ABSTRACT

This paper describes the graphical and text user interface to the Version 6.06 SAS Display Manager (DM). DM is the intuitive user interface for developing and executing SAS applications. The topics covered in this paper include 6.06 features of:

- a discussion of the software layering of DM
- a discussion of the base windows in DM
- a discussion of new windowing features

INTRODUCTION

The SAS System has 3 different modes of operation. Each mode of operation serves an important purpose for the user. The first two modes are batch and line mode. Batch mode operation provides for executing large non-interactive programs. Typically, these are computationally involved programs with no need for user interaction. Line mode operation provides an environment for executing SAS applications interactively and is provided mainly for compatibility with previous versions of SAS.

The third environment is the Display Manager (DM). DM provides a highly interactive windowed user interface in which the user can develop and execute SAS applications and generally control the flow of the SAS session. DM does this by allowing different sub-tasks of the SAS System to be placed in independent viewable areas named windows. The user can choose to interact with the windows in any order or fashion desired. As with most windowing systems, the windows can be grown, zoomed, positioned, and iconed.

One of the major accomplishments of Version 6.06 is that DM is designed to allow SAS to have the "look and feel" of the native windowing operating environment. This is done by layering the code within DM. For instance, the same DM code is ported to the mainframe, X-windows, and Presentation Manager environments and is then combined with a small portion of host code. This provides for a consistent feature set on each machine but allows DM to operate in a fashion consistent with the native windowing system. For instance, vertical scroll bars are implemented across all Version 6.06 environments. However, the scroll bars on the mainframe are character oriented, while the scroll bars exactly match the look and feel of Dec-Windows on the VAX, and of Presentation Manager on OS/2. This is accomplished by layering the DM software and allowing each host to replace only the lowest layer of code so that the information can be displayed by its windowing system. Even though the environment is portable, functionality has not been sacrificed. Performance is actually improved by taking advantage of hardware and software components native to the environment. In this way, the SAS user gets the best of both worlds by receiving the look and feel of a particular host while also receiving the full feature set of DM.

THE THREE MAIN WINDOWS

Three main windows make up the DM environment. These are the Program Editor, the Log, and the Output windows. These windows are displayed each time SAS is invoked.

The Program Editor window implements a basic editor used for developing SAS applications. Unlike previous versions of the SAS System, a common editor is used by all editing windows within the display manager environment. The editor is similar to IBM's ISPF editor (Interactive Systems Productivity Facility), but it can be customized to allow the user to work in a more familiar environment. Once a user has finished editing his code, the code may be submitted to the SAS System for execution.

The log window displays the SAS statements as they are being executed along with any notes, warnings or other informatory messages. All log window data is saved in a scrollable pad that may be browsed at anytime.

The output window contains all text oriented output produced by the SAS procedures that have executed. The output is page oriented and may be scrolled to view all portions of the listing.

STANDARD POP UP WINDOWS

Along with the three main DM windows, SAS sup-
plies a series of pop-up windows that can be used to manage data, supply information, or control the SAS environment.

HELP
The help window can be used to receive help on any portion of the SAS System. The window displays information on all of the procedures, windows, options, and other aspects of the SAS System.

KEYS
The keys window allows a user to change the command settings assigned to any of the function keys. A function key can be assigned any command that is valid within the SAS System or any string of text that should be inserted whenever the key is pressed.

OUTPUT MANAGER
The output manager window allows the user to manage the output that is contained in the output window. The procedure name, number of pages, starting page, and a one line description are listed for each procedure that produced output. The user may then choose to edit or delete any of the procedure output, and any changes made to the procedure output are reflected in the output window. To edit the output of a particular procedure, the user simply chooses the procedure and the edit option. An edit session containing the output for the procedure chosen is displayed. The user can change any of the data, and when the edit window is terminated, the changes are reflected in the output and output manager windows. Procedure output can be deleted by choosing the procedure and the delete option. All output produced by that particular procedure run is removed from the output listing.

OPTIONS
The options window allows the user to view and change many of the setable options in the SAS System.

TITLES FOOTNOTES
The title and footnote windows allow the user to view and edit the current title and footnote settings.

FILENAME
The filename window displays a list of all assigned filerefs in the SAS System.

LIBNAME
The libname window displays a list of all assigned libnames in the SAS System. The user may select any of the libnames; this in turn invokes the DIR window on the selected libname.

DIR
The dir window displays a list of catalogs and data sets for the given directory. If the user selects one of the catalog entries, the CATALOG window is invoked for the catalog that was selected. If the user selects a data set, the VAR window is invoked for the data set that was selected. The user is also allowed to delete or rename any of the data sets or catalogs.

VAR
The var window displays a list of all the variables in the given data set along with format and type information. The user is allowed to change the the variable name or the formats associated with the variables.

CATALOG
The catalog window displays a list of all the objects in the catalog. The user may delete, copy, or rename the objects.

NOTEPAD
The notepad window is an instance of the System editor. Note pads may be saved into the user profile catalog for later recall. Common uses of notepads are phone numbers, old notes, and even common SAS program segments.

NON-DMS RELATED WINDOWS
Besides the standard DM windows described above, there are a series of windows supplied by other SAS products. Access to these windows is allowed if the user has the particular product licensed. For example if the user has SAS/FSP® licensed, he can bring up the FSEDIT, FSLIST, FSLETTER, FSPRINT, and FSBROWSE windows, or if he has SAS/GRAPH® licensed, he can bring up the AXIS, LEGEND, and GRAPH windows.

NEW WINDOW FEATURES
DM provides many new features to version 6.06. These features are intended to make the system easier to use and to allow the user to build powerful and easy to use applications.
MENUS
Most SAS users are familiar with the standard command line interface. This interface is flexible and allows the user to enter the commands, but there are problems with this interface. First, the user must know the command and secondly, the user must be able to type the command in correctly. An optional command interface has been added which is known as the pmenu or pull down menu interface. On some systems these are referred to as action bars. The pmenu interface replaces the standard command line on the SAS windows with a menu of command groupings. The user may select any one of the groups which in turn drops down a sub menu. The sub menu can then be scanned and the appropriate action selected. At this point one of several actions may occur: the action could be processed without further user interaction, another submenu may be displayed, or a dialog box may be displayed that prompts the user for more information. The end result of this process is that a command is pushed and processed. The dialog boxes that a user might see are actually small windows that appear and ask him for specific information. The information is requested via input fields, radio buttons and check boxes.

Data step and AF applications can also take advantage of the pmenu interface. There is a procedure in the base system, PROC PMENU, that a user can use to create and modify menus for his data step and AF applications.

SCROLLBARS
A common function in many windowing systems is scrollbars. A scrollbar shows the user the relative position of the visible data to all the data that can be viewed in the window. The scrollbar is also an input tool that allows the user to decide what portion of the data he would like to view without entering commands in the command area. To view other portions of the data, simply move the cursor to the relative position in the scrollbar and click the mouse or press enter. The scrollbars also allow a user to scroll one line or one page at a time. Of course, scrollbar usage is optional.

POINT & CLICK
Version 6.06 of the SAS System was designed so that applications could be "point and click" or "mouse" oriented. The point and click interface allows the user to move the cursor and select actions to be performed without typing. The user can select an action either by pressing a mouse button or by pressing the enter key. Several of the windows within the SAS System incorporate this functionality: for example the ASSIST, HELP, LIB, and DIR windows allow the user to select actions to be performed by simply clicking in an area of the window. There are several areas common to all windows where the user may point and click to perform actions. These areas include the pmenu items, scrollbars, radio buttons, check boxes, and push buttons. The pmenus and scrollbars were discussed in earlier sections. Radio buttons are logically grouped in a radio box, and only one button within the radio box can be ON at a time. When the user switches to a new setting, the old setting is automatically turned off. This is similar to the buttons on a car radio. A checkbox is a single toggle switch that may be either on or off, and a push button is rectangular area that the user may press to perform an immediate action.

CUT & PASTE
One of the main features that was added to Version 6.06 of the SAS System is the ability to copy text from one window to another. Within the SAS System, the user is allowed to copy the contents of any window and store it in a paste buffer. The buffer contents can then be pasted into any window that is using the SAS editor. The SAS editor also supports other functions within the marked area. The marked text can be cut or removed, or commands like FIND and CHANGE can be used to limit the area affected by the commands.

CUSTOMIZING THE SESSION
Keeping with the tradition of former versions of SAS, the Display Manager or windowing environment allows the user to customize his session. The user is allowed to redefine any of the function keys that are available on his terminal. He is also allowed to resize and reposition any of the windows and choose any color settings within the windows. The user can choose to run using the pmenu system or the command line or choose to have scrollbars set on or off. Within the editor the user can remove the numbers pane, and
within the Log and Output windows the user can specify the amount of data that can be scrolled. These are just a few of the many items that the user can customize for his SAS session. Once the user has customized his session, he can save the settings in his profile catalog. Then, whenever the user reinvokes a SAS session, his customization will automatically take effect.

GRAPHICS

In version 6.06 graphics output has been integrated into the windowing environment. If the terminal that the user is running on allows text and graphics to be mixed, then all graphic output that is produced by the SAS System can appear in a window. All of the graphics procedures that currently store their images in a graphics catalog, will also display their images in the GRAPH window. This window is similar to the output window in that all of the output produced by the graphics procedures is saved and can be viewed by scrolling the images. By incorporating graphics into the windowing environment, the user is capable of controlling his graphics output. He now has the use of function keys, window sizing and positioning, pmenus, scrollbars, and other functions that are available to all windows. Another major benefit of placing the graphics in a window is that the user may choose to size the window so that the graphics image can be viewed while viewing other windows. The system also allows the user to have multiple graphics windows displayed at the same time; therefore, the user is able to visually compare images from two or more graphs.

CONCLUSION

The user interface for the SAS Display Manager has evolved since the Version 5 and Version 6.03 releases. Many new features have been added to make the system easier to use for both experienced and novice users yet, we feel that there are still many more features that can be incorporated. These new features will be added in future releases and we will continue to remain dedicated to enhancing the interface without sacrificing the flexibility that you are accustomed to in the SAS System.

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