

**Chapter 6****NCSA DataScope and Other Programs**

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Chapter Overview

Using NCSA DataScope with Other Programs

- Cut, Copy, and Clear

- Paste

- Permanent Data

- HDF Files

Obtaining HDF

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## Chapter Overview

NCSA DataScope has many calculation and imaging features, but it cannot duplicate all of the functions of good spreadsheet and color painting programs. This chapter describes methods for exchanging data and images with other programs, so you can take advantage of a combination of programs for your Macintosh.

## Using NCSA DataScope with Other Programs

The primary exchange methods for NCSA DataScope data are the standard Macintosh Clipboard and HDF files. NCSA DataScope provides a variety of copy and paste capabilities that allow you to use the application in conjunction with other programs under MultiFinder.

Programs that can read and write to the Clipboard or HDF files can have access to the data and images used by NCSA DataScope according to the guidelines presented in the following sections. The scope and applications of the Cut, Copy, and Paste commands are discussed in the following sections.

### Cut, Copy, and Clear

NCSA DataScope supports four text editing capabilities—Cut, Copy, Paste, and Clear. Cutting removes the selected text from the notebook window and places it on the Clipboard. Copying copies the selected text and places it on the Clipboard. Clear removes selected text, but does not place it on the Clipboard. Pasting is discussed in the following section.

To Cut, Copy, or Clear text from notebook windows, which operate as standard Macintosh windows:

1. Select the text.
2. Choose Cut, Copy, or Clear from the Edit menu; or press ⌘-X, ⌘-C, or DELETE, respectively.

Now you can paste the text into other notebook windows or into other MultiFinder partitions. Likewise, you may paste text copied onto the Clipboard from within another application into NCSA DataScope's notebook windows.

You can also copy a selected region of the printed floating-point numbers displayed in a text window. When you copy the current selection region, it is placed onto the Clipboard as a list of numbers separated by tabs and new lines. Consequently, you can then paste the copied array of numbers into graphics and spreadsheet programs or into an NCSA DataScope notebook window.

Image windows also support Copy. If you invoke the Copy command when an image window is frontmost, the entire image is copied onto the Clipboard. You can then paste the image into a color paint program, or any other program that supports color image pasting.

**NOTE:** The Copy command copies the entire image, ignoring the selection region. To copy only the selection region of an image:

1. Choose Extract Selection from the Numbers menu.
2. Choose Generate Image, Interpolated Image, or Polar Image from the Image menu (or press ⌘-G, ⌘-I, or ⌘-P, respectively) to create a new image from the extracted dataset.
3. Choose Copy from the Edit menu or press ⌘-C.

## Paste

NCSA DataScope can accept several types of data from the system Clipboard: text, images, text-formatted datasets, and 'clut' resources.

### Pasting Text

Like most Macintosh programs that handle text, the notebook window can accept text pasted in from other programs. The text is unformatted when pasted into NCSA DataScope's notebook window.

### Pasting an Image

Images and most drawings are stored in the Macintosh Clipboard in PICT2 format. When you paste an image into NCSA DataScope, it attempts to convert it to a raster image of the type that DataScope might create. Then it manufactures a new dataset and opens a text window, displaying the numbers from the raster image. These numbers start out in the range from 0 to 255 since they come from an 8 bit raster image, but they are stored as floating-point numbers and may be used in notebook calculations.

### Pasting a Dataset

You can also paste text-formatted datasets from the Clipboard into NCSA DataScope. The datasets should be arranged as rows of numbers, with the same number of columns in each row, where each number is separated by white space. For example, the following array, typed into a word processor, may be copied and pasted into NCSA DataScope as a new dataset.

1.1	2.2	3.3	4.3	5.2
5.2	6.3	7.3	8.9	9.8
0.1	0.2	3.2	5.2	1.3

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To paste the above numbers from the Clipboard into NCSA DataScope, for example,

1. Activate any window other than a notebook window.
2. Choose Paste from the Edit menu or press ⌘-V. This creates a new text window for a 3 x 5 dataset. The row and column headings are numbered with integers starting at zero (0, 1, 2, 3, 4...). This tabular format is compatible with most Macintosh spreadsheets.

### **Pasting a Palette**

Palettes copied in NCSA Image, NCSA Layout, or NCSA PalEdit, are placed onto the Macintosh Clipboard as a 'clut' resource. To paste such a palette into NCSA DataScope:

1. Select an image window to make it frontmost and to make the dataset associated with that window active.
2. Choose Paste from the File menu or press ⌘-V. The images associated with the active dataset are redrawn according to the new color palette. Note that each dataset loaded into NCSA DataScope may be linked to a unique color table.

## **Permanent Data**

Data that is read into NCSA DataScope cannot be changed. It is assumed that a simulation or other source of data created the dataset as a permanent record. NCSA DataScope allows you to extract selected regions of the data, perform calculations using the data, and so forth, but each operation creates a new dataset from the old one. Modifications of the original are not allowed. Overwriting the original file is still your choice, but not recommended.

## **HDF Files**

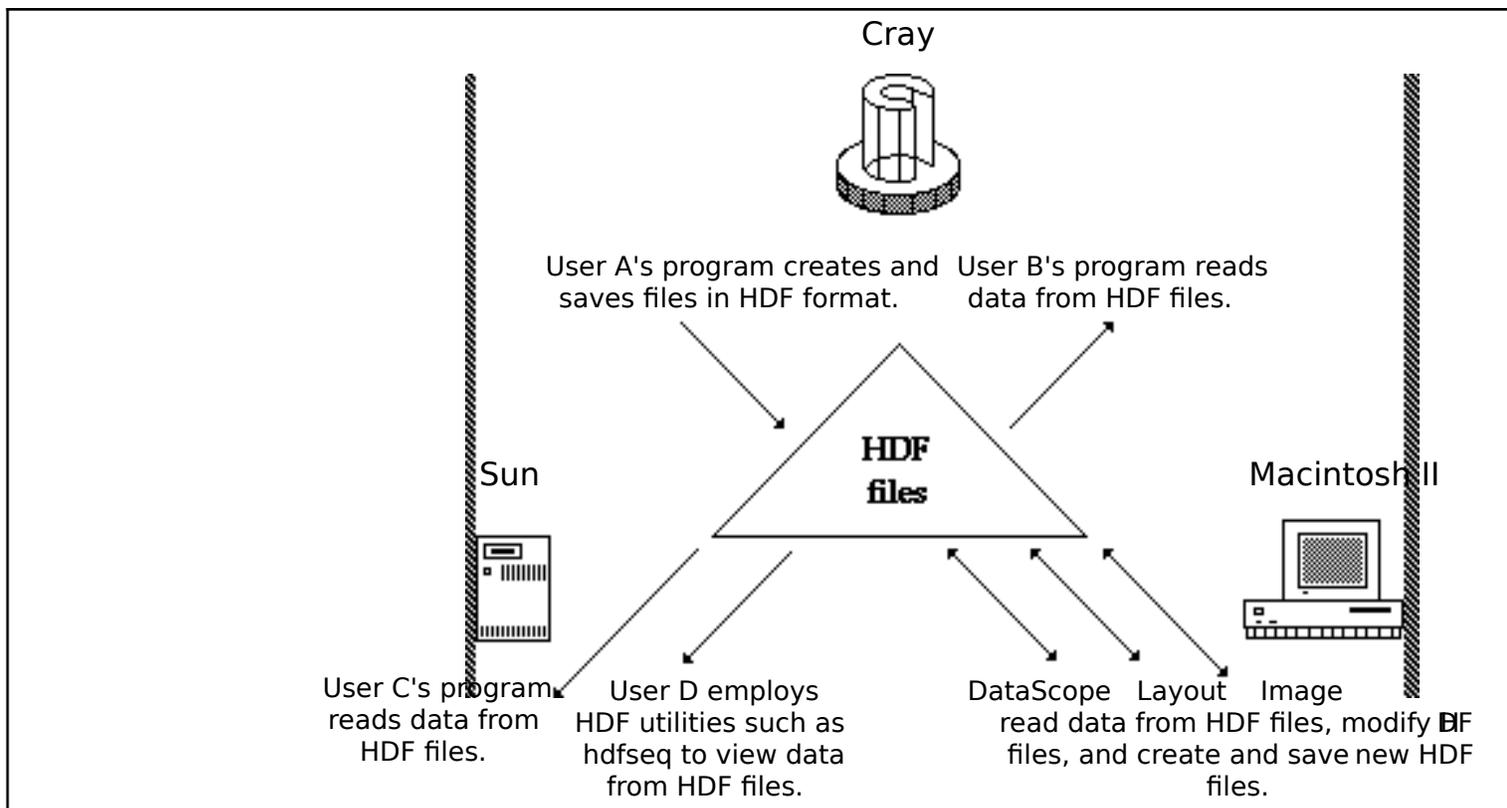
NCSA's *Hierarchical Data Format*, or HDF, is a flexible, standard file format designed at NCSA for sharing graphical and floating-point data among different programs and machines. Moreover, HDF lets you store datasets with extra file information about your data. This makes the files easier to read and manage for programs such as NCSA DataScope, and saves you the trouble of tracking this information externally.

When NCSA DataScope saves information to an HDF file, it creates a scientific dataset (SDS) record for the floating-point array associated with the frontmost window. HDF files can contain all of the data for NCSA DataScope's two independent and one dependent variables, along with the auxiliary data for the dataset. The auxiliary data might include the rows, cols, printing formats, variable names, user notes, and associated images; and is automatically retrieved when you reload the file.

If you have image windows open when you save a dataset, images associated with the dataset are automatically saved in the file along with the floating-point data. Specifically, the most recent image window of each type is saved with the data—up to one simple image, one interpolated image, and one polar image. Any notebook information for that data goes into the file also. When you reload this file using the Open command, all of the windows which were saved with the data reappear on the screen.

Saving your dataset with its generated images in an HDF file is one of the easiest ways to exchange data and images with other programs. HDF supports a wide variety of systems and data types. Files stored as HDF files can be transported among various systems and programs. HDF files are accessible from NCSA software for the Macintosh such as NCSA DataScope, NCSA Image, NCSA ImageIP, NCSA GelReader, NCSA Layout, and NCSA PalEdit as well as user programs, other NCSA software, and HDF utilities. These files can be used on such machines as the CRAY X-MP/48, CRAY-2, Sun Workstation, IBM PC, and Alliant. The portability and usefulness of HDF files is demonstrated in Figure 6.1.

**Figure 6.1** HDF Environment



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### How Do I Create an HDF File?

Public domain software is available from NCSA for creating HDF files. NCSA's HDF libraries support both Fortran and C calls on any of the following machines: Cray (UNICOS), Sun (UNIX), Alliant (Concentrix), Macintosh, and IBM PC (MS-DOS).

The best way to store your data in an HDF file is to incorporate calls to the appropriate library in the program that produces your image or scientific data. These calls can store your raw image, palette, scientific data, and other information in an HDF file in proper format.

If you have access to the HDF libraries, you can store floating-point data in your file, and use it directly.

**NOTE:** If you have a UNIX-based system, you can use the command line utility called `r8tohdf` to convert one or more raw raster images and palettes to HDF format.

### Obtaining HDF

If you are connected to Internet (NSFNET, ARPANET, MILNET, etc.) you may download NCSA HDF software, documentation, and source code, at no charge from an anonymous file transfer protocol (FTP) server at NCSA. The procedure you should follow to do so is presented below. If you have any questions regarding this procedure or whether you are connected to Internet, consult your local system administration or network expert.

1. Log on to a host at your site that is connected to the Internet and is running software supporting the FTP command.
2. Invoke FTP on most systems by entering the Internet address of the server:  

```
ftp ftp.ncsa.uiuc.edu
```

or

```
ftp 128.174.20.50
```
3. Log in by entering **anonymous** for the name.
4. Enter your local login name for the password.
5. Enter `cd HDF` to move to the HDF directory.
6. Enter `get README.FIRST` to transfer the instructions (ASCII) to your local host.
7. Enter `quit` to exit FTP and return to your local host.

8. Review the README.FIRST file for complete instructions concerning the organization of the FTP directories and the procedure you should follow to download the README files that contain further information on how to get and compile the most recently released version of HDF for your machine and operating system and to determine which files to transfer to your home machine.

Your login session should resemble the sample presented below, where the remote user's local login name is *smith* and user entries are indicated in boldface type.

```
harriet_51% ftp ftp.ncsa.uiuc.edu
Connected to zaphod.
220 zaphod FTP server (Version 4.173 Tue Jan 31 08:29:00 CST 1989) ready.
Name (ftp.ncsa.uiuc.edu: smith): anonymous
331 Guest login ok, send ident as password.
Password: smith
230 Guest login ok, access restrictions apply.
ftp> cd HDF
250 CWD command successful
ftp> get README.FIRST
200 PORT command successful.
150 Opening ASCII mode data connection for README.FIRST (10283 bytes).
226 Transfer complete.
local: README.FIRST remote: README.FIRST
11066 bytes received in .34 seconds (32 Kbytes/s)
ftp> quit
221 Goodbye.
harriet_52%
```

NCSA HDF documentation, program, and source code are now in the public domain. You may copy, modify, and distribute these files as you see fit.

Like other NCSA software, NCSA HDF is also available for purchase—either individually or as part of the anonymous FTP reel or cartridge tapes—through the NCSA Technical Resources Catalog. Orders can only be processed if accompanied by a check in U. S. dollars made out to the University of Illinois. To obtain a catalog, contact:

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