SAS® Cloud Analytic Services 3.2: Graphing Your Output

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Graphing Your CAS Output

Overview of the Graph Software

About the Graph Software

Some analytical procedures provide an option for generating a graph when the procedure is run. To determine whether a graph option is available for a particular procedure, see the documentation provided for the procedure. For procedures that do not provide the option to generate a graph, you can use graph software to create the graph from the analytical procedure's output.

SAS provides the following graph software systems:

ODS Graphics — produce graphics through the Output Delivery System (ODS) using a template-based system. SAS provides a suite of ODS Graphics software that you can use to create graphs. In addition, many analytical procedures also produce template-based graphs automatically by default.

SAS/GRAPH — produces graphics using a device-based system. Devices determine the type of output. Examples of device drivers are SVG, PNG, GIF, ACTIVEX, and SASPRTC.

You can use both systems to generate your graphical output. For example, you might use SAS/GRAPH to generate the output for some jobs, and ODS Graphics to generate the output for others. For more information about these two systems, see "ODS Graphics and SAS/GRAPH" in *SAS Graph Template Language: User's Guide*.

ODS Graphics

About ODS Graphics

The software listed here is part of a suite of ODS Graphics software. For more information about this software suite, see *Introduction to SAS Platform Graphing*.

With ODS Graphics software, you can use the ODS GRAPHICS statement to customize graph output. For more information, see "ODS GRAPHICS Statement" in *SAS ODS Graphics: Procedures Guide*.

ODS Graphics Procedures

The ODS Graphics procedures provide a simple, concise programming syntax for creating graphs. You can create a wide variety of charts and plots with only a few lines of code. You can create single-cell plots and charts, multi-page classification panels, and scatter plot matrices. The procedures provide many options for customizing the appearance of your graphs.

These ODS Graphics procedures are available for creating graphs:

- SGPLOT creates single-cell plots with a variety of plot and chart types and overlays.
- SGPANEL creates classification panels for one or more classification variables. Each graph cell in the panel can contain either a simple plot or multiple, overlaid plots.
- SGSCATTER creates scatter plot panels and scatter plot matrices with optional fits and ellipses.

For more information, see *SAS ODS Graphics: Procedures Guide*.

Graph Template Language (GTL)

Note: The ability of GTL and the SGRENDER procedure to access an in-memory table through a CAS engine libref applies to SAS 9.4M5 and later releases.

GTL provides a comprehensive language for creating complex, customized graphs. You write templates that specify the layout and details of a graph. After creating a template, you apply the template to your data and render the graph. To do this, run an SGRENDER procedure statement that specifies the template and graph data in order to generate the graph.

GTL enables you to create sophisticated graphics. For example, using GTL, you can generate Model-Fit plots, Distribution Plots, Comparative plots, Prediction Plots, and more. You can modify the template for graphs that are created automatically for SAS procedures. Changing the templates enables you to make persistent, programmatic changes in the default graphs.

For more information, see *SAS Graph Template Language: User's Guide* and *SAS Graph Template Language: Reference*.

SAS/GRAPH

Note: The ability of SAS/GRAPH to access an in-memory table through a CAS engine libref applies to SAS 9.4M5 and later releases.

SAS/GRAPH is optional software that is not part of Base SAS. SAS/GRAPH enables you to create a variety of graphs, including bar charts, pie charts, scatter plots, surface plots, contour plots, and much more. SAS/GRAPH includes the following graph procedures: GAREABAR, GCHART, GPLOT, GBARLINE, GKPI, GCONTOUR, and G3D procedures.

SAS/GRAPH enables you to do the following:

- organize the presentation of your data and visually represent the relationship between data values as two- and three-dimensional graphs, including charts, plots, and maps.

  Note: Some of the map procedures are part of Base SAS. Also, the map procedures do not support CAS data. For more information, see *SAS/GRAPH and Base SAS: Mapping Reference*.

- enhance the appearance of your output by selecting text fonts, colors, patterns, and line styles, and controlling the size and position of many graphics elements.
- create presentation graphics. SAS/GRAPH can create text slides, display several graphs at one time, combine graphs and text in one display, and create automated presentations.
- generate a variety of graphics output that you can display on your screen or in a web browser, store in catalogs, or review. You can send the graphics output to a hard copy graphics output device such as a laser printer.
- use utility procedures and statements to manage the output.

For more information, see *SAS/GRAPH: Reference*.

Main Steps for Graphing CAS Data

The graph software can access a CAS in-memory table through a CAS engine libref. The data is downloaded from CAS to the SAS client through the CAS engine libref, and then it is processed on the SAS client by the graph software. Large volumes of data can be processed in CAS at in-memory speeds and then used by the graph software to perform data visualization.

Here are the main steps for using the graph software with data that has been analyzed in the cloud:

1. Run the analytical procedure, making sure that the graph software can access the output CAS data. The examples that are provided use the CAS engine LIBNAME statement for this purpose.

   Note: Some analytical procedures can summarize or reduce the amount of data. If you are working with large amounts of data, you should summarize or reduce the data before attempting to graph it. Doing this improves the performance of your program.

2. Use the graph software to generate a graph of your output data from step one.

Examples

With CAS in-memory tables, data order can vary across program executions. This can affect group attribute assignments, how groups are displayed, connect order, tick-value order for discrete axes, and other aspects of the graph.

For more information and for examples of using the graph software with CAS data, see the following topics:

- Plotting a Cloud Analytic Services (CAS) In-Memory Table in *SAS ODS Graphics: Procedures Guide*

- "Plotting a SAS Cloud Analytic Services (CAS) In-Memory Table" in *SAS Graph Template Language: User's Guide*
- "Plotting a Cloud Analytic Services (CAS) In-Memory Table" in *SAS/GRAPH: Reference*