Implementing Dashboard Samples With SAS®

Contents

CHAPTER

1

Introduction to SAS/GRAPH Dashboard Samples

What are Dashboards?

A dashboard is a data visualization application that consolidates important performance information and delivers it to decision-makers as a collection of concise indicators. Like the gauges and warning lights on an automobile dashboard, the following dashboard (Few 2006) enables the manager of a telephone sales organization to monitor the performance of the team at a glance:
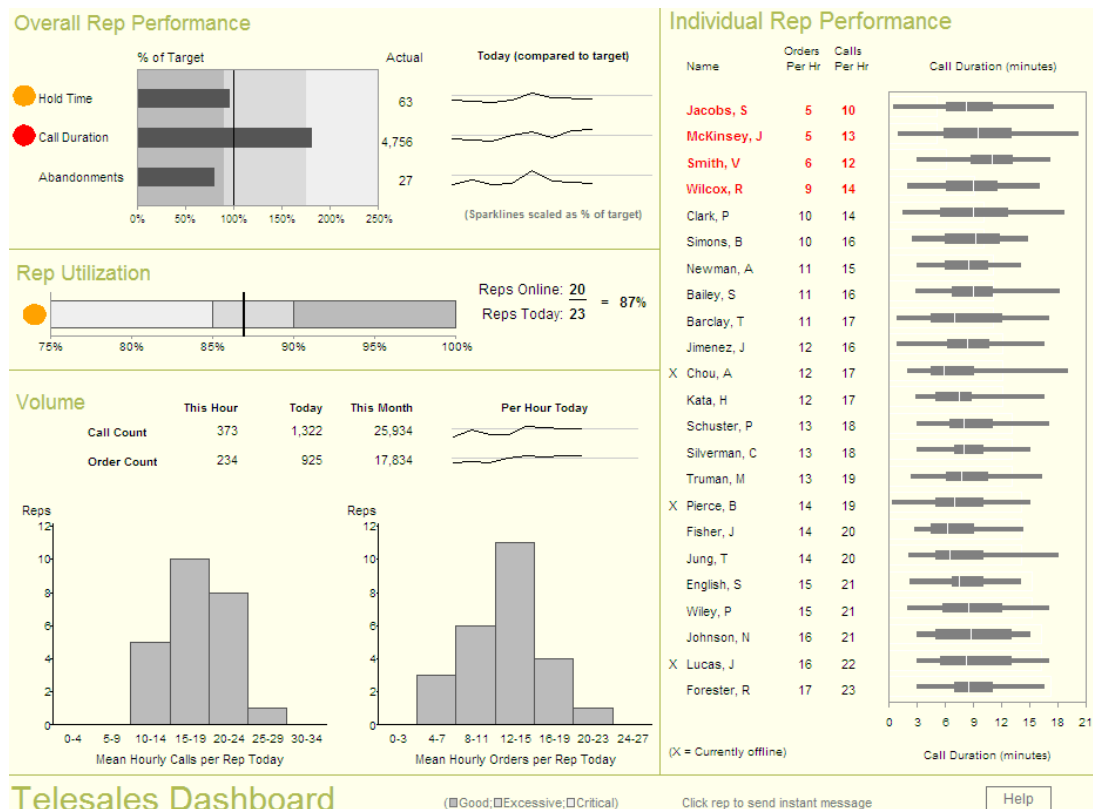
The display of an individual dashboard indicator can include both graphics and text. The term indicator refers not only to the visual representation but also to the underlying data source, range information, target values, and so forth. A collection of indicators presented together comprises a dashboard.

Creating Dashboards with SAS/GRAPH Software

The keys to creating effective dashboards are to have the appropriate performance data available and to choose the appropriate indicators that convey each corresponding performance measure. SAS software is a powerful tool for designing and constructing dashboards because it provides tools for managing, analyzing, and summarizing data as well as for presenting the results.

SAS/GRAPH software provides the flexibility to create virtually any type of chart or plot required for a dashboard indicator. In addition to the graph types that can be generated with its built-in procedures, SAS/GRAPH software provides an Annotate facility that enables creative programmers to customize the standard graph types or to create entirely new graph types that are not provided by the built-in procedures. Once you have assembled the desired collection of indicators, you can use the GREPLAY procedure in SAS/GRAPH software to arrange the indicators in any layout that you desire.

Sample Dashboards

The SAS Customer Support Center Web site includes sample code that illustrates some of the types of dashboard indicators and dashboards that you can create using SAS/GRAPH software in conjunction with other SAS software. You can find these samples at

http://support.sas.com/rnd/datavisualization/dashboards.

Some of the dashboard samples are built from multiple instances of a single type of indicator:

slider chart indicator
   shows a key value as a pointer on a bar that shows qualitative ranges. The pointer can be highlighted to indicate items that need immediate attention. The sample dashboard with slider chart indicators shows various measures of the performance of an information technology department compared against ranges that represent expected performance standards.

bullet graph indicator (Few 2006)
   shows a key value as a bar against a background that shows qualitative ranges, combined with a symbol that represents a target value. The sample dashboard with bullet graph indicators shows various measures of the performance of a business compared against ranges that represent expected performance standards as well as against specific performance targets.

dial gauge indicator
   shows a key value as pointer on a circular scale that represents a qualitative range. The sample dashboard with dial meter indicators illustrates some of the types of measures that are appropriate for representation with this indicator.

bar chart indicator (with target marker)
   shows a related group of key values as bars, along with symbols that represent target values. The color of each bar represents a qualitative measure of the

corresponding value. In addition, pointers on each bar represent the target value for the measure. The sample dashboard with bar chart indicators shows various measures of the sales performance of a wine distributor compared against ranges that represent expected performance standards as well as against specific performance targets.

Note: This sample won an award for best depiction of data in a dashboard in the 2005 Data Visualization Contest sponsored by *DM Review* magazine. △

In addition to the samples that feature specific indicators, the following samples are available that illustrate more complex dashboards that include multiple types of indicators:

Telesales performance
shows indicators that monitor the real-time performance of a telephone sales team or similar organization. The following measures are shown on the dashboard:
□ call wait time
□ call duration
□ abandoned calls
□ call volume
□ order volume
□ sales representative utilization

Note: This dashboard is an implementation of the example that originally appeared on page 199 of *Information Dashboard Design* (Stephen Few 2006). △

Web marketing analysis
shows indicators that support the analysis of customer data for an online merchant or similar organization. The following measures are shown on the dashboard:
□ number of visitors (daily, monthly, and yearly)
□ number of registered visitors
□ number of orders of top-selling products
□ number of times top-selling products were viewed
□ products purchased together but not displayed together
□ products displayed together but not purchased together
□ other Web sites that provided referrals

Note: This dashboard is an implementation of the example that originally appeared on page 201 of *Information Dashboard Design* (Stephen Few 2006). △

Delivering Dashboards to Users

In order to be useful, dashboards must be readily available to the decision-makers who rely on the information that they present. You have a wide variety of options for delivering the dashboard indicators or complete dashboards that you create with SAS/GRAPH software, including the following:

□ You can store the indicators and dashboards that you create with SAS/GRAPH programs in standard graphics file formats so that they can be consumed by other applications.

□ You can use the Output Delivery System (ODS) features in SAS/GRAPH software to package the dashboards into HTML pages that can be sent to a Web server and

viewed with a browser. ODS HTML output also supports adding chart tips and drill-down links on individual bars and other graphic elements in the indicators. All of the SAS/GRAPH dashboard samples on the SAS Customer Support Center Web site are designed to generate ODS HTML output.

□ You can use SAS Web Report Studio software to deliver dashboards in the form of Web-based reports. For information on using SAS Web Report Studio software to create dashboards from the sample indicators or to display the sample dashboards, see Chapter 4, "Displaying Dashboards in SAS Web Report Studio," on page 13.

□ You can use SAS Information Delivery Portal software to deliver dashboards as portlets within the framework of a corporate Web portal. For information on using SAS Information Delivery Portal software to display the sample dashboards, see Chapter 5, "Displaying Dashboards in the SAS Information Delivery Portal," on page 27.

□ You can use the SAS Stored Process Web Application to provide users with online access to dashboards that are generated by SAS/GRAPH code in stored processes. For information about using the SAS Stored Process Web Application to display the sample dashboards, see Chapter 6, "Displaying Dashboards in the SAS Stored Process Web Application," on page 35.

References

Few, Stephen. 2006. *Information Dashboard Design*. Sebastopol, CA: O'Reilly Media, Inc.

C H A P T E R

2
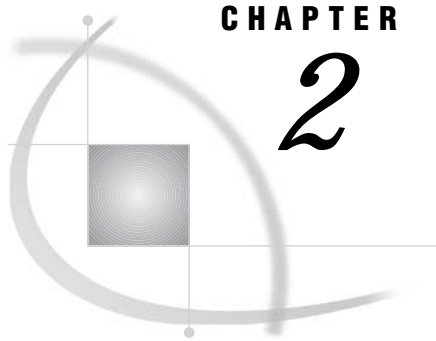
Downloading and Modifying The Dashboard Samples

Downloading The Dashboard Samples

There are two ways to obtain the SAS code for the dashboard samples from the Samples area of the SAS Customer Support Center Web site:

- copy the code from the Full Code tab for the sample and paste it into the SAS Program Editor window or into a file.
- download the text file containing the code from the Downloads tab for the sample.

Three different versions of each dashboard sample are available:

- code that can be submitted as a SAS program in interactive or batch mode
- code that can be executed as a SAS stored process
- code that can be used in a webDAV content portlet in the SAS Information Delivery Portal.

The entire collection of dashboard samples, along with a copy of this document, can also be downloaded as a single archive file from which you can extract the desired sample files.

Note: In order to use the stored process or portlet versions of the samples, you must first register metadata for each sample that you want to use. The registration process is covered in Chapter 3, "Registering a New Stored Process," on page 9. △

Working With the Sample Code

Using Macro Variables to Customize Indicator and Dashboard Features

In the samples, the values that control features of the dashboards and indicators that are most likely to be customized are assigned using SAS macro variables that are

defined at the beginning of each sample code. For example, in the slider chart indicator dashboard, the following macro variable definitions control the colors of the three segments of the slider bars:

```
%let light_red=cxFFC1C1;
%let light_yellow=cxFFFFAA;
%let light_green=cxB4EEB4;
```

You can change the colors of any of the segments on all the indicators in the dashboard by changing the value of the corresponding macro variable.

For details of the features that can be customized by changing macro variable values, see the comments in the beginning section of the code for each sample.

Modifying the Data for Indicators

Most of the indicators in these samples use SAS data sets as data sources. You can modify the supplied data or adapt the sample code to use your own data sets instead. Other data values are specified in macro calls that generate the indicators. For details of the structure of the data sets and macro calls used in the samples, see the comments in the sample code.

Using the Annotate Facility to Add Information to Indicators

These indicator and dashboard samples rely heavily on the Annotate facility in SAS/GRAPH software. The Annotate facility enables you to generate a special data set of graphics commands from which you can produce custom graphics output. This Annotate data set can be used to enhance graphs produced by other SAS/GRAPH procedures— for example, to draw lines on or add text or symbols to a bar chart—or to create entire graphs of types that the built-in SAS/GRAPH procedures cannot produce.

In order to change the appearance or behavior of the indicators in a sample, you must understand how the Annotate facility works. To learn more about the customizations that can be achieved with annotations, see Part 3, "The Annotate Facility," in *SAS/GRAPH Reference*.

Using the GREPLAY Procedure to Position Indicators on the Dashboard

In these dashboard samples, individual indicators are not displayed as they are created. Instead, they are stored in GRSEG catalog entries. The dashboards are created by loading the catalog entries for the indicators into templates that define how each entry is positioned. The GREPLAY procedure in SAS/GRAPH software is used both to create the templates and to load the entries into the templates.

In order to add indicators to a sample or change the placement of indicators in a sample, you must understand how GREPLAY templates work. To learn more about GREPLAY templates and the GREPLAY procedure, see Chapter 43 , "The GREPLAY Procedure," in *SAS/GRAPH Reference*.

Customizing Drill-down Information for Dashboard Indicators

Because dashboard indicators typically provide a summarized view of a performance measure, it is common for them to support a drill-down feature to provide more details about the underlying data. In the sample dashboards, clicking on the bars and other graphic elements in indicators will, in most cases, open an HTML page that can be used

to provide more details. Hovering your mouse over a graphic element will show the data values for the element. As provided, all the sample indicators drill down to the same page (specified in the `hardcoded_drilldown` macro variable). In an actual dashboard, each element in an indicator would typically have its own details page that you create programmatically based on the data for the indicator.

Note: The default drill-down page, specified in the `hardcoded_drilldown` macro variable assignment that can be found in the beginning section of each sample, is on the SAS Customer Support Center Web site. If you do not have Internet access, you should change that variable to point to an HTML file that is accessible at your location. △

See Also

For more information on the features of SAS/GRAPH software used in the dashboard samples, see *SAS/GRAPH Reference*, which is available from the Documentation section of the SAS Customer Support Center Web site.

CHAPTER

3
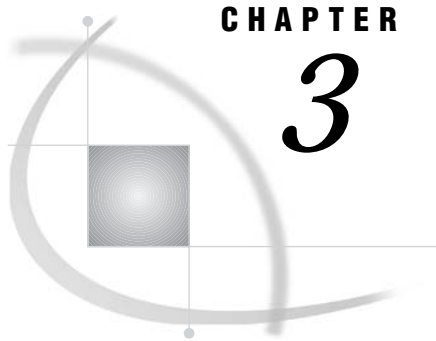
Registering a New Stored Process

Prerequisites for This Chapter

The information in this chapter makes the following assumptions:

□ SAS Management Console and SAS Foundation Services, including BI Manager, have been installed at your site.

□ The stored process code for the dashboards and indicators has been downloaded, and the code has been saved in the source code repository on the SAS Stored Process Server at your site. See Chapter 2, "Downloading and Modifying The Dashboard Samples," on page 5 for more information about how to download the code.

□ You have write metadata permission for the metadata repository so that you can register stored processes.

□ You have access to and know the location of the stored processes that you are registering.

How to Register a New Stored Process

Before you can use a stored process, you must first register the metadata for the stored process. The following steps describe how to register stored processes within the context of these sample dashboards and indicators.

Note: Before you can register a stored process, a server must be defined for the stored process to run on. For these examples, you need to use a SAS Stored Process Server. You can use the Server Manager to define a stored process server. For more information about how to define a server, see the Help for the Server Manager. △

To register a new stored process:
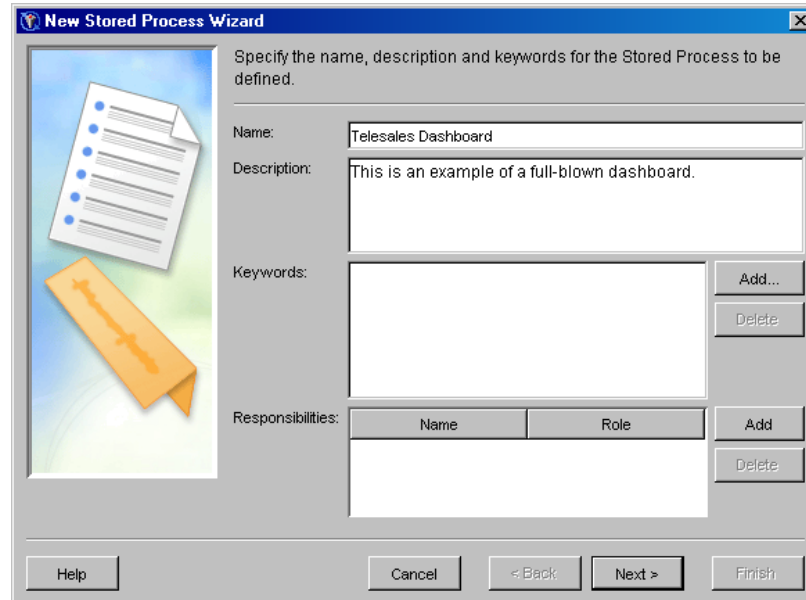
1 From the SAS Management Console navigation tree, select the folder under BI Manager in which you would like to create the new stored process.

Note: For SAS Web Report Studio, the stored process must be registered in the foundation repository that will contain the reports that use the stored process. Within that repository, the stored process must be registered in the **BIP Tree/ ReportStudio/** folder structure. △

To create a new folder under BI Manager, navigate to where you want to put the new folder. Select **Actions ▸ New Folder**. The New Folder Wizard appears.

2 Select **Actions ▶ New Stored Process**. The New Stored Process wizard appears.

3 In the New Stored Process Wizard:

> **a** Enter a name for the stored process. Slashes, backslashes, and control characters cannot be used in this field. Stored process names are limited to 60 characters, and must be unique within a folder. In this case, uniqueness is defined to be case-insensitive.
>
> **b** Enter a description for the stored process. The description can contain up to 200 characters. This step is optional.

Display 3.1   New Stored Process Wizard —Name Specification

> **c** Click **Next**.
>
> **d** Select a SAS Stored Process Server from the list.
>
> **e** Select a source code repository from the list. A source code repository is a location on the application server that contains stored process source code. For more information about the source code repository, see the BI Manager Help.
>
> **f** Enter the name of the source code file for the stored process.
>
> **g** Select the type of output from the list. For these examples, specify **Streaming** as the stored process result type.

Display 3.2 New Stored Process Wizard —Execution Details
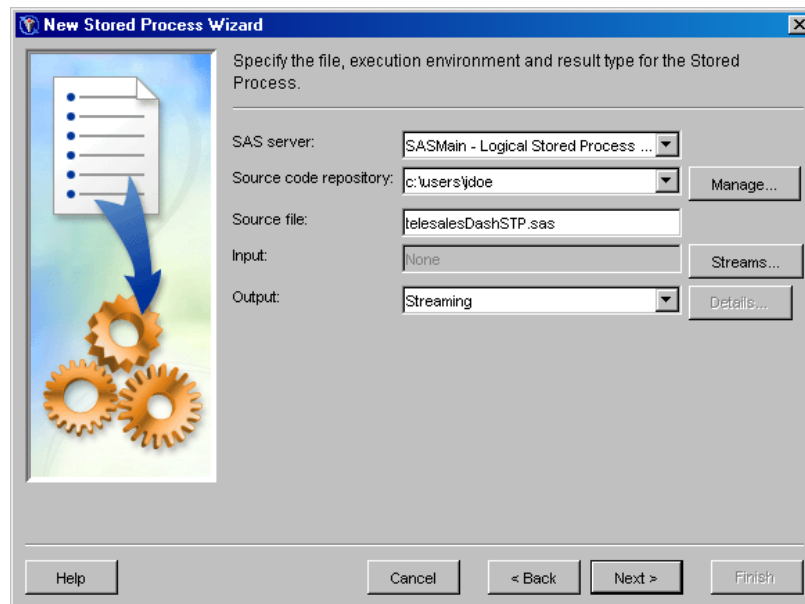
h Click **Next**.

i Click **Finish** to register the new stored process.

Note: After you have registered the stored process, use the Stored Process Properties dialog box to control access to the stored process. For more information, see the BI Manager Help. △

Displaying Dashboards in SAS Web Report Studio

Prerequisites for This Chapter

This chapter uses examples to explain how to perform the following tasks in SAS Web Report Studio:

- ☐ Select a stored process to view output for a single indicator.
- ☐ Save a displayed indicator as part of a report.
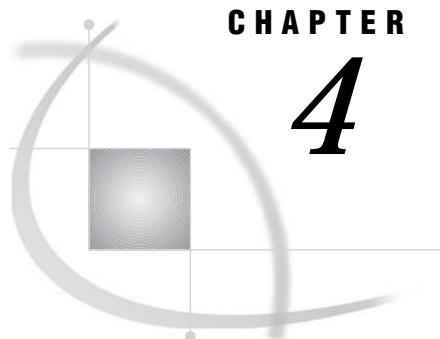- ☐ Use multiple indicators to construct a simple dashboard report.
- ☐ Select a stored process to view a dashboard that contains multiple indicators.
- ☐ Print indicator and dashboard output.

If you want to complete the tasks by using your own indicators and dashboards, you must meet the following requirements:

- ☐ All necessary components of the SAS Intelligence Platform are installed and configured at your site. The components must include the SAS Stored Process Server. This server generates the output for the indicators and dashboards, which are SAS Stored Processes.
- ☐ The stored processes that you want to use have been registered in SAS metadata as explained in Chapter 3, "Registering a New Stored Process," on page 9.
- ☐ You have logged on to SAS Web Report Studio with a user ID that has permission to create reports.

☐ You are familiar with using the SAS Web Report Studio application.

Note: For more information about any of the tasks in this chapter, select **Help ▶ Contents** from within SAS Web Report Studio. △

Overview: Displaying Dashboards in SAS Web Report Studio

SAS Web Report Studio enables you to display the output of SAS Stored Processes. A single stored process might produce output for an individual indicator or it might produce a complete dashboard of indicators.

You also can combine individual indicators to create a dashboard report that includes visual elements that are available in SAS Web Report Studio, such as headers, footers, and text.

Display the Output of a Single Indicator

This example shows you how to view output from a single indicator simply by selecting the stored process name from the Open dialog box in SAS Web Report Studio.

1 Select **Report ▶ Open** and navigate to the location where the indicator is stored. In this example, the Slider Chart Indicator is stored with other indicators in a folder named `StoredProcesses`.

Note: The name of the example folder does not imply that the folder must contain only stored processes. A folder in SAS Web Report Studio can contain both stored processes and reports. Stored processes are identified by this icon: 🖼. △

Display 4.1 Open Dialog Box Showing the Contents of the StoredProcesses Folder
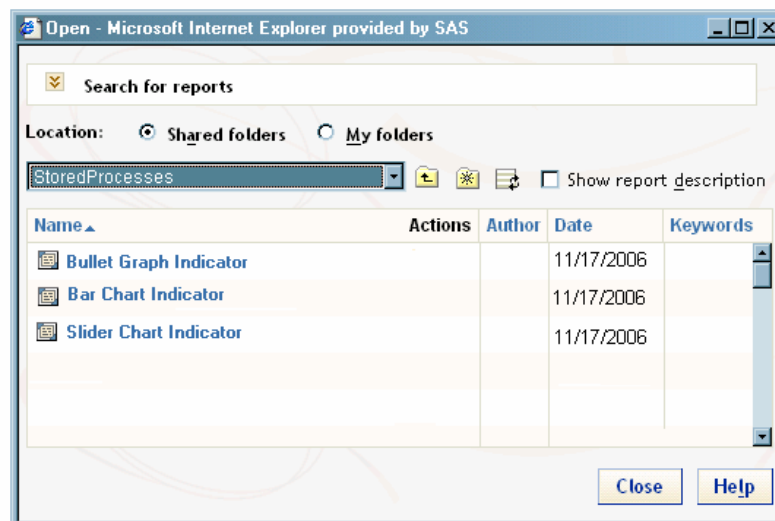
Note: You also can use the Report Management page to select the indicator △

2 Select the name of the indicator. For example, select `Slider Chart Indicator`. This sample indicator shows three ranges of data and a triangular marker that points to the actual data value.

Display 4.2   Output for the Slider Chart Indicator Shown in the View Report View
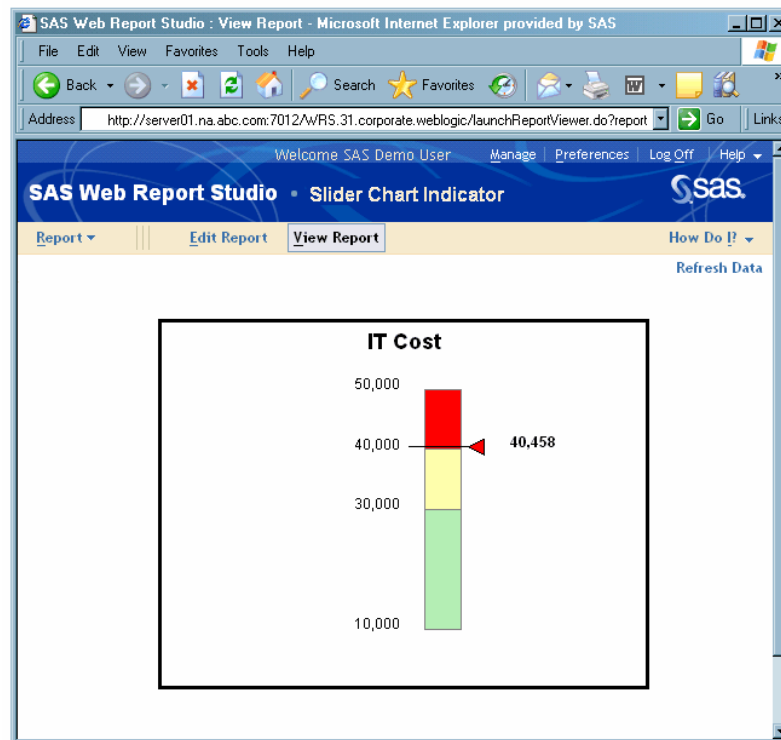
3   (Optional) To view a SAS log for the indicator, select **Help ▸ View Log**.

When you open an indicator by using the method described in this topic, the data is automatically refreshed. You also cannot modify content.

However, when an indicator is saved as part of a report section, you can add visual elements such as headers, footers, images, and text that are independent of the indicator. You also can save the report so that the data in the report is manually refreshed.

For more information, see "Creating a Report That Displays the Output of One or More Indicators" on page 15.

Creating a Report That Displays the Output of One or More Indicators

Create a Report from an Open Indicator

One way to include an indicator as part of a SAS Web Report Studio report is to select **Report ▸ Save** or **Report ▸ Save As** when the output is displayed in the View Report view (as shown in Display 4.2 on page 15). For a new report, either menu selection opens the Save As dialog box.

Note: You also can save from the Edit Report view (which is discussed in "Step 1: Insert the Indicators into the Report Layout" on page 17). △

In the Save As dialog box, you name the new report, provide an optional description, navigate to a storage location, and select options such as `Make read-only`. To prevent

the report from automatically displaying the most recent data, you can select **Data can be manually refreshed** from the **Type** drop-down list.

Display 4.3   A New, Manually Refreshed, Read-Only Indicator Report Named 'IT Expenses'
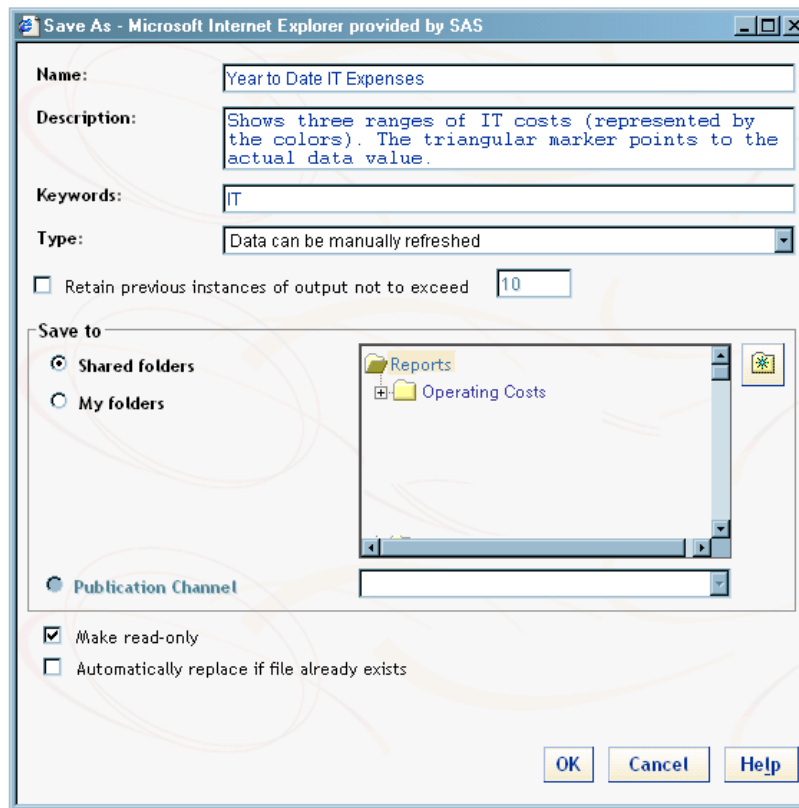
The Slider Chart Indicator continues to exist in addition to the new saved report named IT Expenses.

For information about how to save multiple indicators in a report, see "Using Multiple Indicators to Create a Simple Dashboard Report" on page 16.

Using Multiple Indicators to Create a Simple Dashboard Report

About the Example

The topics in this section explain how to combine multiple indicators to create a simple dashboard such as the one shown in Display 4.4 on page 17. The example uses three indicators that are based on the Bar Chart Indicator from the samples library. They are the Sales Revenue Indicator, the Profit Indicator, and the Market Share Indicator. Besides output from the three indicators, the report contains the following features:

- □ A header with a company logo, static text, the report description as dynamic text, and a dividing line between the header and the main report content.
- □ Text beneath each indicator that includes a link to another report that contains more details about the information in the associated indicator.
- □ A footer that contains a confidentiality message and a link to the corporate Web page for more information about company policy.

Display 4.4   A Simple Dashboard Report That Contains Output from Multiple Indicators

To begin creating this example, see "Step 1: Insert the Indicators into the Report Layout" on page 17.

Step 1: Insert the Indicators into the Report Layout

In "Create a Report from an Open Indicator" on page 15, you learned how to save a displayed indicator as part of a report. Another way to create reports that include indicators is to use the tools in SAS Web Report Studio's Edit Report view. When you use the Edit Report view, your report can contain multiple indicators.

1 Select **Report ▶ New** to access the Edit Report view.

Display 4.5 The Edit Report View as It Appears Before Content Has Been Added or Defined
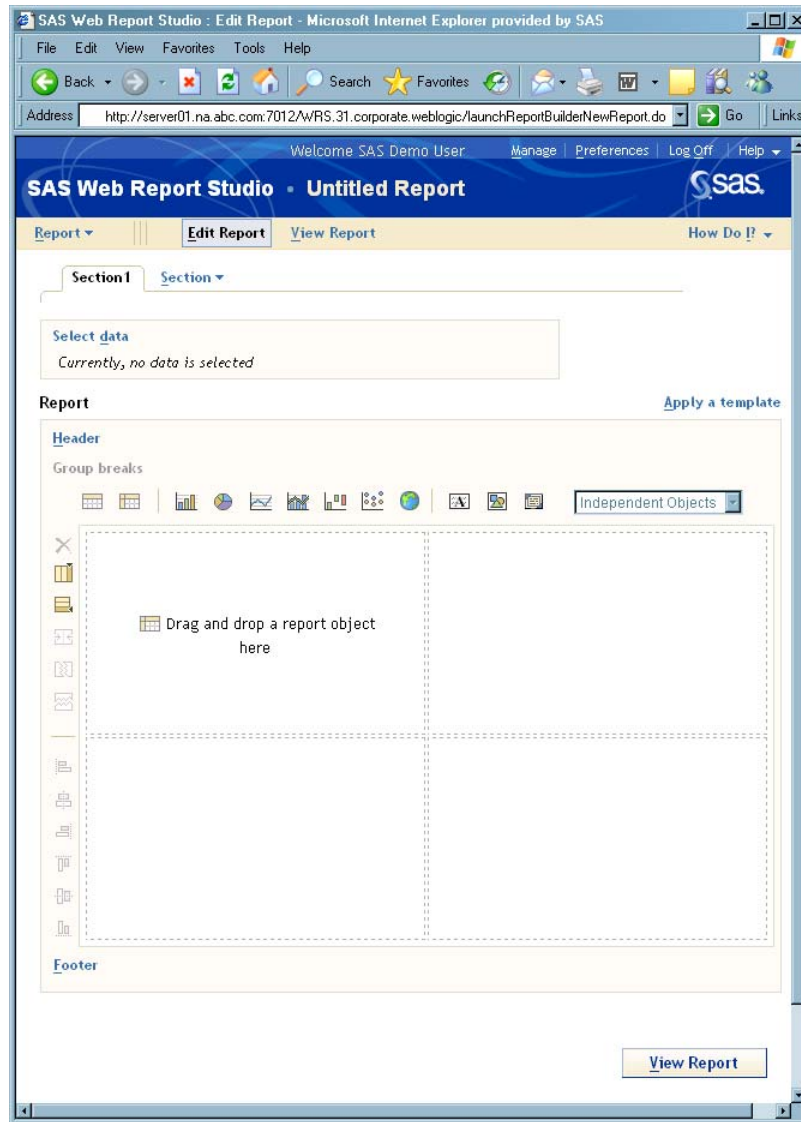
2 By default, the body grid has two columns, but, in this example, the three indicators are side-by-side at the top of the report. To insert a third column on the right, click ▥ (located on the vertical toolbar).

3 Click ▦ (located on the horizontal toolbar) three times to insert placeholder objects into the first three cells in the top row of the body grid.

Display 4.6   The Layout with the Three Empty Placeholder Objects
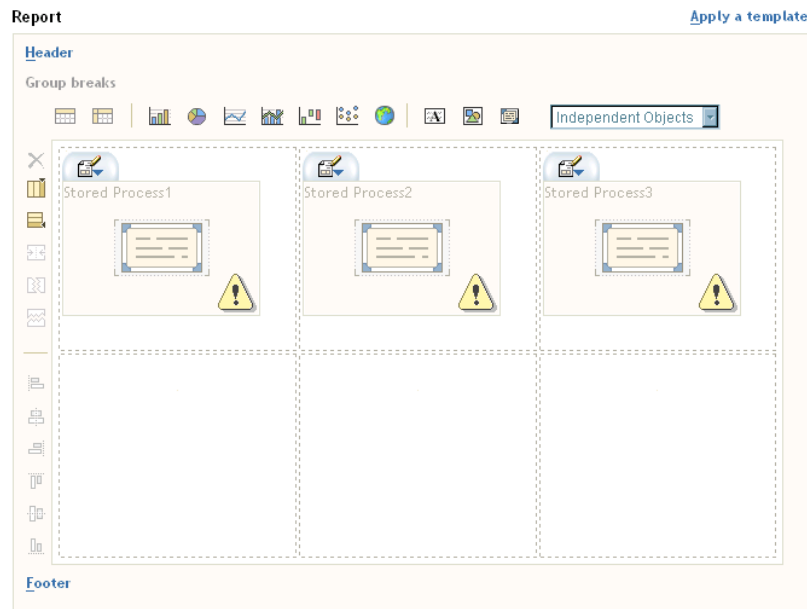
Note: You can also click and drag the ▣ tool into each cell to insert a placeholder object for a stored process. △

Step 2: Assign an Indicator to Each Placeholder Object

To assign an indicator to a placeholder object, complete the following steps:

1 On the toolbar for the first placeholder object, click ▣▾, and then select **Edit Stored Process** to open the Insert a Stored Process dialog box.

2 Navigate to the folder that contains the indicator that you want to insert.

3 Select the indicator, and then click **OK**. In this example, the Sales Revenue Indicator is in the first cell.

4 Repeat steps 1 to 3 in order to select the second and third indicators. In this example, the Profit Indicator is in the second cell and the Market Share Indicator is in the third cell.

Display 4.7 The Layout with the Three Indicators Selected
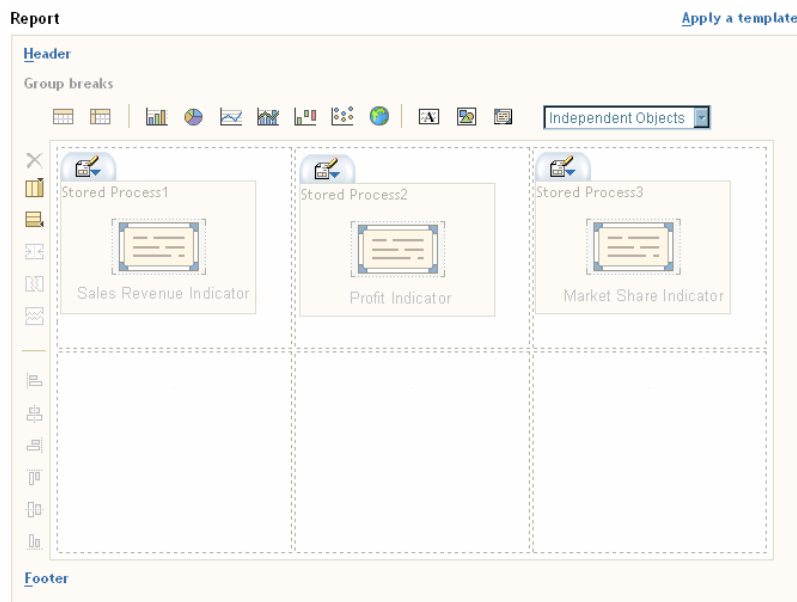
Step 3: Save Your Work

Before continuing, save the report.

1 Select **Report ▶ Save** to open the Save As dialog box.

   Note: Because this is a new report, **Report ▶ Save** opens the Save As dialog box. △

2 Name the report. In this example, the report is named **2005 Sales Dashboard**.

3 Type a description. This sample report has the following description:

   This dashboard uses three bar charts with triangular markers to graphically present three indicators for 2005 sales: revenue, profit, and market share.

4 Click **OK**.

Note: When creating a report, save your work frequently, especially after making changes that require you to complete multiple steps. △

Step 4: Add a Header

A header can contain a banner image, static text, hyperlinks, dynamic text, and a dividing line. In this example, the header includes a banner image, both static and dynamic text, and a dividing line.

1 Click **Header** to open the Edit Header dialog box.

2 From the **Banner** drop-down list, select an image. In this example, the header contains an image named **orionstarHeader**.

3 In the text box, enter the static text, insert dynamic text for the report description, and use the formatting tools until the text appears the way you want it to. The text for this example is shown in Display 4.8 on page 21.

   Note: To insert the dynamic text, select **Report Description** from the **Dynamic text** drop-down list and then click **Insert**. △

4 Select the option to insert a horizontal line between the header and the report content.

Display 4.8 This Header Contains a Banner Image, Static and Dynamic Text, and a Horizontal Line
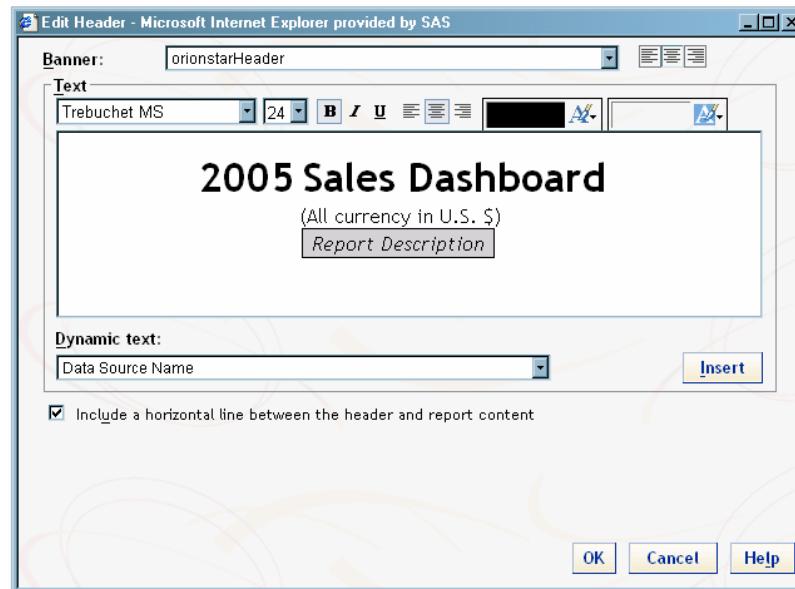
5 Click **OK**.

Note: When the report is rendered, SAS Web Report Studio replaces ⬚Report Description⬚ with the text that was entered in the **Description** field in the Save As dialog box (see "Step 3: Save Your Work" on page 20). If you change the description, the changes are automatically included in the report the next time it is rendered. SAS Web Report Studio has a variety of dynamic text options such as report author, report name, and last saved date. △

Step 5: Beneath Each Indicator, Insert Text with Hyperlinks

The sample dashboard includes text beneath each indicator. Each block of text includes a link to another report that contains more detail about the associated indicator.

1 Click ⬚ three times to insert placeholder objects into the last three cells in the bottom row of the body grid.

Note: You can also click and drag the ⬚ tool into each cell to insert a placeholder object for text. △

2 On the toolbar for the first placeholder, click ⬚, and then select **Edit Text** to open the Edit Text dialog box.

3 In the text box, type the text for the first indicator, and accept the default formatting. The text for the Sales Revenue Indicator is shown in Display 4.9 on page 22.

4 To link to the detailed report, select the text that you want users to click on. In Display 4.9 on page 22, the text **Sales by Region and Representative** is used for the link.

Display 4.9   Text for the Sales Revenue Indicator
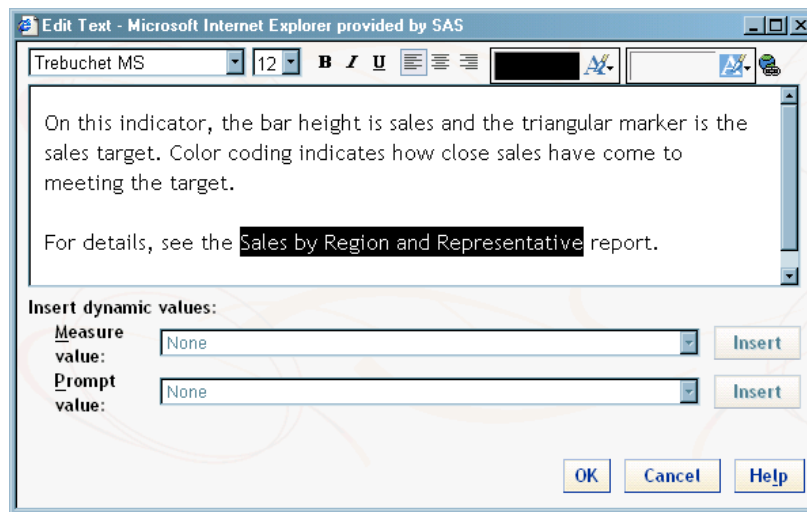
5   Click 🖳 to open the Report Linking dialog box, and then complete the following steps.

   a   Select the **Make text a link** option to enable the rest of the items in the dialog box.

   b   Select the target report, and then click **OK** to return to the Edit Text dialog box.

Display 4.10   The Target Report That Contains Details for the Sales Revenue Indicator Is Selected
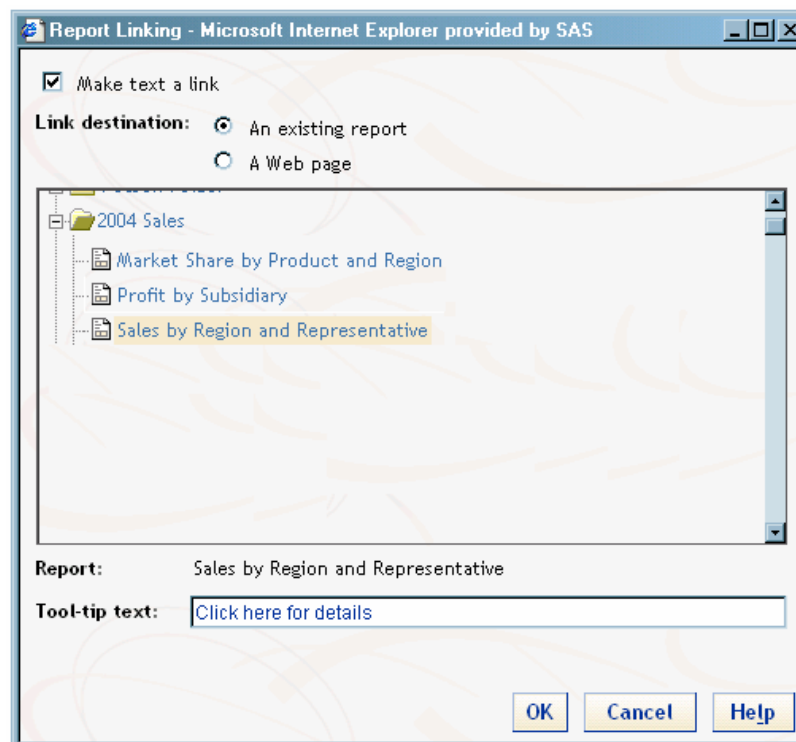
6   Click **OK**.

7 Repeat steps 2 through 6 in order to create the text and the links for the other two indicators. In this example, the text for the Profit Indicator links to the Profit by Subsidiary report, and the text for the Market Share Indicator links to the Market Share by Product and Region report.

Step 6: Insert a Footer

Like headers, a footer can contain a banner image, static text, hyperlinks, dynamic text, and a dividing line. In this example, the footer includes text, a hyperlink to a company Web page, and a dividing line.

1 Click **Footer** to open the Edit Footer dialog box.

2 In the text box, enter the static text. In this example, the company Web page address is typed in the form **www.abccorp.internal.com**. SAS Web Report Studio automatically converts the address to a hyperlink.

3 Select the option to insert a horizontal line between the footer and the report content.

Display 4.11 The Footer with a Hyperlink to the Company's Internal Web Page
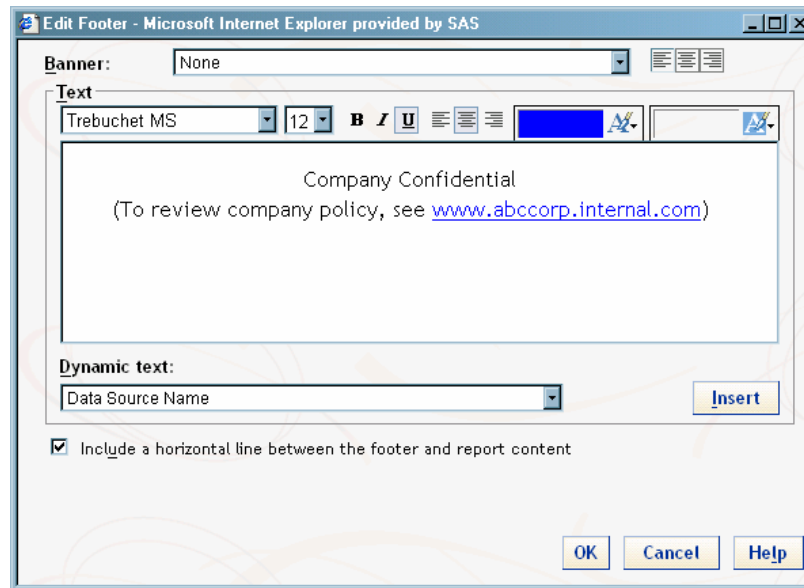
4 Click **OK**.

Step 7: Save Your Work

Select **Report ▶ Save** to save the final report.
Because the report has already been saved, the Save As dialog box does not appear again.

Note: You also could click **View Report** to preview the report before saving. △

Step 8: View the Dashboard Report

To view the report, click **View Report**.

Display the Output of a Complete Dashboard from a Single Stored Process

One stored process can also produce a complete dashboard of indicators. The dashboard shown in Display 4.12 on page 24 includes output from 17 bar chart indicators. (Three of these indicators were used to create the simple dashboard shown in Display 4.4 on page 17.)

1   Select **Report ▶ Open** and navigate to the location where the dashboard is stored.

2   Select the name of the dashboard. For example, select `Bar Chart Dashboard`.

Display 4.12   A Complete Dashboard Produced from a Single Stored Process

As explained in "Step 5: Beneath Each Indicator, Insert Text with Hyperlinks" on page 21, you could create a text link from this dashboard to another SAS Web Report Studio report or to a Web page. For example, you could link to a URL address such as the one described in "Display a Dashboard or Indicator" on page 36. This link could take users to a version of the same dashboard that enables them to drill down to more detailed data.

Note: Before you can create a text link, you must save the dashboard as a SAS Web Report Studio report (for more information about saving, see "Step 3: Save Your Work" on page 20). △

Printing Indicators and Dashboards

To print indicators and dashboards from SAS Web Report Studio, complete the following steps:

1 Select **Report** ▸ **Page Setup** to open the Page Setup dialog box. Adjust page settings such as margins and orientation, and then click `OK`.

2 Select **Report** ▸ **Print** to open the Print dialog box. Click `Preview and Print` to display a PDF file that you can print or save.
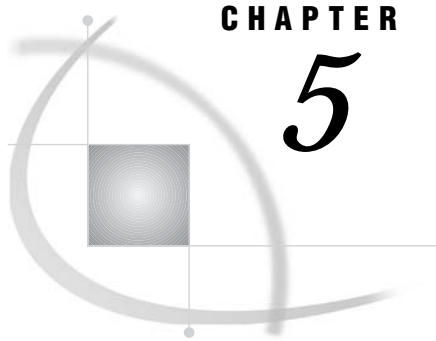
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Displaying Dashboards in the SAS Information Delivery Portal

Prerequisites for This Chapter

This chapter makes the following assumptions:

- You know how to start the SAS Information Delivery Portal. For information about starting the portal and the servers on which it depends, see "Starting the Web Applications" in the *SAS Intelligence Platform: Web Application Administration Guide*, which can be found at **http://support.sas.com/913administration**.

- You are familiar with the SAS Information Delivery Portal. If you need instructions on using the portal, click the **Help** link in the upper right corner of the portal page.

- You have access to one or more sample SAS programs that generate dashboard output. For information about the samples, see Chapter 2, "Downloading and Modifying The Dashboard Samples," on page 5.

- Your deployment includes the Xythos WebFile Server (WFS). You must use Xythos WFS to manage dashboard output in a WebDAV repository.

Overview: Displaying Dashboards in the SAS Information Delivery Portal

The SAS Information Delivery Portal enables you to display key performance indicators as dashboards in portlets. Authorized portal users will then see the dashboard indicators when they log on to the portal. Here is an example of a dashboard that is displayed in a portlet labeled Dial Meters. The dashboard consists of four dial indicators.

Display 5.1 Sample Dashboard Indicators in a Portlet
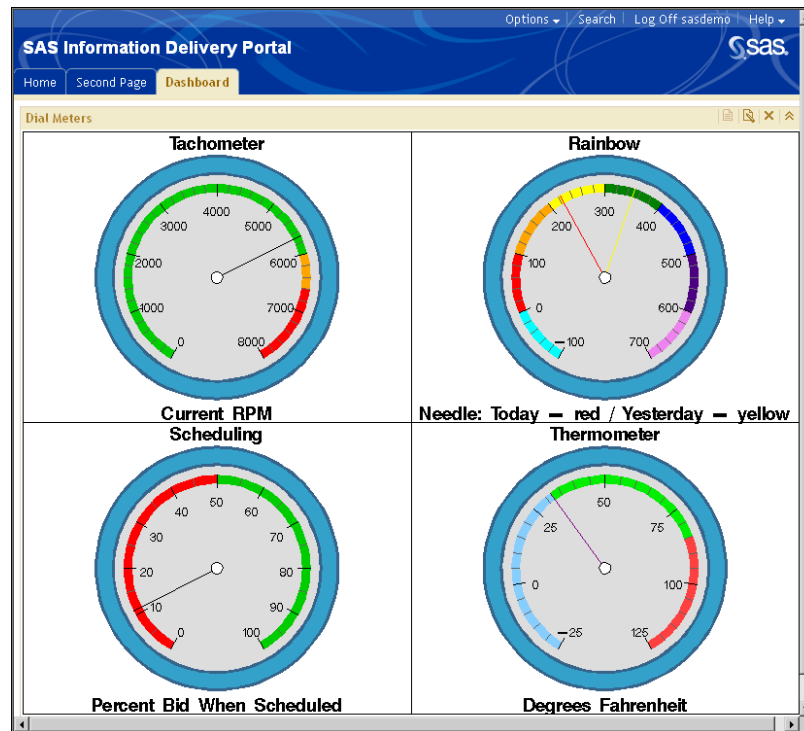
The best way to present a dashboard in the portal is to display the dashboard in a WebDAV content portlet. A WebDAV content portlet enables you to enforce security so that only authorized users can see the dashboard contents. A WebDAV content portlet also provides drill-down capability so that users can access any additional information that you make available.

A WebDAV content portlet displays the contents of a specified HTML fragment that is stored in the portal's WebDAV repository. An *HTML fragment* is an HTML file that does not include opening and closing HTML tags, HEAD tags, or BODY tags, and which can be displayed successfully in the cell of an HTML table.

Note: As an alternative to displaying the dashboard in a WebDAV content portlet, you can add a SAS Stored Process to a collection portlet. Users can then run the stored process to generate dashboard output and view its output via the SAS Stored Process Web application. Note that with this option, the dashboard is not displayed inside of a portlet.

If you choose this option, then be sure to register the stored process in metadata. (See Chapter 3, "Registering a New Stored Process," on page 9.) With this option, you don't need Xythos WFS unless the stored process produces package results. For instructions on adding content items to a collection portlet, see the portal's online Help. △

Display a Dashboard in a WebDAV Content Portlet

Step 1: Add the Dashboard's Output Files to the WebDAV Repository

To display a dashboard in a WebDAV content portlet, you first add the dashboard's HTML and GIF files to the WebDAV repository. Complete these steps:

1 Run the SAS program that generates the output that you want to display.

The file name for the SAS program should include the word "Portal." For example, you might run a program named **dialMeterDashPortal.sas** or **sliderDashPortal.sas**. The programs targeted for the portal produce files that are HTML fragments. These programs contain an ODS statement that is similar to the following statement:

```
ODS HTML path=odsout body="&name..htm"
(title="Dial Meter Dashboard" no_top_matter no_bottom_matter)
style=minimal;
```

2 Add the output files to the WebDAV repository. See the Xythos documentation for instructions on adding files.

Note: A macro is available that adds files to the WebDAV repository. For details about using this macro, see "Use a Macro to Add Files to the WebDAV Repository (Optional)" on page 32. △

If you want the dashboard to be available to all portal users, then add the output files to **sasdav/Public** in the Xythos repository. If you want to limit the dashboard to a group that is defined in metadata, then add the files to the folder for that group.

For example, you might add the output files to a folder named **sasdav/Sales** in order to make the dashboard available to a group named Sales that is defined in metadata. Before members of this group can see the dashboard in the portal, the Sales group must be granted Read and Inherit Read permissions on the WebDAV folder in Xythos.

Note: If you need to create a group in metadata, you can do so using SAS Management Console. You must restart Xythos WFS before it can find the new group in metadata. △

Step 2: Create a WebDAV Content Portlet

After you have added the dashboard files to WebDAV, create a WebDAV content portlet that will display the dashboard output. The procedure for creating a WebDAV content portlet is the same as the procedure for creating other types of portlets, except that you select a different value for the **Portlet type** field.

Complete these steps to create a WebDAV content portlet:

1 Start the SAS Information Delivery Portal and log on.

You should log on as a content administrator for the respective WebDAV group. You will need to be a group content administrator in order to share the portlet or page with the group. For more information, see "Configure a Group Content Administrator" in the *SAS Intelligence Platform: Web Application Administration Guide*. Optionally, you can log on as the SAS Web Administrator, who is a content administrator for all groups.

2 Navigate to the page where you want to add the portlet.

3 Select **Options ► Edit Content**.

4 On the Edit Page Content page, click **Add Portlets**.

5 On the Create tab of the Add Portlets page, select **WebDAV Content Portlet** as the portlet type.

6 Enter descriptive information about the portlet:

Name
   Short name that will appear in the title area at the top of the portlet.

Description
   Short description that will appear with the portlet in search results.

Keywords
Single words that you or other users can use to search for this portlet. Use spaces to separate keywords from one another.

Note: To ensure efficient searching, develop a standard list of keywords and use these keywords consistently. △

7 If you are a group content administrator, then you can specify a location (group) with which to share the portlet. The group can be Public or some other group that is specified in metadata. You must have WriteMetadata permission for the respective group in metadata.

8 Click **Add**.

A message appears, indicating that the portlet was added.

9 If you want to create additional portlets, repeat steps 5 through 8. When you are finished creating new portlets, click **Done**.

10 On the Edit Page Content page, specify where the new portlets are to appear on the page:

□ If you are using a column layout, you can move the portlets to different columns or to different positions within the columns.

□ If you are using a grid layout, specify where you want each portlet to appear by selecting the portlet names in the drop-down boxes for the appropriate cells. To span rows or columns, select the same portlet in adjoining cells.

For more information about specifying the layout of portlets, see the online Help.

11 Click **OK**. The original page is displayed, with the new portlets added.

The new WebDAV content portlet contains a message that instructs you to edit the portlet to specify a path and file name. For example, if you gave the portlet the label Dial Meters, then the new portlet would look like this:

Display 5.2   Sample Empty WebDAV Content Portlet

You can now add a dashboard to the portlet, as described in the next section.

Step 3: Add a Dashboard to the WebDAV Content Portlet

After you create a WebDAV content portlet, you must edit the portlet in order to specify the path to the dashboard's HTML file. You can also specify a link to additional detailed information.

To edit a WebDAV content portlet, complete these steps:

1 If you are not logged on to the SAS Information Delivery Portal, then log on now.

2 Identify the HTML file for the dashboard that you want to display in the portlet. The file must be stored in the portal's WebDAV repository in a folder that you are authorized to access.

Note: To see a list of files in the WebDAV repository that are available for you to access, you can use the portal's Search feature and search for content with a

content type of File. In the search results, the path will be displayed in the Location column and the name will be displayed in the Name column. For instructions on using the Search feature, see the portal's online Help. △

3 Navigate to the page that contains the portlet that you want to edit.

4 In the portlet's title bar, click the Edit Contents icon 🔍 .

5 On the Edit Portlet page, enter the following:

Path

Enter the WebDAV path or URL of the HTML file that you want to display.

You can enter a relative path (either with or without the WebDAV repository name), or you can enter a complete URL that specifies the proprietary SAS Business Intelligence Platform (SBIP) protocol.

For example, to specify a file called `dialMeterDashPortal.htm`, which is in the folder structure `Sales` in a repository called `WebDAVDemo`, you can use any of the following formats:

□ `WebDAVDemo/Sales/dialMeterDashPortal.htm`

□ `Sales/dialMeterDashPortal.htm`

□ `sbip://WebDAVDemo/Sales/dialMeterDashPortal.htm`

Detail link

If you want the portlet to display a link to additional detailed information, specify a SBIP URL for the content item that contains the information. For example, you might link to a SAS Report, a SAS Stored Process, a SAS Information Map, or some other file. You can link to content that is located in the WebDAV repository, or to content that is defined in SAS metadata.

To create the URL, follow these steps:

a Use the Search tool to find the content item that you want to link to.

b Copy the item's path information from the Location column in the search results.

For WebDAV content, the path begins with the name of the WebDAV repository. The default repository name is `WebDAVDemo`.

For content that is defined in SAS metadata, the path begins with the name of the metadata repository. The default repository name is `Foundation`.

c After the path, enter a slash (`/`) followed by the content item's name (from the Name column in the search results).

d Place the following characters in front of the path:

`sbip://`

Note: The portal Web application uses the SBIP protocol as a default even if you do not specify it explicitly. △

Here are some examples of SBIP URLs for various types of content items:

□ `sbip://Foundation/Samples/Stored Processes/Sample: Shoe Sales Graphics`

□ `sbip://Foundation/BIP Tree/ReportStudio/Maps/SalesEast`

□ `sbip://Foundation/BIP Tree/ReportStudio/Shared/Reports/ Sales.srx`

□ `sbip://WebDAVDemo/Users/sasdemo/detail.html`

6 Click `Save`.

When the portlet appears, it will display the contents of the HTML fragment.

Step 4: Make the Dashboard Available to Portal Users

When you created the WebDAV content portlet, you had the option of sharing the portlet with a group. If you didn't share the portlet at that time, you can later edit the portlet's properties and specify a share location.

You can also share the page on which you added the portlet. When you share a page that contains a portlet, you can specify whether you also want to share the portlet. For instructions, see the portal's online Help. Depending on the share type, group members will either see the page the next time that they log on, or group members can search for and add the page to their portals. For details about shared pages, see "Understanding Pages and Page Templates" in the *SAS Intelligence Platform: Web Application Administration Guide*.

After you create the portlet, you can edit the portlet as needed. Any changes that you make to a shared portlet are seen by all users who can access the portlet.

Use a Macro to Add Files to the WebDAV Repository (Optional)

You can use a SAS macro to add the directory that contains your dashboard files to the WebDAV repository. Complete these steps to use the macro:

1 Create a SAS program that invokes the **copyToWebDAV** macro. The macro file is located in the dashboard download package. The macro is also included as an attachment to the portal dashboard samples in the SAS Samples application.

2 In your SAS program, when you invoke **copyToWebDAV**, you must pass a set of arguments that specify the files to be copied, the WebDAV location, and the credentials that are required to write to that location.

Here is the syntax for the **copyToWebDAV** macro:

```
%copyToWebDAV (dirname, davloc, userid, passwd)
```

Here are descriptions of the parameters:

dirname   Specify the full path of the directory that contains the files to be added to the WebDAV repository. Enclose the path in single quotation marks. For example:

```
'C:\dashboard\Dial_Meter'
```

Note: If the directory contains any subdirectories, they will not be copied to the WebDAV repository. △

davloc   Specify the URL for the WebDAV location, enclosed in single quotation marks. For example:

```
'http://<WebDAVHost>:8300/sasdav/Sales/dial_meters'
```

In this example, the macro creates a **dial_meters** folder under **sasdav/Sales** on the WebDAV server, and then copies all the files in **C:\dashboard\Dial_Meter** to that folder.

CAUTION:
Be sure to specify a unique location for the directory. If the location that you specify already exists on the WebDAV server, then you will overwrite the existing files. △

userid   Specify the user ID that is used to connect to the WebDAV server, enclosed in single quotation marks. If the WebDAV server runs on

a Windows system, then the user ID should be qualified with either the domain name or the machine name. For example:

```
<Windows domain or machine>\saswbadm
```

The user ID that you specify must be authorized to write to the WebDAV location that is specified for the *davloc* parameter. In the example, saswbadm has write permissions for the **sasdav/ Sales** location on the WebDAV server.

passwd   Specify the password that is used to authenticate the user that you specified in the previous argument, enclosed in single quotation marks. It is recommended that you encrypt the password, but you are not required to do so.

Use SAS proprietary 32-bit encryption to encrypt passwords. For example, to encrypt a password of **pswd123**, you would submit this code in the SAS Program Editor:
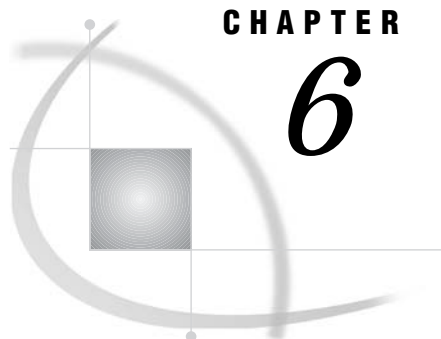
```
proc pwencode in='pswd123' method=sasenc;
run;
```

Here is a sample SAS program that includes and then invokes the **copyToWebDAV** macro:

```
%include "copyToWebDAV.sas";
%copyToWebDAV('C:\dashboard\Dial_Meter',
 'http://localhost:8300/sasdav/Sales/dial_meters',
 'saswbadm', '{sasenc}4CE77C1519B5EBA351AAA7734A6CA437');
```

3 Save and run the SAS program.

Displaying Dashboards in the SAS Stored Process Web Application

Prerequisites for This Chapter

The information in this chapter makes the following assumptions:

☐ All necessary components of the SAS Intelligence Platform, including the Java Runtime Environment (JRE) or Java Development Kit (JDK), a servlet container (such as Apache Tomcat or BEA Weblogic), and the SAS Web Infrastructure Kit or SAS Information Delivery Portal have been installed and configured at your site. The SAS Stored Process Server that contains the dashboard programs has been started.

☐ The stored process code for the dashboards and indicators (for the example discussed in this chapter, the file is named telesalesDashSTP.sas) has been downloaded and saved in the source code repository on the SAS Stored Process Server at your site. See Chapter 2, "Downloading and Modifying The Dashboard Samples," on page 5 for more information about how to download the code.

☐ The stored processes have been registered at your site with SAS Management Console. See Chapter 3, "Registering a New Stored Process," on page 9 for more information about how to register these sample stored processes.

☐ You know how to log on to the SAS Stored Process Web Application, and you have a valid user ID and a password. (You need to have metadata permission to register and execute the stored process, and file system permissions to create the SAS program.)

☐ You are familiar with using the SAS Stored Process Web Application. For more information about the SAS Stored Process Web Application, see the documentation about SAS Stored Processes in the **SAS Integration Technologies: Developer's Guide** at **http://support.sas.com/rnd/itech/library/library9.html**.

☐ You have access to and know the location of the Telesales Dashboard, which is the example that is used in this chapter.

Overview: Displaying Dashboards in the SAS Stored Processes Web Application

SAS Stored Process Web Application enables you to display dashboards or key performance indicators in a Web browser using stored processes. Here is an example of a complex dashboard stored process that consists of several types of indicators (Few 2006, p. 199).

Display 6.1   Sample Dashboard in the SAS Stored Process Web Application
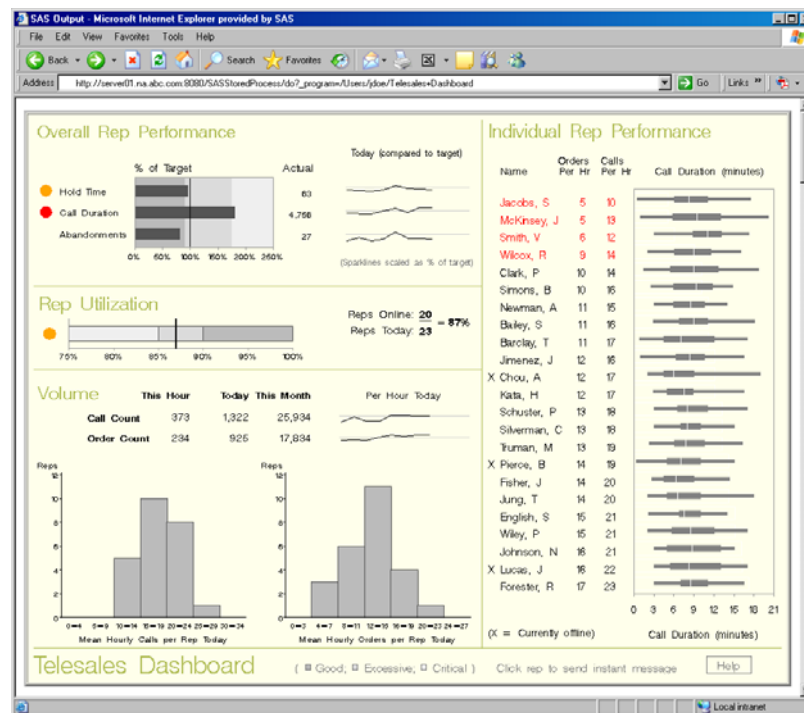
Display a Dashboard or Indicator

To use the SAS Stored Process Web Application to view output from a dashboard or indicator, open a Web browser and enter the URL for this sample. You can specify input parameters as a sequence of name/value pairs in a URL by using the query string syntax. Each name in the query string is separated from the following value by an equals (=). For example, the SAS Stored Process Web Application might have the following URL:

```
http://server01.na.abc.com:8080/SASStoredProcess/
    do?_program=/Users/jdoe/Telesales+Dashboard
```

The URL specifies your server, an absolute path to the SAS Stored Process Web Application, and the query string (following the question mark character). In this example, **_program=/Users/jdoe/Telesales+Dashboard** is the reserved input parameter that specifies the metadata location of the stored process to be executed.

There are special rules for the formatting of name/value pairs in a URL. Special characters (most punctuation characters, including spaces) in a value must be URL encoded. Spaces can be encoded as a plus (+) or **%20**. Other characters are encoded

using the %*nn* convention, where *nn* is the hexadecimal representation of the character in the ASCII character set. In the previous example, the value **/Users/jdoe/ Telesales+Dashboard** actually identifies the stored process named **Telesales Dashboard**. The space in the name is encoded as a plus (+). If your parameter values might contain special characters, it is important that they are URL encoded.

The dashboard or indicator is displayed in the Web browser, as follows:

**Display 6.2**   Sample Dashboard in the SAS Stored Process Web Application
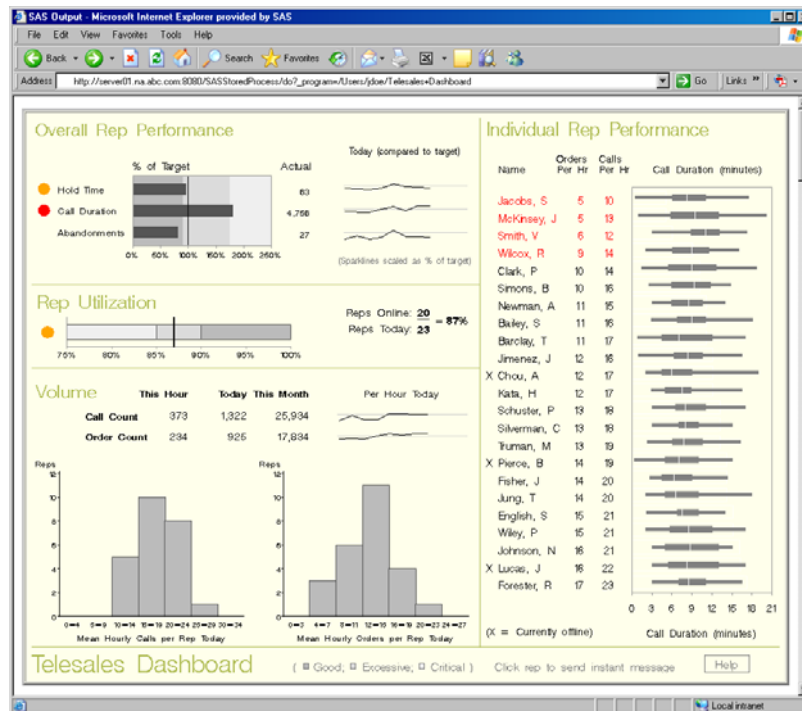

Navigate the SAS Stored Process Web Application

Instead of using the _PROGRAM variable, you can start with the application URL for the SAS Stored Process Web Application and navigate to the stored process that contains the dashboard or indicator that you want to display. Your application URL might look like the following URL:

```
http://server01.na.abc.com:8080/SASStoredProcess/do
```

When you enter this URL, the SAS Stored Process Web Application welcome page is displayed (if Welcome.htm is installed). The Welcome page might look like this:

Display 6.3 Welcome Page for the SAS Stored Process Web Application
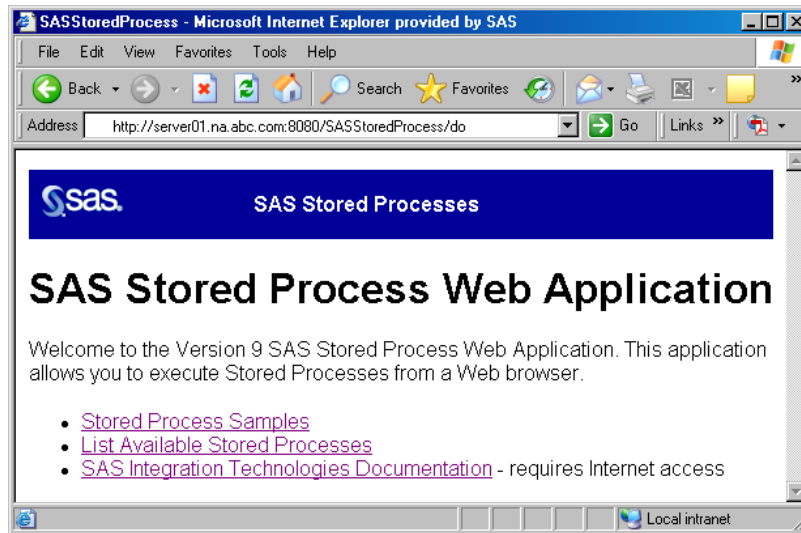
From this page, you can click List Available Stored Processes in order to display a page that contains a tree view of metadata repositories, folders, and stored processes. (You can also append the _ACTION variable with a value of INDEX (_ACTION=INDEX) to the SAS Stored Process Web Application URL in order to display this page. For example, the URL might be `http://server01.na.abc.com:8080/SASStoredProcess/do?_action=index`.) You can then select a stored process in the tree view in order to view metadata for the stored process or to run the stored process. A page with the tree view and metadata might look like this:

Display 6.4 Stored Process List and Summary Page
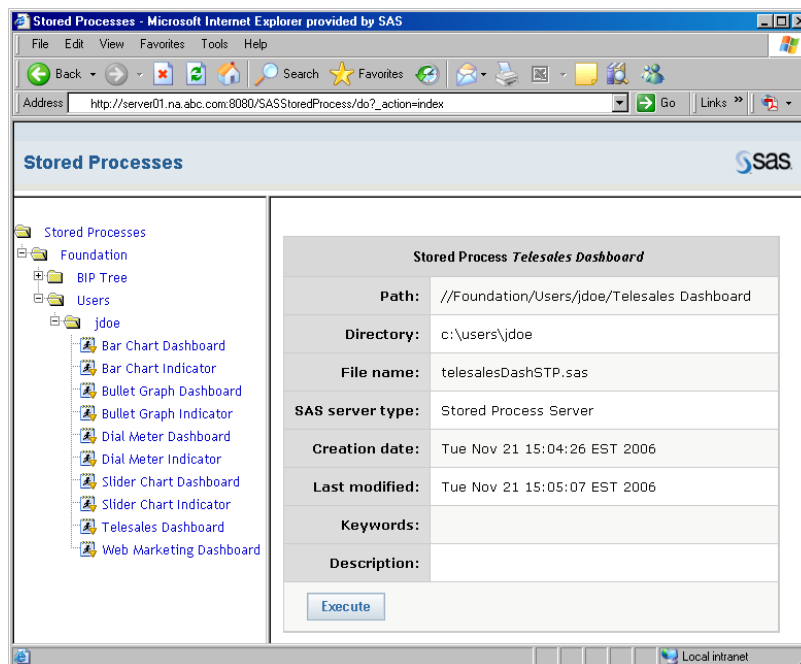
Click `Execute` to see the execution options. For more information about modifying these options, see "Modify the Execution Options for a Stored Process" on page 39.

Click **Execute** to run the stored process and display the dashboard or indicator in the Web browser.

Modify the Execution Options for a Stored Process

You can modify the execution options for a stored process if you want to do things like the following:

□ specify whether to open a new Web browser window to display the stored process output.

□ show the SAS log, execution time, or execution trace with the stored process output.

Note: The items in this list are just a few of the modifications you can make with the execution options page. However, do not attempt to modify the ODS style, graphic device, or output type for these dashboards and indicators. These options are set in the SAS code for each sample. △

To get to the execution options page, you can either navigate to it using the method described in the previous section, or you can use the _PROGRAM variable along with _ACTION=PROPERTIES in the URL. Multiple name/value pairs in the URL are separated by ampersands (&). For example, the execution options page might have the following URL:

```
http://server01.na.abc.com:8080/SASStoredProcess/
    do?_program=/Users/jdoe/Telesales+Dashboard&_action=properties
```

Here is an example of what the execution options page looks like:

Display 6.5 Stored Process Execution Options Page

For more information about the other execution options on this page, see the documentation about the SAS Stored Process Web Application in the **SAS Integration Technologies: Developer's Guide** at **http://support.sas.com/rnd/itech/ library/library9.html**.

When you are finished modifying the execution options, click **Execute** to run the stored process and display the dashboard or indicator in the Web browser.

References

Few, Stephen. 2006. *Information Dashboard Design*. Sebastopol, CA: O'Reilly Media, Inc.

Your Turn

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