you have more room to work.

Title Area Menu

Rename Change Text File

- **Rename**
Presents the current name of the node and allows you to modify it.
- **Change Text File**
Changes the name of the actual UNIX file containing the text. The text associated with each node is maintained in a separate file by the system (and given a name by the system). If you choose to change the name of the text file to a new file name, you will lose whatever text was associated with the node. This option is useful if you wish to associate text with a node from (e.g.) a text file created on a PC or on a different editor under UNIX. You should understand what this option does before using it.

Remember that throughout the system, any changes made to node names or node text in one mode change the same node in all other modes. Two nodes are recognized as the *same* however, only if one has been created by copying and pasting the other. Nodes which were created separately in Network and Tree Modes, even though they have identical names, are not considered the *same* by the system.

3.8 Help Support

A short help message is available for any menu option. Press the *SHIFT* and *LEFT* keys simultaneously while selecting the command to access the message.

Appendix A

Use of Trees in the WE System

A.1 TREE VERIFICATION IN NETWORK MODE

The `Copy Tree` command in Network Mode allows you to copy part of your network into the holding area for later inclusion into Tree Mode. The structure copied must be a *verified* tree whose root is the node from which the command was invoked.

When we discuss how a tree is *verified*, keep in mind that a tree is a network (or graph, as it is sometimes called), but a network is not necessarily a tree. A network is simply a set of nodes and a set of links with no restrictions on how they are related. A tree, however, must have a single root which is connected by links to any number of children, each of which is the root of a tree. Cycles are allowed in networks but not in trees.

When you invoke `Copy Tree` from a node in Network Mode, the system first records that node as the root. Then it conducts a breadth-first search starting with the root. Any links leading out from the root are followed, and the nodes they connect with are recorded as children of the root. Once all links leading out from the root have been checked, the system performs the same search starting with each recorded child. This process continues until there are no more links left to trace. Each time a node is recorded it is also marked so that it will not be recorded again if another link (perhaps part of a cycle) leads back to it. The tree

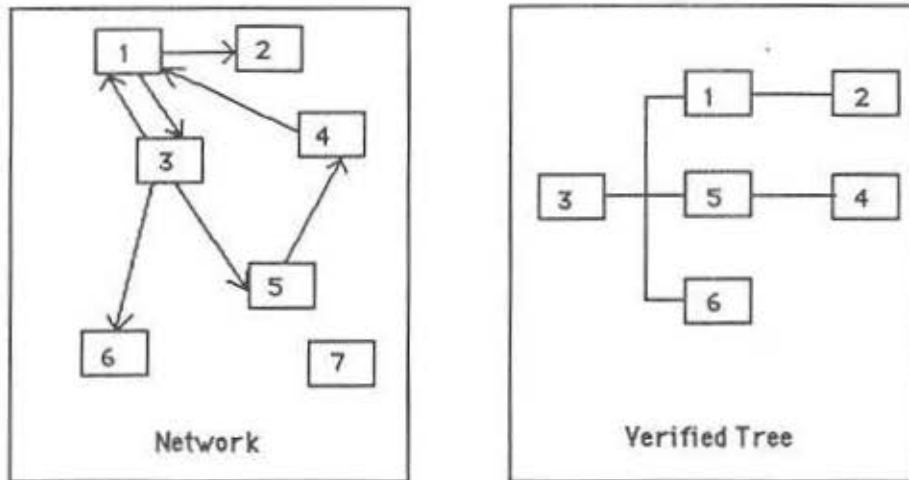


Figure A.1 Verified Tree Starting from Node 3 in the Network

that is built as a result of this process is placed onto the holding area stack.

A.2 ORDER OF TEXT IN FINAL DOCUMENT

Several commands in Tree Mode require ordering the nodes in the tree. These commands include all three from the Display/Print Menu: Show in Text Mode, Send to Line Printer, and TeX Output, as well as one command from the Node Menu: Show Text for Subtree. In all four cases, the question is: in what order will text associated with each of the nodes be placed?

A preorder traversal is used in each case. Here it is described in terms of a horizontal, rather than vertical tree, since the former is the representation used in the WE System. The root of the tree is *visited* first, then its top-most subtree is traversed in preorder. The next subtree under the top-most is traversed in preorder next, and so on, down the line of subtrees. Any text associated with a node is output when that node is visited.