

Querying Data Easily with the SQL QUERY Window

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ABSTRACT

The SQL Query window is a production feature in SAS/ASSIST software beginning with Release 6.08 TS408 and Release 6.09 TS037 of the SAS® System. This feature provides a point and click environment to build SQL queries and reports with minimal effort and no knowledge of SAS System syntax.

INTRODUCTION

With the Query window you can query any files the SAS System can access. This includes tables in the database management systems (DBMS's) that are supported by SAS/ACCESS® software, SAS data sets, or SAS views. SAS views include SQL views, DATA step views, and SAS/ACCESS View Descriptor views. By querying DATA step views, you can query flat files and VSAM files, as well as SAS data sets and other SAS views. The files you query can reside on the local host on which you have invoked the Query window or, if your site has licensed SAS/CONNECT® software, on a remote host.

Because it is customizable, the Query window can be told which data sources or tables a group of users or an individual user should have access to, thereby providing only the appropriate data for the group or user.

The Query window provides tables to query based on what is referred to as an access mode. The following access modes are currently available:

- SAS
- DB2
- ODBC
- ORACLE
- SYBASE
- SQL/DS
- Rdb/VMS

The following access modes are currently under development:

- DB2/2
- Ingres
- Informix

When you invoke the Query window without specifying an access mode, the SAS access mode is used. All other access modes listed above are SAS/ACCESS interfaces that support the SQL procedure's pass-through facility. The list shown above will continue to grow as Query window development progresses and as SAS/ACCESS software expands its support for SQL pass-through to other databases.

The SQL pass-through facility allows more efficient queries to be generated. All SQL code is generated and passed directly through to the DBMS for processing (with the exception of any summary functions that are available to the SAS System but not to the particular DBMS and any WHERE expressions that make use of the SAS System's SQL calculated component; these are processed on the SAS side).

You can invoke the Query window by any of the following methods:

- Using SAS/ASSIST software, select QUERY on the Report Writing or Data Management menu.

- Issue the QUERY command in the display manager's Program Editor window.

- Issue a CALL EXEC CMD('QUERY') statement from a SAS/AF® application. The call exec cmd can include any combination of the parameters illustrated in the following statement:

```
CALL EXEC CMD('QUERY
PROFILE=libname.catname.profilename,
ACCESS=access mode,
DATA=a table to begin querying');
```

- Specify the QUERY command as the attribute or command to be processed from a SAS command object within a SAS/EIS® application.

FEATURES AND AN EXAMPLE QUERY

With the Query window you can query one table or join multiple tables. The following is a one table query of a SAS data set named FREQFLYR contained in a SAS data library referenced by the libname AIRLINE. This query reports the maximum miles traveled, points earned, points used, and available points for each of the frequent flyer member types. The query is subsetted to include only frequent flyer members in certain states. The terminology used here is point and click; however, the query can also be built by moving the cursor to the appropriate area in the window and pressing the Enter Key on the keyboard.

You begin to build the query by selecting AIRLINE in the Table Sources list. The Available Tables list will then display the tables (in this case SAS data sets and views) in the AIRLINE library. You next select the FREQFLYR table by either double clicking on FREQFLYR in the Available Tables list or single clicking on it and then clicking the add arrow ► in the pad in the middle of the window that points to the Selected Tables list.

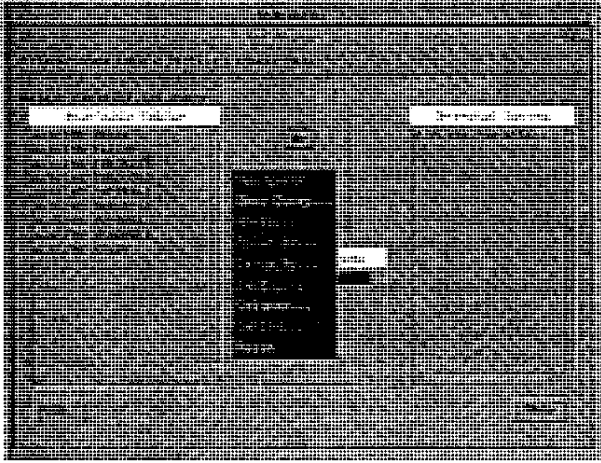
Display 1. AIRLINE.FREQFLYR Table Selected in the Tables Window



You now move on to the columns in the FREQFLYR table in any of the following ways:

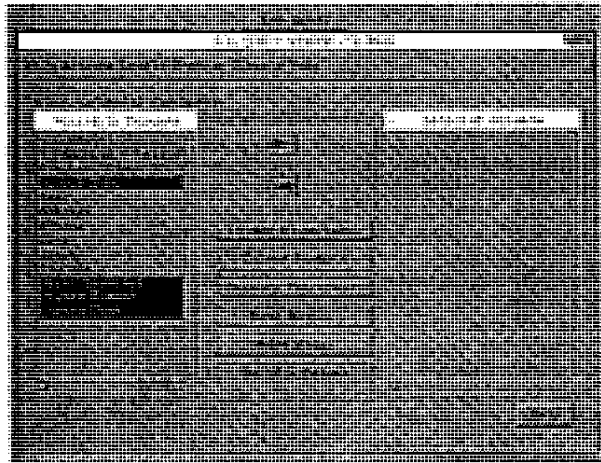
- Click the OK button at the bottom left in the window.
- Select Locals in the Menu bar at the top of the window and then select Columns.
- On a device with a mouse, click the right mouse button and select Columns in the popup menu that is displayed.

Display 2. Popup Menu Displayed for Right Mouse Button



While you are building the query, all references to columns will display the column labels. For this query, the columns Member Type, Miles Traveled, Points Earned, and Points Used need to be selected. You can double click on each of these columns, or single click on each column and then click the add arrow ► that points to the Selected Columns list to select the columns for the query.

Display 3. Columns Window with Selection of Columns Underway



The report generated from this query will display the columns in the order in which they are listed in the Selected Columns list. You can rearrange the columns with the Move Before and Move After buttons on the pad in the middle of the window.

This query will report the maximum number of Miles Traveled, Points Earned, and Points Used for each Member Type. The FREQLYR table contains three distinct member types: bronze,

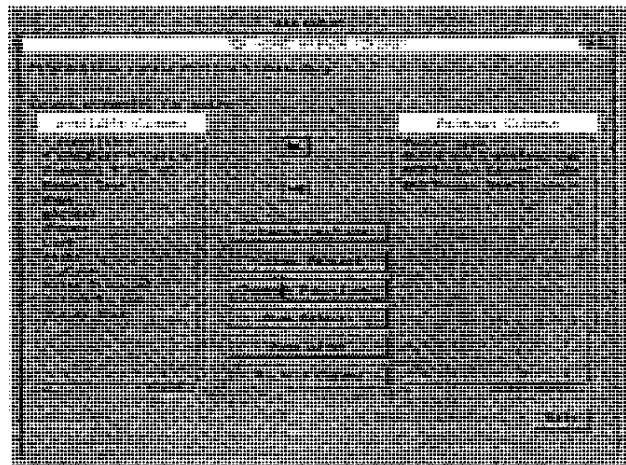
gold, and silver. You click the columns to which the maximum summary function needs to be applied and then click the Summary Functions button on the pad in the middle of the window. A popup menu of the available summary functions is displayed.

Display 4. The Available Summary Functions Menu



Select the MAX summary function, and it will be applied to all of the selected columns that you chose. A default label of the summary function and the column name is also applied to the column. You can change this label by choosing the column and the Column Alias/Label button.

Display 5. Columns with MAX Summary Functions Applied



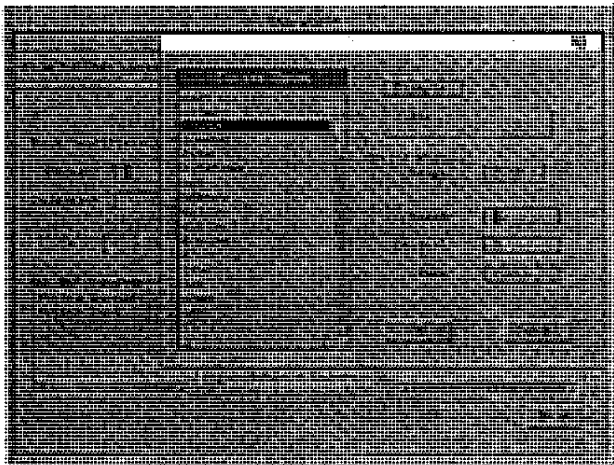
You can add report modifiers/attributes (such as the formats or labels mentioned above) to customize the report. The values for the summary functions in the query report may be large and may be more readable with commas, so you can click each summary function column and then click the Column Formats button to apply an appropriate SAS format for the values in the report.

Display 6. Column Formats Window



If you are familiar with SAS format names, you can key the name in the text entry field and then select the OK button to return. If you are unfamiliar with or uncertain of SAS format names, you can click the arrow to the right of the format text entry field to display a window that contains the available SAS formats. This window will display an example value when you choose a format name. It will also display the valid width range for the particular format. Choose the comma in the Format Names list as the format for the maximum summary function values this query will report.

Display 7. Column Format Names Window



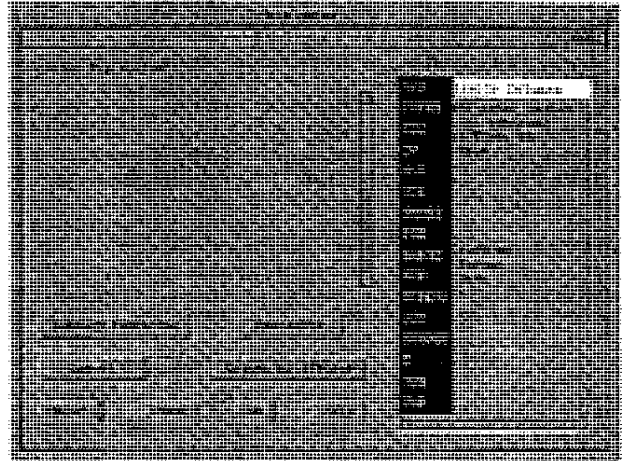
Click OK to return to the Columns window. This query will also report the maximum available points in each member type group. You add this computed column to the report by clicking the Build a Column button and building a new column expression. The Column Expression window appears, and as you choose from the available columns to build this column expression, operators are automatically displayed to drive you through the build process. After you have the complete column expression, you add any column and report attributes by clicking the Column Attributes button.

To report the maximum available points in each member type group, you can build the following expression:

```
MAX(Points Earned) - MAX(Points Used)
```

To begin this column expression, choose the Summary Functions button in the bottom section of the window, and the summary functions popup menu will be displayed. Select a summary function from this menu.

Display 8. Summary Function Popup Menu in the Column Expression Window



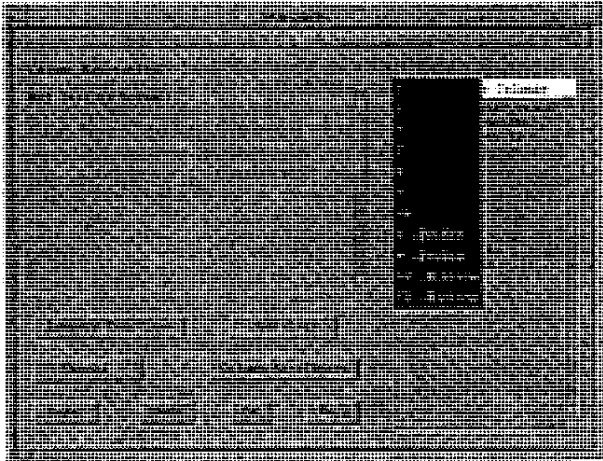
Choose the MAX summary function. The column expression is displayed in the extended table under the Column Expression: heading as you build it. You now click the Points Earned column in the Available Columns to add it to the expression.

Display 9. Selecting the Available Column for the Expression



After the Points Earned column is added to the expression, a popup menu that contains the operators is automatically displayed.

Display 10. Operators Popup Menu in the Column Expression Window



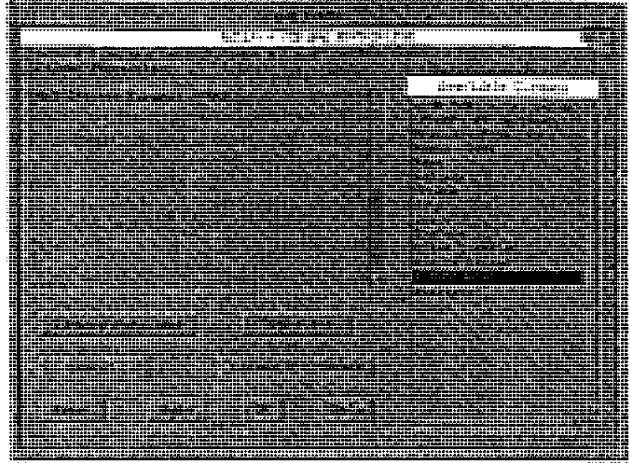
Choose the "-" for subtraction and then click the Summary Function button to display the Summary Function popup menu.

Display 11. Summary Function Popup Menu



Choose the MAX summary function. Now click the Points Used column to add it to the column expression.

Display 12. Completing the Column Expression



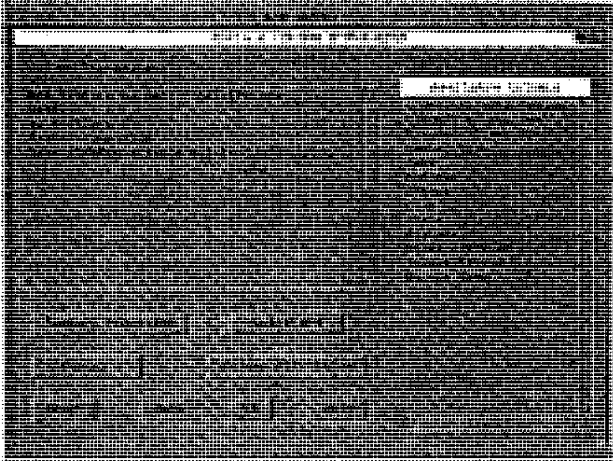
The column expression you are building is now complete. You can add column and report attributes by clicking the Column Attributes button. This enables you to give an alias name that will then become an available column throughout the query building, a format for the reported values, and a label for this column in the report.

Display 13. Column Attributes for the New Column



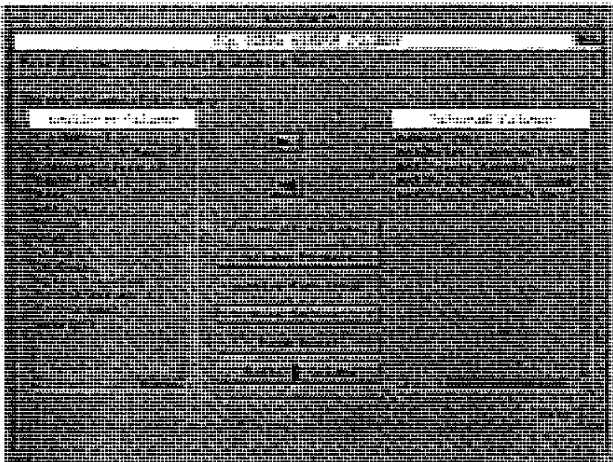
When you choose OK from the Column Attributes window, your column expression is complete.

Display 14. The Finished Column Expression



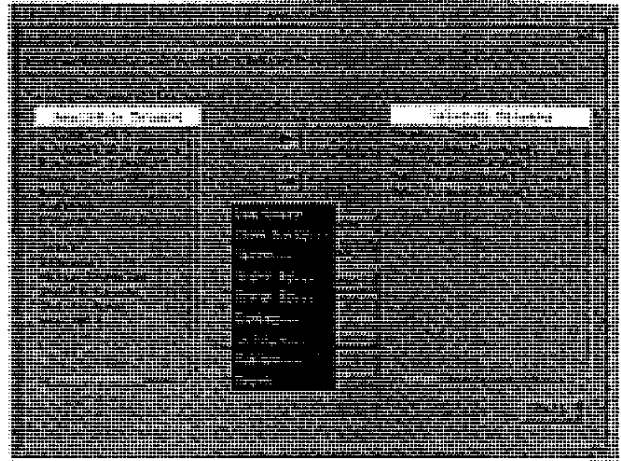
When you choose OK from the Column Expression window and return to the Columns window, the new column expression is in the Selected Columns list and the alias column attribute you assigned it is in the Available Columns list.

Display 15. Columns Window after Build a Column is Complete



You can select columns to GROUP values BY for the summary functions, or you can let the Query window automatically choose the group by columns at run time. The Query window will choose any selected columns that do not have summary functions applied to them to define the groups of values to calculate the summary functions for. In this query, the group by column(s) automatically generated would be Member Type. To select the group by columns, either choose Locals in the menu bar at the top of the window and then choose Group By or, if you have a device with a mouse, click the right mouse button and choose Group By from the popup menu displayed.

Display 16. Moving to the Group By Window



Double click the Member Type column in the Available Columns list or single click and then click the add arrow ► that points to the Selected Columns list to choose the Member Type column to be the column to group values for in this query.

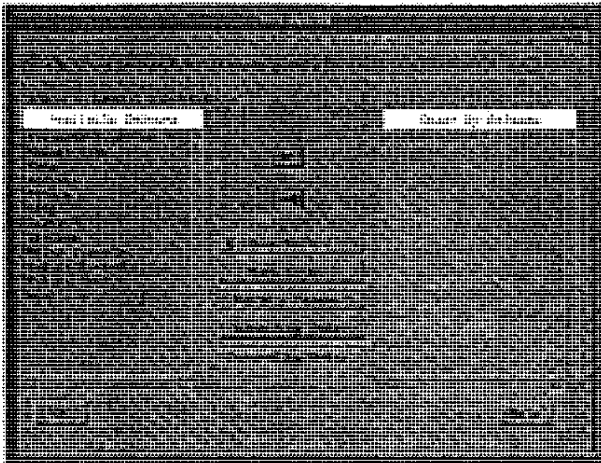
Display 17. Group By Window with Group By Column(s) Selected



If you have certain conditions that the groups of values must satisfy to be included in the report, you can build a HAVING expression by choosing Locals in the menu bar at the top of the window or Having in the popup menu displayed when the right mouse button is clicked. The Having Expression build process is the same as the Column Expression above.

You can select columns to ORDER the query BY if you need the reported values to be in a particular order. To select columns to order the report by, choose Locals in the menu bar and then Order By, or choose Order By in the popup menu displayed when the right mouse button is clicked. This query does not require a particular order.

Display 18. Order By Window

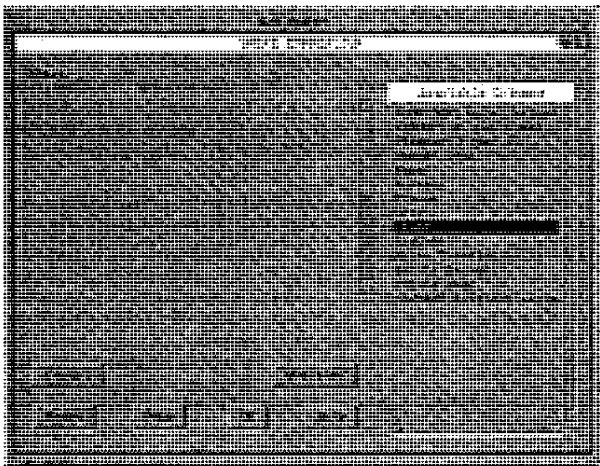


This query needs to report values for members in the states of California, North Carolina, and Colorado. You accomplish this subset of row values by building a WHERE expression that specifies the condition(s) that the rows in the FREQFLYR table must satisfy to be included in the query results. In this query, the WHERE will be:

```
WHERE Member Type IN(CA, NC, CO)
```

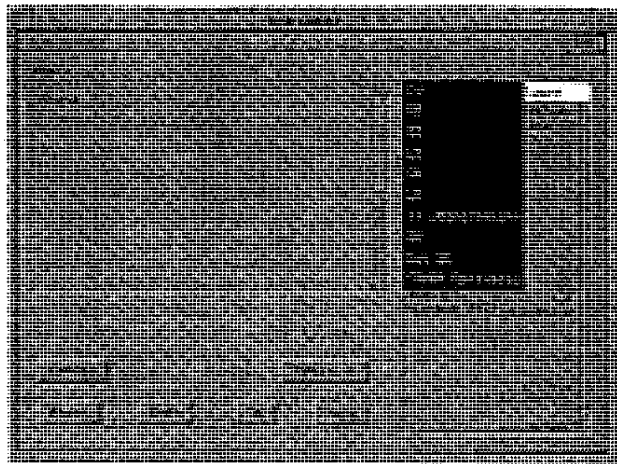
You build this WHERE expression for the query by choosing Locals in the menu bar and then Where, or by choosing Where in the pop-up menu displayed when the right mouse button is clicked. The Where Expression window appears, and as you choose from the available columns to build the WHERE, operators are automatically displayed to drive you through the build process in the same way that the other expression builders in the Query window did. Begin by choosing the column State in the Available Columns list.

Display 19. WHERE Expression Window



The WHERE is displayed in the extended table under the heading Where as you build it. A popup menu of available operators is displayed as soon as State has been chosen. Choose the IN operator.

Display 20. Where Expression Window Operators Popup Menu



You now have several options for entering the State values that you want the query results to satisfy.

- You can select the <CONSTANT enter value> in the Available Columns list. A dialog box will be displayed for you to key the exact value(s).
- You can select the <PROMPT at run time> in the Available Columns. The <PROMPT at run time> enables you to enter a value each time you run the query, save the query to an external file, or create a table of the query results.
- You can select the <LOOKUP distinct values> to have the distinct values for the column in the WHERE condition displayed for selection. Any pending WHERE conditions will be used to subset this LOOKUP.
- You can set automatic lookup in a SAS data set for particular columns to simplify building the WHERE expression. See the 'Additional Features' section later in this paper for a brief description of this feature.

To build this query, you select the <LOOKUP distinct values> and choose the three desired states.

Display 21. Choosing <LOOKUP distinct values> for the WHERE Expression

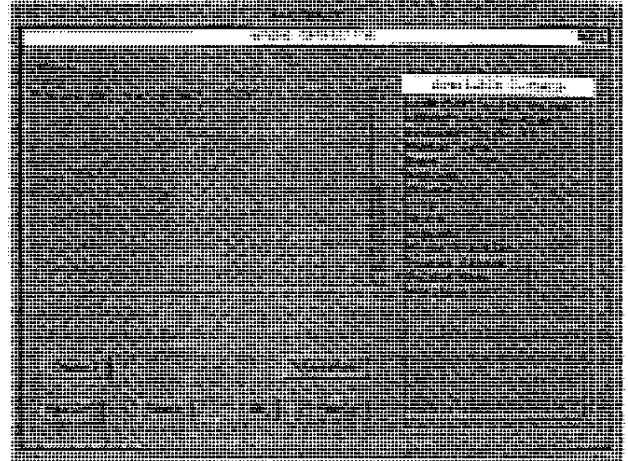


Display 22. Choosing the Values Displayed from the <LOOKUP distinct values>



When you choose OK from the Lookup window and return to the Where Expression window, the WHERE condition for this query is complete.

Display 23. WHERE Expression



You can continue to add other conditions for the WHERE expression by clicking the Operator button and choosing one of the logical operators (such as AND or OR) that is displayed in a popup menu and building another condition in the same way you built this one. At any point while building a WHERE expression you can reset the WHERE expression by clicking the RESET button, undo the last thing added to the WHERE expression by clicking the UNDO button, or replace any part of the WHERE expression by clicking in the extended table that displays the WHERE expression on the item you wish to replace and then choosing a replacement.

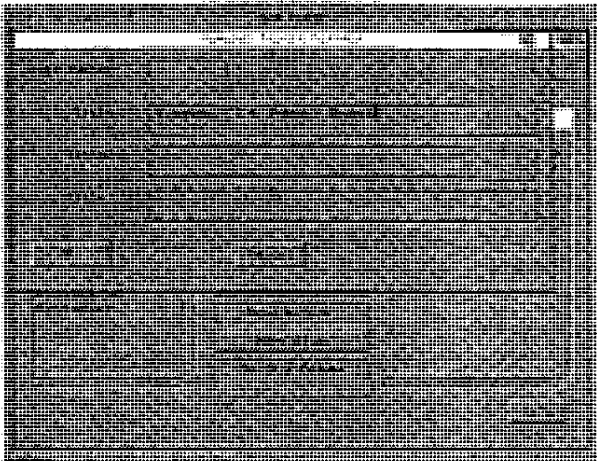
When you choose OK and return to the Columns window, this query is now complete. You can look at the query syntax by choosing Actions in the menu bar and then Show Query, or by choosing Show Query in the popup menu displayed when you click the right mouse button.

Display 24. Show Query Window with the Query Displayed



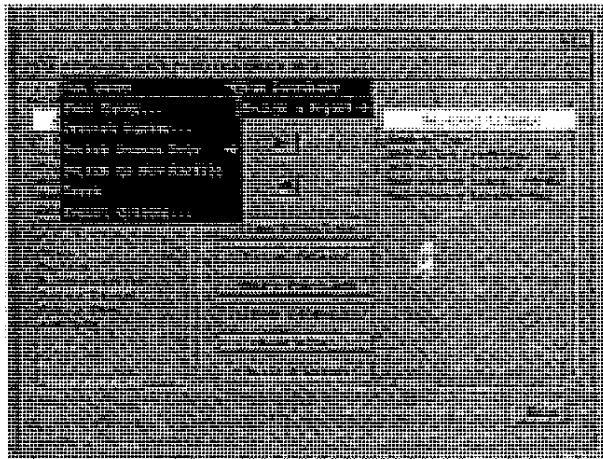
Before you run the query to see the query results, you can set a page number and title by choosing Actions in the menu bar and then Report Options. A dialog box is displayed for you to enter the page number and/or title.

Display 25. Report Options Window



You can run the query and see the results in the SAS Display Manager Output window or continue designing the report while you view the results with PROC REPORT. To continue designing the report, choose Actions in the menu bar, Run Query, and then Design a Report. To run the query immediately and view the results in the display manager output window, choose Actions in the menu bar, Run Query, and then Run Immediate, or choose Run Query and then Run Immediate in the popup menu displayed when the right mouse button is clicked to run the query.

Display 26. Run Query Menu



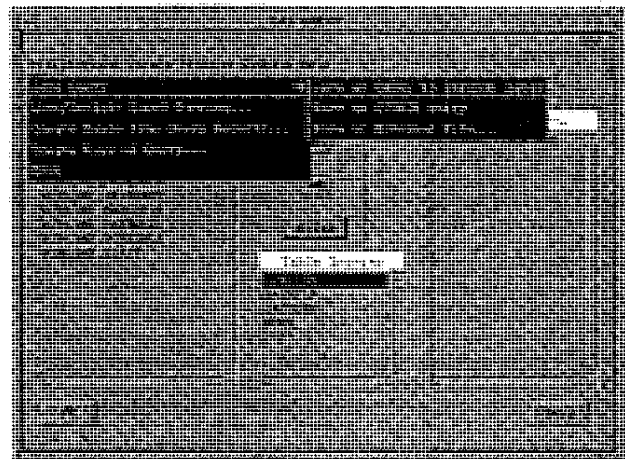
The following report shows the query results from Run Immediate.

Frequent Flier Summary Report				
Member Type	MAX(Miles Traveled)	MAX(Points Earned)	MAX(Points Used)	MAX(Available Points)
BRONZE	75,669	76,169	50,000	26,169
GOLD	81,926	84,426	50,000	34,426
SILVER	91,495	96,495	40,000	56,495

You can save this query in the following ways (each of these methods is accessible by clicking the File in the menu bar and then Save Query; the first two are also accessible from the Save Query button in the Show Query window):

- **Save as QUERY to Include later**
All components of the query are saved to a .QUERY catalog entry and can be included in any query session.
- **Save as SOURCE entry**
The query's SQL syntax is saved to a .SOURCE catalog entry.
- **Save as External File**
The query's SQL syntax is saved to an external operating system file that can then be included into any application within the SAS system that supports the SAS text editor or that can be executed in a batch environment.

Display 27. Save Query Menu



ADDITIONAL FEATURES

The Query window includes features that enable a query session to be customized. These features include automatic lookup capabilities for building WHERE expressions and preferences settings in a profile to define the environment for an individual or group's query session(s).

You can set automatic lookup in a SAS data set for particular columns to simplify building the WHERE expression. Any pending WHERE conditions will be used to subset the lookup. This automatic lookup can include the following strategies:

- The V (value) strategy automatically retrieves and displays the distinct values of the column that was selected for the WHERE expression.
- The T (table) strategy reads a given table and displays the values of all the table's columns. The first column is the value needed for the WHERE expression, and any other columns can be de-

scriptive information.

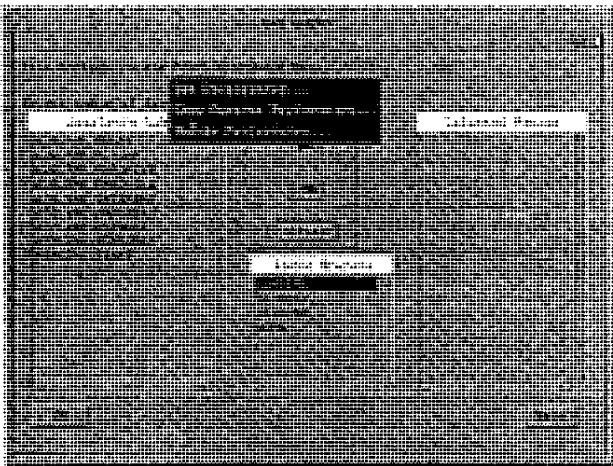
- The L (list) strategy enables you to select specific columns from a given table to be displayed. The table can be the same as the table you are querying, or it can be a separate table.

Note: The List and Table strategies can be helpful when the table being queried contains a huge number of rows, but the values to be displayed for subsetting in the WHERE expression are a significantly smaller number. These strategies are also helpful when the value itself is not descriptive enough and descriptive information for the value is needed.

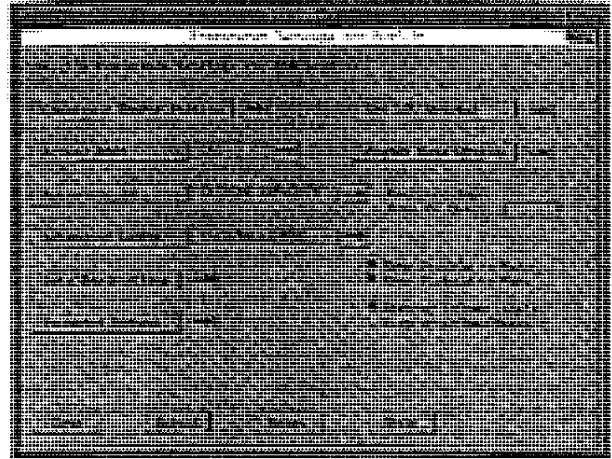
- The P (program) strategy invokes a user-written SAS/AF program. An SCL list that contains the currently pending WHERE expression is passed to the program where it can be used or ignored.
- The F (format) strategy displays column data values and their corresponding formatted values.

You can customize query sessions by setting preferences in a profile. Choose Profile on the menu bar and then choose Set Preferences. You can update this profile when needed by choosing Profile on the menu bar and then choosing Update Preferences.

Display 28. Profile menu



Display 29. Preference Settings for Profile Window



You can customize the following preferences:

- Configure a remote session.
- Set an access mode and any associated access options.
- Create a SAS data set that contains the column links that are needed to automatically build WHERE expressions to join particular tables, or assign a previously created SAS data set to automatically join tables.
- Restrict the QUERY session only to the desired data for an individual, a group of users, or an application. This restriction can occur at the table source level, the table level, and the column level.
- Specify a SAS data set to be used for the automatic lookup data set.
- Assign a password to the profile to prevent unwanted updating of the profile.
- Specify SQL options for the SAS system's SQL procedure to be used throughout the QUERY session.
- Restrict the number of rows that can be queried.
- Turn off the PROFILE and/or GLOBALS during a QUERY session.

During a query session, you can switch to a different access mode by clicking Actions in the menu bar and then Switch Access Mode in the secondary menu that is displayed. You can also switch to a different profile by clicking Actions in the menu bar and then Switch to a New Profile.

CONCLUSION

The SQL Query window offers you a variety of features that enable you to quickly and easily query and report your data. You can query from data stored in virtually any format or location. You do not need to know SAS System syntax or database terminology. You do not need to be concerned with where your data resides. The query will be built quickly and efficiently for you as you point and click.

If you are building an application for others, you can create a customized environment for query sessions in the application by creating a profile or multiple profiles.

For more details on the SQL Query window features, refer to SAS Technical Report P-254 *Using SQL Query Window Release 6.08*.

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