Preparing and Presenting Management Reports using SAS/AF® Software

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Abstract

A major goal of end user reporting is to be "user friendly". This can be accomplished only by requiring as little understanding about the mechanisms of the interactive application as possible. The end user should not need _syntactic_ knowledge. A _conceptual_ understanding of the application combined with a recognition of variable names and values should be all that is needed to obtain full use of the application.

The user should be asked only to choose from menu listings that he is interested. Furthermore, the end user should be supplied with menus that are dynamically modified according to who the end user is and what choices he has made in previous screens. If these functions are included, the end user is more likely to use the application and more able to obtain desired information quickly and with minimum preparation.

These goals were met in an application titled "Management of Department Information" (MGMT). MGMT provides detailed employee work information to managers for use in evaluating employees' performance. SAS/AF® was determined to be an optimal tool in developing such an application.

Introduction

The need for a Management Reporting Application arose because the following conditions existed:

1. We had a database of information of interest to a group of managers.
2. The managers had a need for up-to-date reports.
3. There was no easily accessible way to extract data in a meaningful manner using available query methods. With those methods the users:
   a. Were required to know variable names or values.
   b. Lacked time to develop proficiency with a query language.
4. We needed a menu system that would satisfy a wide user base.

User friendliness was a key goal for the "Management of Department Information" (MGMT) application. This was pursued by requiring only _conceptual_ understanding of the data by the user rather than any _syntactic_ knowledge. The end user should not need to know any variable names (i.e., how a particular variable name is spelled), nor should he need to know exactly what the variable values are (i.e., the exact spelling of one of his employees). A conceptual understanding of the application, on the basis of a recognition of variable names and values should be all that is needed to obtain full use of the application. Due to particular characteristics of the SAS/AF language, we were able to design and develop a menu-based system that met this goal.

The MGMT application will be discussed in this paper, with particular attention paid to those features which enhance user friendliness. These techniques are rather generic and may be applied to almost any menu-based management reporting system.

There are three major features of MGMT which may be of interest to other application designers. First, it sets up a profile for the user that is a copy of the application specific profile in which, for example, the PF keys have been redefined. Second, it retrieves the user ID of the person signed onto the application in order to match the user ID with an organizational table which designates what data the signed on user is authorized to view. Third, and most important, this application facilitates _dynamic_ screen building. This means that what the user sees on any screen is constructed on the basis of who that user is and what types of selections he has made on previous menu screens. These features enable the user both to have access to a wide range of data and to be able to select items from a dynamic screen rather than having to specify desired values of index variables on a fill-in screen.

As an example, one screen presents to the user a list of employees from which to select. The employee names have been retrieved from the department that the user chooses.

In order to encourage the use of an end user application, it is necessary to provide a flexible, easy to use tool that provides meaningful information to a large set of users. This SAS/AF application supplies the user with a pseudo-personal menu. It was straightforward to design and required little time to code and debug (3 weeks) compared to the benefits derived by the users.

MGMT Invocation

This application runs on the MVS operating system and is begun from a CLIST called "MGMT" which the user starts by typing in "MGMT" after logging onto the system. The CLIST invokes SAS twice.
The first time, a copy of the MGMT application profile dataset is made to the temporary profile dataset belonging to user ID of the manager. From the copied dataset, a pre-defined set of PF keys is made available to the SAS/AF application. The end user representative requested that PF2 be the END key and PF3 be the CANCEL key. This was accomplished by entering SAS/AF, defining the keys as desired in the SAS member DISPLAY.KEYS, and saving that in the dataset called 'MGMT.PROFILE'.

As shown in Figure 1, the saved key definitions are copied via PROC COPY into each user's temporary SASUSER file. For use in SAS/AF, only one user at a time can have access to a SASUSER dataset. Therefore, it was necessary to make a separate copy for each user. This could be accomplished only by invoking SAS once to make the copy, and a second time to run the SAS/AF application.

The second SAS invocation runs a PROC FORMAT and a DATA step as a setup to the SAS/AF application. Before the user initiates the SAS/AF application, the program retrieves his user ID by converting the TSO macro variable for user ID to a SAS macro variable. Figure 2 shows how this is done. The DATA step matches the User 10 with an organizational table. Macro variables are set here and are available to the SAS/AF programs. This enables the SAS/AF program to make available only those reports that the user is authorized to see. As an added precaution, the separate data bases are RACF protected. Figure 2 illustrates the SAS code dealing with the user ID. A sample line of the organization infile looks like this:

21345678901234567890 <= this is the column number

In the first line, the matching manager would be passed directly to the variable selection screen in MGMT because he is authorized to view only his own department. In the second case, the manager may view his branch and will be shown a selection screen to select the desired department within his branch. In the third case, the manager will be shown the directorate screen for the whole organization as seen in Figure 7, and will be asked to choose a department from within the directorate.

The SAS/AF code is heavily dependent upon the passing of SAS macro variables to user fields and vice versa. This allows the application to have modifiable user screens and to pass the user input across SAS/AF program screens, respectively. These features were found to be quite valuable in designing this application.

MGMT SAS/AF Menus

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SAS/AF was used as a front-end interface so that non-programmers could obtain the information needed for decision making purposes. This was accomplished by providing SAS/AF menu screens to the user which would prompt the user for details about the data in which the user was interested. The flow of the MGMT application is shown in Figure 3.

**MGMT Primary Menu**

The MGMT Primary Menu presents the user with his options for what kind of data he prefers to view. Figure 4 presents the primary menu and also shows how to carefully set all the PF keys on the attribute panel. Note that the user will branch right back to the main menu if he presses a non-functional key.

**Department Selection Program**

It is not possible from an SAS/AF menu screen to branch to a program screen using macro variables. That is why the initial branch from the MGMT Primary Menu must be to a program screen that provides that flexibility. That is provided by the MGMT2FRS program screen shown in Figure 5. The program to branch to is provided by the macro variable LEVEL which is assigned a value in the DATA ORG step (see Figure 2).

**Figure 5. MGMT2FRS Program.** This is the program that directs users to select the desired month of data to view.

For those managers who have the authority to view more than just their own department, there exist a series of screens, one for each level of authority, that will provide a listing of the departments from which a manager may choose. The screen provided is specific to the user ID of the manager signed on. The proper program screen is selected via a macro variable which contains the necessary value. The program screen for the manager of all locations is presented first and the SAS code is seen next.

In the unprotected user field, where you see “Enter Selection”, the user enters a number between 1 and 47, indicating his choice of departments to view. His response is validated, and the program provides values to needed macro variables based on his response. The user is then shown the program screen to select the desired month of data to view.

**Figure 6. MGMT20D - MGMT Department Selection Screen.** This is the PROC DISPLAY screen for department selection for those users having the authority to view more than one department.
Month Selection Program

The MGMT21 program which is not shown facilitates, with macro variables, branching to the desired application, i.e., 2 or 3. It also sets the macro values for the selected fields to view to nulls. This SAS/AF screen will branch to MGMT211 if the MGMT2 choice was made on the main menu.

If the user chooses the MGMT2 option of the main menu, he will have to choose which month’s data he desires to view. The next two figures illustrate this process. Figure 8 shows how the macro variables are initialized, and Figure 9 shows the month selection screen with the accompanying SAS code. It also shows the employee macro variables to blanks. These employee macro variables will be provided values after the user specifies the desired month.

Each available month is specified with the macro date, looking for the most recent six months, and setting those values to the month macro variables. If the user does not choose a month, the most current month is chosen for him. If the user chooses a month for which there is no data for that particular department, he is shown a screen which states that and is requested to choose a different department or to exit the application. That screen is called “MGMT2BAD.PROGRAM”. If the user does choose a month for which data exist, he is branched to MGMT23 to choose the variables he wishes to view in the output.

Figure 7. MGMT Department selection - SAS Code. This is the SAS code for the MGMT department selection screen.

Figure 8. MGMT211 - MGMT Month Selection Preparatory Program

![Image of code]

Figure 9. MGMT212 - MGMT Month Selection Screen and SAS Code
Variable Selection Program

At this point, the user is shown a list of 35 variables from which he may choose 7. The output screen has room for only 7 variables to be displayed nicely in one screen width. If the user takes the default, he will be shown the first 7 variables when the report is displayed. The screen and its accompanying SAS code is shown in Figure 10. Var1 through Var7 are the macro variables used to designate the desired variables to view. When done with this screen the user is transferred to the employee selection screen, MGMT24.

Employee Selection Program

Figure 11 is a sample Employee Selection Screen for Branch 545, Department BOO for Dallas for month 8701. The names have been changed from reality to protect the innocent. The employee selection program screen is shown in Figure 12 with the employee name macro variables. When the user views the screen, those macro variables are substituted with the real names from the database for the department and month that has been chosen by the manager. These employee name macro variables were provided with values after the month selection took place as seen in Figure 9.

Figure 11. MGMT24 - Sample Employee Selection Screen

Figure 12. MGMT24 - Employee Selection Program Screen

After the manager has selected the employees whose data he desires to view, the SAS code as shown in Figure 13 is executed to provide him with the data in the output screen. In our environment, users work from 3270 PC terminals. In this situation, the manager may print the screen if he has a printer PC or copy the screen to a PC file. When the manager is done viewing the output, he is brought back to the Variable Selection Screen, MGMT23, where he may choose a different set of variables, and after that, a different set of employees.

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Conclusions

The SAS code and AF screens that have been presented demonstrate the flexibility and power that is available to a programmer interested in building an end user application. The macro language combined with the screen design facilitate dynamic capabilities for the screens. Neither the user, nor the programmer is locked into narrow constraints.

An important requirement is to avoid user input error. The MGMT application provides the user with the employee names from which to choose rather than requiring the user to type in the desired employee name. If the end user can always be provided with a selection screen rather than a fill-in screen, ambiguity will be avoided.

SAS/AF is a tool which enables the end user to be taken care of by the programmer. The concepts illustrated in this application can be easily employed in other areas. The only limit is one's imagination.

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