

Developing an Executive Information System with SAS/EIS® Software

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Abstract

SAS® has provided users with a new, intuitive, and powerful tool for developing information systems. SAS/EIS software provides users with a vast set of objects to aid in the development of custom information applications. In this tutorial, a simple bank account application will be developed. The following tasks will be stepped through:

1. Details for a bank data set
2. Creating the data set structure in SAS
3. Registering of the data set in the application's metabase
4. Building the application
 - Data entry system
 - Expanding report
 - Hierarchical organization chart
 - Multi-dimensional report
 - Graphical menu builder

The tutorial is geared towards users with little or no SAS/EIS experience.

Introduction

SAS/EIS software provides SAS users with a point-and-click system to access executive information systems. These systems contain applications that allow users to access information. Applications could be: graphs, reports, data entry screens, etc. All of these applications are tied together in the EIS system.

This paper will focus on the steps necessary to build a simple, yet functional, EIS system. The system will be a simple bank account EIS system. Its components include a transaction application, report application, organizational chart, a multi-dimensional report application, and a bar chart.

The transaction application allows the user to enter transactions into a data set. Data

entered includes the type, contents, date, and amount of the transaction.

A drill-down report is produced from the report application. The report lists the transactions and allows the user to drill down to the date and amount level. The bar chart is exactly the same as the drill-down report, except it presents the information in vertical bar charts.

The organizational chart displays the same information as the drill-down report. However, the information is displayed as an organizational chart versus a table report.

Finally, the multi-dimensional report summarizes the data. It provides the user feedback on the balances remaining in their accounts.

Registering the Data

The first step in creating the banking EIS is to register the databases being used. In this system, a single data set is registered. The data set is the account data set containing the transaction information entered by the users. Figure 1 contains a listing of the variables and their data types for the account data set.

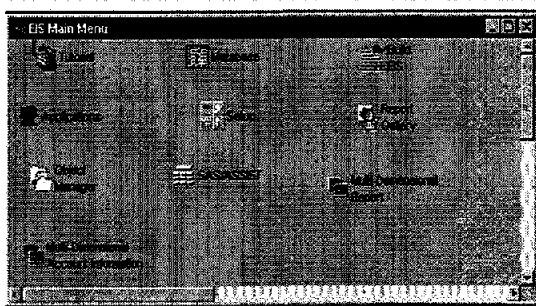
Variable	Type	Len	Pos	Format
BALANCE	NUM	8	1	
DEPOSIT	NUM	8	9	
WITHDRAWAL	NUM	8	17	

Figure 1. Account Data Set Proc Contents

Of course, this data set must exist prior to adding it to the metabase definition.

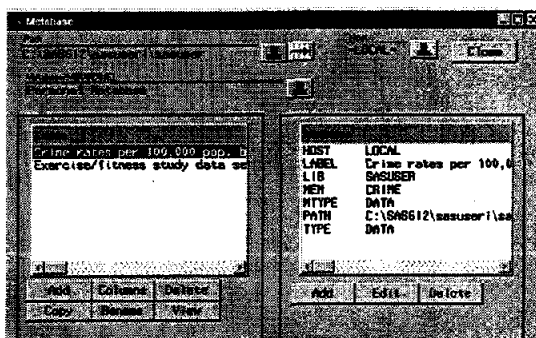
The steps necessary to define the metabase are:

1. Start SAS/EIS using one of the following
 - Globals ⇒ Develop ⇒ EIS application builder
 - Type 'eis' in the command line box
 - Within SAS/ASSIST®, select EIS ⇒ SAS/EIS



SAS/EIS Main Menu

2. Click on the METABASE icon
3. Select the path for your metabase from the librefs provided
 - Note: be sure to have a libref pointing to your data set path prior to starting EIS



Metabase Definition Screen

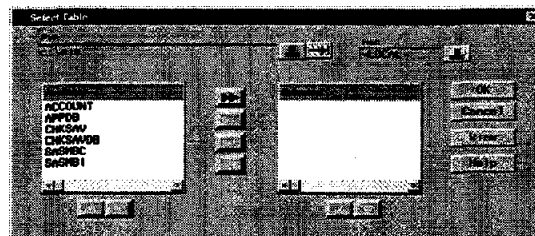
4. Select FILE ⇒ NEW from the pull-down menu to create a new metabase
5. Define the metabase name and description in the dialog box provided



Dialog Box for a New Metabase Definition

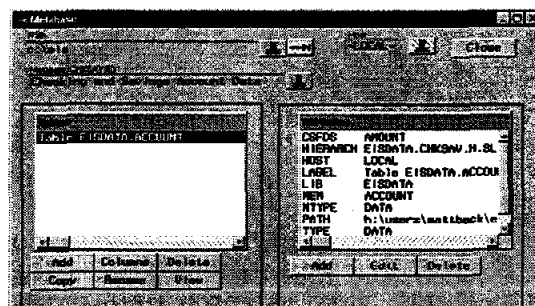
6. Select ADD beneath the Tables listbox

7. Select the available table (data set) you would like to register; in our case it is the ACCOUNT data set
 - Note: you must be sure the data set is moved from the available list box to the selected list box. This can be done by double-clicking the data set name, or highlighting it and clicking the single arrow button



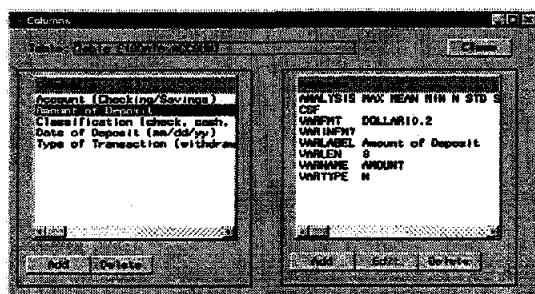
Available Tables to Register

8. Select the OK button to return to the metabase dialog box
9. Highlight the data set to see its current attributes
10. To add attributes, click on the ADD button under the attributes list box



Attributes for the ACCOUNT Data Set

11. Return to the metabase dialog box
12. Select the COLUMNS button under the TABLES dialog box and assign attributes to the variables in the ACCOUNT data set



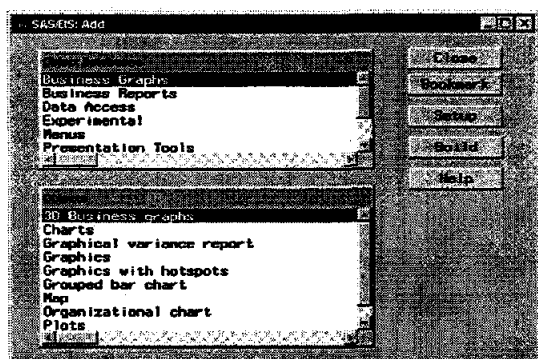
Attributes of the Amount of Deposit Variable

- Return to the metabase window, and select close to return to the main EIS menu

Building the Banking System

Now, we need to define the EIS system we are building. The system knows the metabase definition, but it needs to know the system that metabase will be used for.

- Select the BUILD EIS icon
- Specify the path of your EIS exactly as in the METABASE definition
- Select FILE $\Rightarrow$ NEW to create a new application database
- Provide the application name and description
- By selecting ADD, the user can define new objects to add to the application



Object Add Dialog Box

The EIS manual defines the different objects contained within the object database.

Figure 2 displays the objects contained within the banking system application.

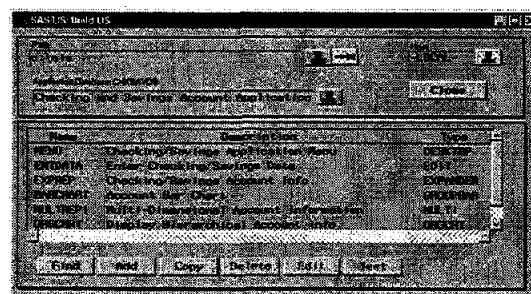


Figure 2. Banking System Application Object List

The following sections define the objects used in the banking system.

ENTDATA Object

The purpose of this object is to provide the user with an entry screen for transactions. Users register the transaction type, contents, date, and amount into the ACCOUNT data set. The object database for this object is DATA ACCESS and the object is SAS Data Set. Figure 3 displays the definition screen of the ENTDATA object.

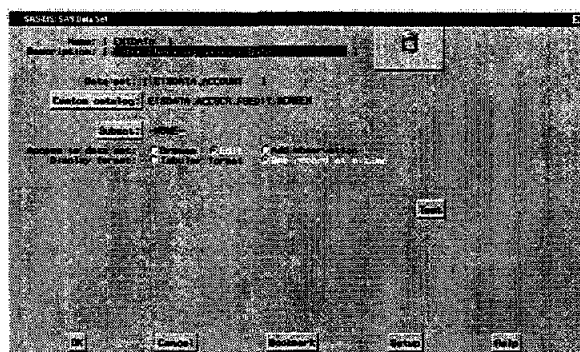


Figure 3. ENTDATA Object

The ENTDATA object allows the users to access the ACCOUNT data set with the custom screen catalog defined. This catalog was defined outside the EIS system to provide the users a descriptive entry screen. Note that the access to the data set is EDIT, and it is displayed one record at a time.

EXPREP Object

This object produces the drill-down report table. When adding this object, its type is BUSINESS REPORTS and object is

EXPANDING REPORT. Figure 4 displays the definition for this object.

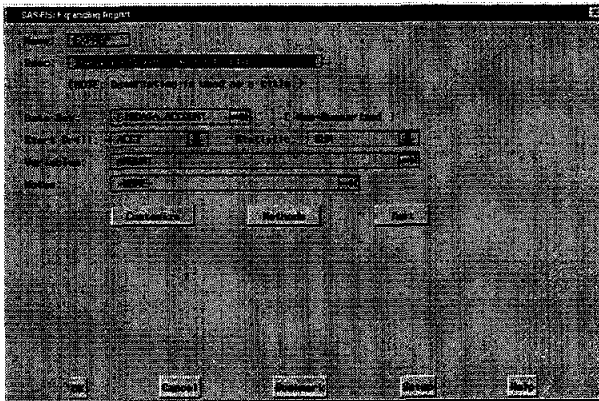


Figure 4. Expanding Report Definition

This object uses the attributes assigned when defining the metabase. For instance, the start drill text entry box contains the variable ACCT. When defining the metabase for the banking system, we defined the hierarchy for the ACCOUNT data set. Figure 5 displays this hierarchy.

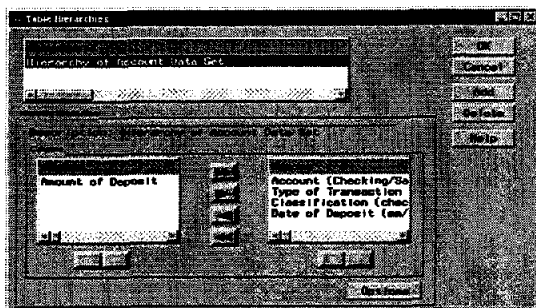


Figure 5. ACCOUNT Data Set Hierarchy

So, when the user clicks on the value of the ACCT variable within the report, it drills down to the next hierarchy in our definition. In this instance, it is the type of transaction.

The ACCT variable is the "class" for this report, while the AMOUNT variable is used for the statistics. So, ACCT's values are used to subdivide the presentation of the amount values. In this case, the sum of the AMOUNT variable is displayed.

BARChart Object

This object is similar to the EXPREP object except that the information is displayed as a vertical bar chart. The object type is BUSINESS GRAPH and the object is a GROUPED BAR CHART. Figure 6 displays the definition.

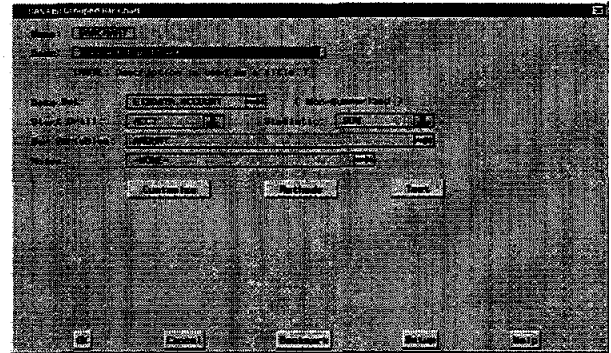


Figure 6. Barchart Object Definition

Note the similarities between the object definition screen for the BARChart and EXPREP objects. Both are utilizing the hierarchy structure we defined within the metabase.

MULTREP1 Object

A class up from the expanding report, this object provides the user with comparisons and statistics on the transaction data. It displays deposits, withdrawals, and balances for each type of account. The object type is BUSINESS REPORT and the object is MULTIDIMENSIONAL REPORT. Figure 7 displays the definition.

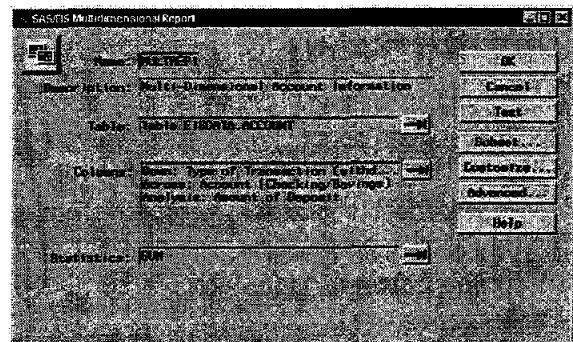


Figure 7. Multidimensional Report Definition

The definition of this report is extremely complex, enough so that a whole SESUG

paper could be written on its definition. Therefore, the definition will not be detailed within this paper. All the information necessary can be found in the EIS manual.

ORGCHRT Object

As noted in the introduction, this organization chart is another graphical way of looking at the data. The object type is BUSINESS GRAPH and the object is an ORGANIZATIONAL CHART. Figure 8 displays the definition.

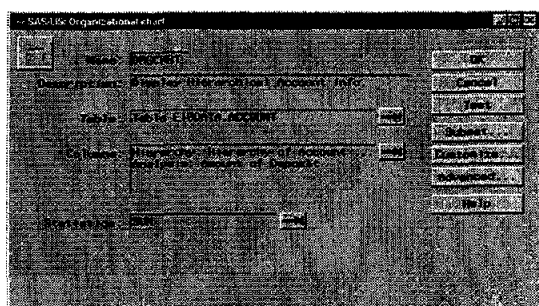


Figure 8 Definition of the ORGCHRT Object

This object utilizes the metabase attributes defined. As the object is defined, only those variables whose attributes are applicable to the organizational chart object are displayed by the EIS building system. For the ACCOUNT data set, only the hierarchy and amount are applicable. Therefore, the organizational chart displays the sum of the amounts within the different hierarchical paths.

MENU Object

This is the object that integrates all the objects into a graphical user interface. In addition, this object is invoked with the `runeis` command to start your application. Building the EIS menu is exactly like building a frame in SAS/AF®. Figures 9 and 10 display the definition screen for the menu object (Figure 9) and the menu that is created (Figure 10).

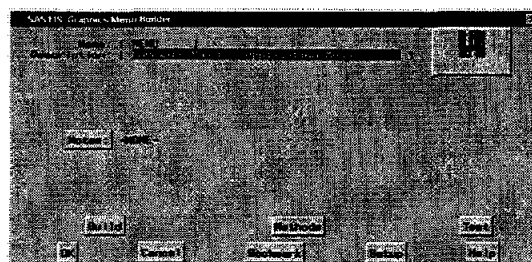


Figure 9. Definition Screen for the Menu Object

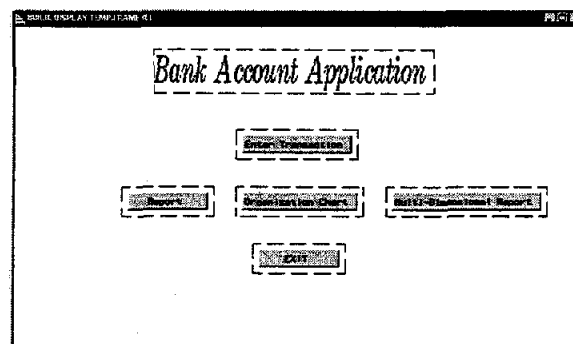


Figure 10. Graphical Menu

Conclusion

The SAS/EIS system is an extremely powerful tool in developing business systems that employ multiple applications available in the SAS® system. In this paper, an extremely basic banking system was created with five objects.

At STATPROBE, SAS/EIS has been used in creating a tracking system for a pharmaceutical client's case report forms. As a form comes in, a person tracks the forms that are received. Reports can be generated and sent to the client providing them feedback on what forms are missing for a patient and what forms are the most likely to be missing.

The most important step in developing an EIS system is the up-front development. Data sets and applications need to be established before the system is developed. As in the banking system, a metabase is essential to develop a functional EIS system.

References

SAS Institute Inc. (1993), *SAS/EIS Software Reference Version 6 First Edition*, Cary, NC: SAS Institute Inc.

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