ABSTRACT
Do you want to create listing or summary reports? Create new variables? Create new SAS® data sets? Combine SAS data sets and sort the data? Simultaneously? This SQL Query Window Hands-On Workshop teaches you how to accomplish these tasks in a point-and-click or tab-and-press-ENTER environment, regardless of operating system. The SQL Query window is new to SAS/ASSIST® software starting with Release 6.08.

No prior Structured Query Language (SQL) knowledge is needed.

INTRODUCTION
The SQL Query window is an easy-to-use point-and-click interface to query data and produce reports. You can access data from native SAS data sets and some database management systems, and create SAS data sets for future use.

You can access the SQL Query window using:
- SAS/ASSIST software
- the QUERY command
- the EXECCMD routine in Screen Control Language.

BENEFITS
The SQL Query window is easy to use because you can query data without writing code or learning code syntax. The SQL Query window enables you to:
- access data from multiple sources including:
  - SAS data sets
  - DB2®
  - DB2/400®
  - ODBC
  - ORACLE®
  - Rdb/VMS
  - SQL/DS™
  - SYBASE
  - INFORMIX
  - INGRES
- save a query from one session to the next
- save a resulting data set as a view or data file
- create multiple styles of reports
- perform automatic joins
- perform automatic table lookups.

ACCESSING THE SQL QUERY WINDOW
You can access the SQL Query window from the Report Writing menu or Data Management menu in SAS/ASSIST software.

From the SAS/ASSIST primary menu, select REPORT WRITING → GQUERY → SQL QUERY... to open the SQL Query window.
To move COMPANY.PAYROLL from the Available Tables list box to the Selected Tables list box, select COMPANY.PAYROLL → [ ].

Display 3 Selecting a Table
Select [ ] to view the list of columns available in the COMPANY.PAYROLL table.

SELECTING COLUMNS
The SQL QUERY COLUMNS window displays all of the columns available for the selected tables.

COUNT(*) is a summary function that counts the number of rows returned by a query. * PAYROLL * <all columns> selects all of the columns in the PAYROLL table.

To move IDNUM, JOBCODE, SEX, and SALARY to the Selected Columns list box, select

1. IDNUM, JOBCODE, SEX, and SALARY
2. [ ]

Display 4 Selecting Columns
The order in which the columns are selected determines their order in the report. To change the column order once the columns are in the Selected Columns list, select [Move Before] or [Move After].

Click on the right mouse button anywhere in the SQL QUERY COLUMNS window to display a list of actions.

Display 5 Output Report
Select [File] → [Exit] to return to the SQL QUERY COLUMNS window.

BUILDING A COLUMN
Example Select the columns IDNUM, JOBCODE, SEX, and SALARY from the COMPANY.PAYROLL table. Label the SALARY column as Annual Salary. Compute the monthly salary by dividing the SALARY column by 12. Name the computed column MSALARY and format the column with the DOLLAR12. format.

To add a label to the SALARY column, select

1. SALARY from the Selected Columns list box
2. [Column Alias/Label]

Type Annual Salary in the Label field.

Display 6 Specifying a Label
Select [OK] to close the window. Select [Build a Column] to create the monthly salary column.
Building a Column Expression

Select SALARY to begin the expression. A list of operators automatically appears. Select \( \div \) from the list of operators. Select \( \text{CONSTANT enter value} \) to divide salary by 12. Type 12 in the Numeric field.

Specifying a Constant Value

Select 12.

Select Column Attributes from the BUILD A COLUMN EXPRESSION window to assign an alias, label, and format.

Type
1. mSalary in the Alias Name field

Formatting a Column

To add a format to the salary column,
1. select SALARY from the Selected Columns list box
2. select Column Formats
3. type DOLLAR7 in the Format field
4. select OK.

Subsetting Data

Example: Display only flight attendants (job codes FA1, FA2, and FA3) and mechanics (job codes ME1, ME2, and ME3) who make less than 50,000 dollars annually.
Click on the right mouse button to display the pop-up menu.
Select **WHERE Conditions...** to subset the data.

You can subset data from the pull-down menu by selecting

```
LOCALS \rightarrow WHERE Conditions...
```

**Display 11  Building a WHERE Expression**

Select **SALARY** from the Available Columns list box to start building the expression **SALARY LT 50000**.

A list of operators automatically appears. Select **<** from the list of operators. To specify the constant value of 50000,

1. select **CONSTANT enter value**
2. type **50000** in the Numeric field
3. select **<** to close the window.

To subset the data for flight attendants and mechanics, select **AND**. The AND operator is chosen because both expressions must be true to include the row in the report. To build the **JOBCODE IN ("FA1" "FA2" "FA3" "ME1" "ME2" "ME3")** expression, select **JOBCODE ** \rightarrow **<** \rightarrow **LOOKUP distinct values**

**Display 12  Selecting Distinct Values**

Select **FA1** **FA2** **FA3** **ME1** **ME2** **ME3**. Select **<** to close the window. The WHERE expression is now complete. Select **<** to close the WHERE EXPRESSION window. Select **Run Query \rightarrow Run Immediate** from the pop-up menu.

The report displays in the OUTPUT window.

**Display 13  Subsetted Report**

Select **FILE \rightarrow EXIT** to close the OUTPUT window.

**ORDERING THE REPORT**

Example: Display the previous report in sorted order by job code.

Select **Order By...,** from the pop-up menu to display the report in sorted order by **JOBCODE**.

You can order the report from the pull-down menu by selecting **LOCALS \rightarrow Order By...**

To order the report by **JOBCODE**, select

1. **JOBCODE** from the Available Columns list box
2. **<**

**Display 14  Selecting an ORDER BY Column**

The default sort order is ascending. To change the order to descending, select the column in the Selected Columns list box, then select **Descending Order**.

Select **<** to return to the SQL QUERY COLUMNS window.

628
From the pop-up menu, select Run Query \rightarrow Run Immediate to execute the query. The ordered report displays.

Display 15  Partial Ordered Report

Select File \rightarrow Exit to close the window.

SUMMARY REPORTS

Example: Create a report that displays the average and maximum salary for flight attendants and mechanics.

To remove IDNUM, SEX, SALARY, and MSALARY from the Selected Columns list box, select

1. IDNUM, SEX, SALARY and MSALARY
2. *

Remove SALARY in order to remove the format and label options.

To calculate the maximum and average salary, select

1. SALARY from the Available Columns list box
2. =
3. SALARY from the Available Columns list box
4. =

Select the first SALARY from the Selected Columns list. Then select Summary functions \rightarrow AVG to request the average salary to be generated for the first SALARY column.

Display 16  Selecting a Summary Statistic

Select the second SALARY from the Selected Columns list. Then select Summary functions \rightarrow MAX to request the maximum salary to be generated for the second SALARY column.

The summary functions appear in the Selected Columns list box.

Select Run Query \rightarrow Run Immediate.

A window opens requesting information on how the summary functions AVG and MAX are to be interpreted in the query.

Display 17  Requesting GROUP BY Information

Select AUTOGROUP because JOBCODE is the only column that is not used in a summary function and summaries for each JOBCODE are requested.
Display 18  Specifying a Permanent GROUP BY

Select [Yes] to retain the GROUP BY criterion after the query is run.

The summary report displays in the OUTPUT window.

Display 19  Grouped Report

Select [File] → [End] to close the OUTPUT window.

SETTING SAS OPTIONS

Example: Turn off the page number, date, and time stamp in the right-hand corner of the report, and add titles to the report.

The date and page number can be eliminated from the report by turning off the DATE and NUMBER SAS system options. To access SAS system options, select [Global] from the menu bar. Then select [Global options] → [SAS options] from the pull-down menu.

A filled box beside the option indicates the option is currently in effect. To toggle the option on or off, select the option. Select [DATE] to turn the DATE option off. Select [NUMBER] to turn the NUMBER option off.

Display 20  Specifying SAS Options

The OPTIONS window can be closed by selecting [End] from the menu bar or pop-up menu.

All options changed here are global and affect all other output generated in your SAS session.

SPECIFYING TITLES

Select [Global] → [Global options] → [Titles] to specify titles for the report. 

1. Average and Maximum Salaries in the Title1 field
2. for Flight Attendants and Mechanics in the Title2 field.

Display 21  Specifying Titles

Select

1. [File] → [End] from the pull-down menu or pop-up menu to close the TITLES window
2. [Run Query] → [Run Immediate] to create the report.

The report displays in the OUTPUT window.
Display 22  Final Report
Select \[ \text{End} \] to close the OUTPUT window.

**RESETTING THE QUERY WINDOW**

Example: Reset the QUERY window to begin a new query.

Select \[ \text{Actions} \rightarrow \text{Reset} \].

Display 23  Resetting the Query
Select \[ \text{Esc} \] to reset the entire query.

When resetting the query, any SAS system or global option (such as titles or dates) remains in effect.

**JOINING TABLES**

Example: Create a report that contains the columns IDNUM, FNAME, LNAME, JOBCODE, and SALARY for flight attendants and pilots. Prompt the user whether to run the report for males or females.

When several columns from different tables need to be placed side by side in a report, an SQL join can be used. The data needed for this example can be found in COMPANY.STAFF and COMPANY.PAYROLL.
Display 26  WHERE Warning Message

If the WHERE clause is omitted, all combinations of rows from all tables are matched. For example, if tables ONE and TWO listed below are joined without a WHERE clause, the result is a Cartesian product (all possible combinations of rows).

<table>
<thead>
<tr>
<th>Table ONE</th>
<th>Table TWO</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>A</td>
</tr>
<tr>
<td>1</td>
<td>a</td>
</tr>
<tr>
<td>2</td>
<td>b</td>
</tr>
<tr>
<td>4</td>
<td>c</td>
</tr>
<tr>
<td>4</td>
<td>d</td>
</tr>
</tbody>
</table>

Result of a Join without a WHERE Clause

Result of a Join with the WHERE Clause

```
<table>
<thead>
<tr>
<th>X</th>
<th>A</th>
<th>Y</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>b</td>
<td>2</td>
<td>x</td>
</tr>
</tbody>
</table>
```

A &PROMPT1 variable appears in the WHERE clause. &PROMPT1 is replaced with the value supplied at run-time (either M or F).

Select OK to close the WHERE EXPRESSION window. Select Run Query to run immediately to execute the query.

The Prompt window appears and requests a value. Type F in the Prompt window.

Display 28  Prompt Window

Select OK.

The result of the query displays in the OUTPUT window.

The prompt string is a text string that appears when the query executes to help the user in entering the correct information. Type Please Enter M or F in the Prompt String field.
SAVING YOUR QUERY

Queries are stored as entries in a SAS catalog. A SAS catalog entry is referenced with a four-level naming convention libref.catalog.entry-name.entry-type. When saving a query, you must specify the libref, catalog, entry-name. The entry type of QUERY is added automatically.

The default storage location is the SASUSER.PROFILE catalog. You can specify a different storage location using the Library, Catalog Name, and Entry Name push-buttons.

Select Library → COMPANY → OK.

Type
1. project in the Catalog Name field
2. combined in the Entry Name field
3. Combined Staff and Payroll Query in the Description field.

Example: Save the current query in the external file named c:\sql\join.sas.

To save the current query in an external file, select File → Save Query → Save As External File → OK. The Save As External File... window displays. Type join.sas in the Selection field. Select OK to save the file.

Example: Save the current query in the COMPANY PROJECT catalog. Specify the entry name COMBINED and an appropriate description.
Display 32  Specifying an External File

External filenames and the window in which you specify them vary among operating systems.

INCLUDING A SAVED QUERY

Example: Include the saved query COMPANY.PROJECT.COMBINED.QUERY and display it in the SQL QUERY window.

Select File > Disc/Include Saved Queries ... to include a saved query. Select

1. COMPANY from the Libraries list box
2. OK to close the window.

Select COMPANY.PROJECT.COMBINED > Include.

Display 33  Including a Query

A window displays asking if you want to replace the current query with the included query, or include it into the current query. Select Clear Query in Progress before Including > OK. Select Actions > Show Query ... if you wish to view the query.

CREATING A VIEW

An SQL view

- is a stored query. It contains no rows of data.
- can be used in SAS programs as a SAS data set. The only limitation is that the view is read only.
- extracts underlying data when used, thus accessing the most current data.

Example: Create a view named COMPANY.FA_PT using the current query. Retrieve only male flight attendants and pilots.

Select File > Create View of Query ... to begin creating a view. Select Library > COMPANY > OK. Type FA_PT in the View field.

Display 34  Naming the View

Select OK to close the window.

Since the query had 'Prompt at Run Time' as part of the WHERE expression, a prompt box appears. Type M in the prompt field to select only male employees. Select OK to close the window. A message displays in the SQL QUERY window confirming the creation of the view COMPANY.FA_PT.

The COMPANY.FA_PT data view is now a SAS data set. You can treat it as a SAS data set anywhere in your program you would read in a SAS data set. For example, you can use the view with a

- SET statement
- PROC GCHART
- PROC MEANS.

CONCLUSION

The SQL Query window easily enables you to point and click your way through your data. You can sort, summarize, create new variables/columns, and create SAS data sets simultaneously. And best of all, you don’t have to write any code!

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