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Chapter Overview

This chapter outlines how to use NCSA ImageTool on your Sun Workstation through the SunView windowing system. Refer to the Glossary for definitions of unfamiliar terminology. To use this tutorial, you need to have a *raster file*. A raster file consists of a stream of bytes representing the data matrix. The raster file format is described in more detail in Chapter 2, "Formatting Your Data Files."

You may continue your tutorial using Chapter 3, "Animation, Palettes, and Plots," which covers more advanced display options available in NCSA ImageTool.

SunView Basics

SunView is Sun's icon-based windowing system. It provides you with a user interface that uses the mouse, keyboard, and graphics capabilities of the Sun Workstation to create a user friendly, menu-driven environment. NCSA ImageTool is designed to operate under SunView. SunView handles all the windows, input and screen drawings. NCSA ImageTool only handles those events that SunView cannot. Following is a description of the basic usage of the SunView windowing software. For more detailed information on how to use SunView, refer to the Sun Microsystems manual, *Windows and Window Based Tools: Beginner's Guide*.

Starting SunView

To start SunView, first log in on the Sun Workstation. After the system prompt appears, enter:

```
suntools
```

and press RETURN. The screen clears and then fills with a gray background. Icons and windows appear on the screen. The icons represent tools that are loaded and ready for use, but are presently idle. Clicking the left mouse button on the application icon activates that application, usually causing a new window to appear.

You can also close applications that are already opened when you start SunView. Once closed, you'll see the icon for that application appear somewhere on the screen.

You can change the beginning configuration of the screen to suit your preferences. For more information on reconfiguring the default layout of the screen, refer to the Sun Microsystems manual.

Using SunView Menus

To view the SunView pop-up menu and its application options, press the right mouse button while the pointer is anywhere in the gray background on the screen. This menu is configurable, and you can customize its contents to your tastes. (Refer to the Sun Microsystems manual for more information.) To exit SunView, select the `Exit Suntools` entry from the menu, then click the left mouse button.

A standard menu is also available for window manipulation. Press the right mouse button anywhere near the edge of any application window to expose the menu. The items of this menu are Move, Resize, Hide, Expose, and Redisplay windows. The `Close` option closes the window and adds an icon of the application to the screen. `Quit` exits the application associated with the window and deletes it from memory.

Text Editing in SunView

Some windows contain editable fields you use to enter text. To edit one of these fields:

1. Move the mouse into the window or window containing the text field. A blinking, triangular cursor appears, indicating the text insertion point.
2. Try typing a character on the keyboard to insert the character at the cursor, which then moves one space to the right.

You can move the cursor to various text fields with either the TAB key or the mouse. Pressing TAB selects the next text field, allowing you to sequence through the fields. To select a text field using the mouse, position the mouse on the text field and click the left mouse button. The selected text field becomes highlighted, allowing you to enter text.

Press DELETE to delete the character in front of the cursor. Press the L10 function key to delete the entire selection.

Getting Started with NCSA ImageTool

Once SunView is running, you can start up NCSA ImageTool. To do this, open the console window if it is not already open. At the prompt, enter:

```
imagetool &
```

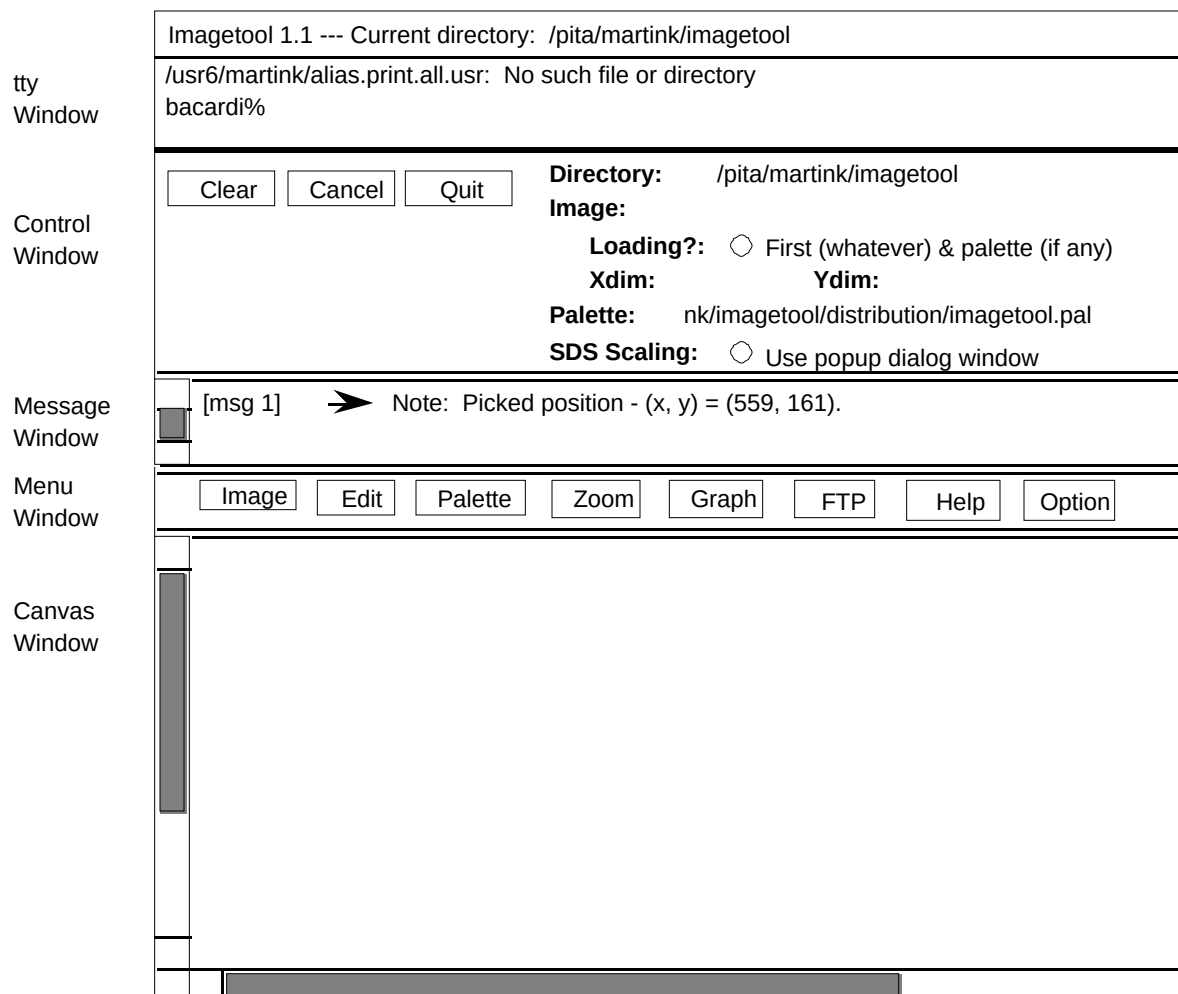
and press RETURN.

NOTE: If NCSA ImageTool is not in your current directory, preface the application name with the pathname.

The main NCSA ImageTool frame (Figure 1.1) appears on your screen. The NCSA ImageTool frame contains five windows.

These windows are the *tty*, the *Control*, the *Message*, the *Menu* and the *Canvas* windows.

Figure 1.1 Main NCSA ImageTool Frame



TTY Window

The *tty* window runs a shell you can use to communicate with the operating system, just as you would from the console window. You cannot resize this window nor scroll its contents.

Control Window

The *Control* window contains some text fields and some standard control buttons. The control buttons are labeled `Clear`, `Cancel`, and `Quit`.

Clear

Clear clears the previously loaded or selected region or image. Click `Clear` twice to clear the entire canvas.

Cancel

Cancel clears the canvas unless stacking or animation modes are active. If you've activated one of these modes, press *Cancel* to return NCSA ImageTool to normal operation.

Quit

Quit stops execution and purges all memory used by NCSA ImageTool.

There are also several text fields in the Control window which you use to specify a default directory, an image file specification with wildcard characters, the image's x and y dimensions, and a palette file.

NOTE: Each of these text fields has a menu associated with it. For a more detailed discussion of these menus, refer to the section, "Text Fields and Other Control Window Menus," in Chapter 4.

Briefly, the menus help you to change the current directory, load an image, specify the type of file you're loading, start an animation sequence, load a palette, select the type of SDS scaling for a scientific dataset, and perform other operations.

Message Window

The *Message* window contains error messages, warnings, and descriptive information about NCSA ImageTool. The messages are numbered from 1 to 20, beginning over at 1 after each cycle of 20. You may scroll through this window's contents, using the actions outlined in the next section, "Scroll Bars."

Scroll Bars

You can use scroll bars in a variety of ways wherever they are present in this program. The results you get depend on the mouse position and the mouse buttons you press. *Scroll arrows* are the small rectangular shaped objects at either end of a scroll bar. The *scroll bar content* is the gray area between the two sets of scroll arrows. The *locator* is the darker gray area that indicates the present location in the text or canvas. Here are the ways you can use the scroll bars:

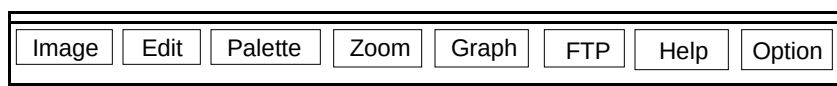
- To move quickly through the file, select a location for the locator by moving the mouse to the location in the gray area and clicking the middle button. The locator moves to that location and jumps the text to that relative location.
- To scroll through window contents an entire page at a time, click the middle mouse button on either set of the scroll arrows. You can also move one page at a time by clicking the left mouse button in the gray area *below* the locator. Clicking the right mouse button in this area scrolls up the text one entire page.

- To scroll through text several lines at a time, place the mouse in the gray area *above* the locator. Click on the left button to scroll the text up; click on the right button to scroll the text down.
- To scroll a single line at a time, place the mouse in the scroll arrow areas and click the right button to scroll up and the left button to scroll down.

Menu Window

The *Menu* window (Figure 1.2) contains a row of buttons with associated menus that you can use to perform the majority of the functions. The controls are labeled Image, Edit, Palette, Zoom, Graph, FTP, Help, and Options. These menus handle image loading, editing of the Canvas, palette manipulations, magnification, plotting and graphing, FTP operation, online help, and default settings, respectively.

Figure 1.2 Button Panel



Click the left mouse button on one of these controls to cause the default action. Press the right mouse button on a control to display its entire menu.

Canvas

The *Canvas* is the area in which image display and drawing occurs. The Canvas is 1150 pixels wide and 900 pixels high. You can neither load an image with dimensions larger than this, nor magnify an image beyond these dimensions. Clicking the mouse buttons in the Canvas area can cause any number of actions to be performed, depending on the operational mode you are in. For more information on mouse button usage, see Appendix A, "NCSA ImageTool Mouse Button Usage."

Loading Images

Before loading an image into NCSA ImageTool, you need to specify the name of the file to be loaded, its directory, its file type, its palette name (if one exists) and, if its not an HDF file, its dimensions.

Specifying Load Information

In the Control window's text fields, enter the following information for the file you are loading:

- The default directory name

NOTE: Entering the directory name in this field does not actually change the current directory. To do so, press CTRL-C at the end of the directory name in the text field, or select Change directory from the menu (Figure 1.3) for this field.

Figure 1.3 Directory Text Field Menu

^N - Get directory name
^C - Change directory

- The image filename
The Image field enters the raster file specification. You can use wildcard characters (* and ?). The fields labeled Xdim and Ydim contain the width and height of the image. If these values are not correct, the program will not display the image properly. The menus for the Xdim and Ydim field only position the cursor at the end of the field for data entry.
- The type of file you're loading
Indicate the file type by clicking in the circle labeled, Loading?, and then, using the right mouse button, selecting the appropriate file type from the menu that appears.
- The dimensions of the file
HDF files have the capacity to contain dimensions of its images, thus you shouldn't have to enter text in the Xdim and Ydim fields if you're using HDF files.
- The palette filename
If no palette exists for your file, NCSA ImageTool applies a default palette, which you've specified, to your image.
- The SDS Scaling
If you are loading a scientific dataset, click in the circle labeled SDS Scaling. Choose the desired type of scaling from the menu that appears, using the right mouse button.

Setting Load Origin Points

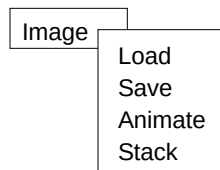
Before loading the raster file, specify the Canvas location for the image. To do this, move the mouse onto the Canvas. Click the left mouse button to select an origin point at which the next drawing operation will start. NCSA ImageTool aligns the upper left-hand corner of the image to this origin point.

Loading an Image

You can load an image in several ways as outlined below.

1. Select Load image from file from the menu associated with the Image text field (located in the Control window.)
2. Press CTRL-L, at the end of the Image text field.
3. Select the Load option of the Image menu (located in the Menu window—Figure 1.4).

Figure 1.4 Image Menu



4. Click the Image button using the left mouse button.
5. Click the left mouse button twice on the Canvas. This action simultaneously sets the origin point and loads an image. However, if you click the right mouse button, the program forgets the origin. The next time you click the left mouse button, NCSA ImageTool sets the origin point to the new location, but does not load the image.

You can also load an image from a file of 32-bit floating-point numbers. Select Floating point from the Load submenu. The file is interpreted as a stream of binary floating point numbers. A dialog box appears that allows you to enter the minimum and maximum data to be used for the scale. A toggle button allows you to select linear or logarithmic scaling. The only way to load a floating point file is to select this menu item.

Manipulating Images

Now that NCSA ImageTool has displayed your image, you can perform a variety of manipulations on it, such as cutting portions of the image, copying entire images or pieces of an image, or magnifying and reducing the image in a variety of ways.

Selecting Areas of the Canvas

Manipulations can operate on entire images, portion of images, or portions of the Canvas. To select an area:

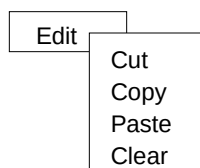
1. Depressing the middle mouse button and drag out a rectangle around the desired area. A white border appears around the selected area.
2. Release the mouse button.
3. Select the operation to perform on the selection.

You can cut, copy, and clear on the selection area. 3D and contour plots use the selection mechanism to accumulate data points to be plotted. (Refer to Chapter 3, the sections, "Contour Plots," and "3D Plots.") Selecting the Save option stores the selection to a file.

Cut, Copy, Paste and Clear Options

Standard editing options—Cut, Copy, Paste, and Clear—are all available under the Edit menu (Figure 1.5).

Figure 1.5 Edit Menu



They operate on the selected area or the area of the most recent drawing. These functions work as follows:

Cut

Cut removes the selection from the Canvas and adds it to the paste buffer.

Copy

Copy copies the selection to the paste buffer.

Paste

Paste redraws the contents of the paste buffer at whatever location you choose on the Canvas. After selecting Paste from the Edit menu, move the mouse into the Canvas area and press the middle mouse button. A border outlining the contents of the paste buffer appears on the Canvas. While holding down the mouse button, drag the border to the desired location the Canvas and release the button. The image appears at that location.

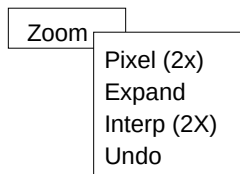
Clear

Clear removes the selected region from the Canvas, but does not store it in the paste buffer. The cleared region is permanently deleted.

Changing Magnification

You can enlarge images by using the Zoom menu options (Figure 1.6). NCSA ImageTool performs these operations on the selection or the most recently drawn area. You can continue to enlarge the image by repeatedly selecting these options.

Figure 1.6 Zoom Menu



Pixel

Pixel expands the image by duplicating pixels. Each time you select this item, the image expands by a factor of two.

Expand

Expand specifies the magnification factors for the X and Y dimension independently. When you select this option, a dialog box appears. In it, specify the X and Y expansion factors, and click OK. If you click Cancel, the operation aborts. Once again, the expansion is a pixel expansion.

Interp

Interp creates an interpolated expansion of the selected region. *Interpolation* is similar to magnification or minification except that it generates a smoothed image. The effects of interpolation are not reversible, because the pixels are not merely duplicated; rather, a mathematical function (bilinear interpolation) is applied to estimate the value of the additional or remaining pixels by taking a weighted average of the known values of their neighboring pixels. For the same reason, interpolation produces a smoother image than simple magnification or minification. NCSA ImageTool interpolates the image by a factor of two each time you select the option.

Undo

Undo allows you to cancel the most recent magnification operation.

NOTE: Do not expand an image beyond the dimensions of the Canvas (1150 x 900 pixels).

Stacking Images

NCSA ImageTool saves images or selections and their palettes using a stack mechanism. The stack holds up to ten images and their palettes. When you enter stack mode by selecting Stack from the Image menu, new buttons, Store, Delete, and Show, appear in the Control window. These buttons store, delete and show the images residing in the stack. The flush button clear the entire stack. Menus are available for each of the buttons.

To enter stack mode, select Stack from the Image menu. The stack buttons appear. To exit stack mode, click on the Cancel button in the Control window.

These buttons all work on individual stack elements, not the entire stack. Notice that a number is displayed to the right of each button. This number, ranging from 1 to 10, is an index into the stack denoting the entry that is affected the next time you press the button. For example, if the number beside `Delete` is 3, then clicking on the button deletes entry three in the stack.

NOTE: While in stack mode, clicking the right mouse button displays the menus for the stack buttons; the left button activates the control buttons.

Store

The Store button stores/adds items to the stack.

Show

The Show button displays the indexed stack entry at the origin point.

Delete

The Delete button deletes the indexed entry from the stack.

Flush

Flush purges the contents of the entire stack and resets the indexes to 1.

The stack control buttons have identical menus that are displayed if you click the right mouse button.

Saving Images

You can save images or selections to disk. To save the current selection or image:

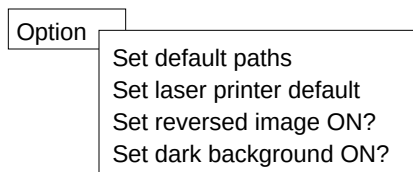
1. Select Save from the Image menu.
2. Enter the filename for the image in the dialog box.
3. Click the OK button to continue with the operation or click Cancel to abort the operation.

If the image is not part of an HDF file, NCSA ImageTool appends the dimensions of the selected image to the filename, which the program displays in the tty window. If you do not remember or record these dimensions, you may have difficulty loading the image properly.

Options

You can customize the NCSA ImageTool program to your specifications by using the Option menu. When you make any selection from this menu (Figure 1.7), a dialog box appears.

Figure 1.7 Option Menu



Set default paths

Set default paths option alters some of the defaults in the `.imagetool_defaults` file. The first text field is labeled Default image directory. The pathname appearing in this field is used as the current directory when NCSA ImageTool starts up. This is also the case with the Default palette field. The Default help file directory field should contain the path name of a directory in which NCSA ImageTool can find the help files for the Help menu. Click Cancel in this dialog box and no changes are made to the file. Click OK and another dialog box is displayed. To confirm the save, click OK to save the defaults and make them permanent or click Cancel to stop the operation.

Set laser printer default

The *Set laser printer default* option sets the name of the default printer. This printer must be a postscript printer. A dialog box is displayed that contains a text field labeled Printer name. Enter the name of the printer in this field and click OK to record the new default, or click Cancel to abort.

Set reversed image ON?

The *Set reversed image ON?* option reverses the orientation of the images horizontally when they are loaded. In the dialog box that appears, enter **y** in the text field to set reversed images or enter **n** to cancel the process. Then click OK to accept or Cancel to abort.

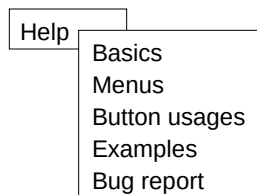
Set dark background ON?

The *Set dark background ON?* option sets the background to black. The background color is the color of the background of the canvas and other panels. This setting is useful for taking photographs or shooting videotapes of the screen. If you select this item, a dialog box is displayed just like the one that appears for Set reversed image. Enter **y** in the text field to change the background to black or **n** if you change your mind. Click OK to accept the change or Cancel to abort it. If you chose this option and do not cancel at the dialog, the entire background turns black (it is normally white).

Online Help

NCSA ImageTool offers online help through the Help menu (Figure 1.8). Simply select any one of the following options: Basics, Menus, Button usages, Examples, and Bug report.

Figure 1.8 Help Menu



Basics

Basics describes the basic operation of ImageTool, including software startup, inputs to ImageTool, error messages, and basic operations.

Menus

Menus describes in more detail the use and functions provided by the menus.

Button usages

Button usages contains a compilation of mouse button usage in ImageTool.

Examples

Examples gives some examples of how you can use NCSA ImageTool.

Bug report

Bug report describes the error and warning messages you may encounter.

Once you've selected an option, a new window generally appears, containing scroll bars that support paging, single line scrolling, and location selection. To search for a specific subject:

1. Enter the desired heading in the search pattern text field.
2. Initiate the search by pressing RETURN.

The Top button takes you back to the beginning of the Help window. The Done button closes the window.