Information Builders

WebFOCUS

WebFOCUS New Features
Release 8.2 Version 01M

September 10, 2018

Contents

Information Builders

Preface

This content describes the new features available in WebFOCUS Release 8.2 Version 01M and Release 7.7 Version 07 Reporting Server. It is intended for end users, developers, and administrators.

Online help is available within the software products. To access technical content for all products, go to *http://webfocusinfocenter.informationbuilders.com/wfappent/*.

To take full advantage of our website capabilities, make sure active scripting (or active content) and cookies are enabled in your browser.

How This Manual Is Organized

This manual includes the following chapters:

	Chapter/Appendix	Contents
1	Introduction to WebFOCUS Release 8.2 Version 01M	Introduces the WebFOCUS new features and enhancements.
2	Reporting With WebFOCUS	Describes the new features for the variety of tools that enable you to create reports.
3	Charting With WebFOCUS	Describes the new features for charting and the new chart engines.
4	Developing Applications	Describes the new features for the application development tools.
5	Scheduling and Distributing Information	Describes the new features for ReportCaster, the scheduling and distribution application.
6	Administering and Securing the Environment	Describes the new WebFOCUS Client repository and authorization security model.
7	Server Enhancements	Describes new server features on the Web Console.
8	Adapter Enhancements	Describes new adapter features. All adapters can be used for WebFOCUS reporting and SQL requests, and as sources for DataMigrator flows.
9	DataMigrator Enhancements	Describes new features for DataMigrator.

	Chapter/Appendix	Contents
10	Resource Analyzer and Resource Governor Enhancements	Describes new features for Resource Analyzer and Resource Governor.

Technical Content Conventions

The following table describes the technical content conventions.

Convention	Description
THIS TYPEFACE or this typeface	Denotes syntax that you must enter exactly as shown.
this typeface	Represents a placeholder (or variable) in syntax for a value that you or the system must supply.
underscore	Indicates a default setting.
this typeface	Represents a placeholder (or variable), a cross-reference, or an important term. It may also indicate a button, menu item, or dialog box option that you can click or select.
Key + Key	Indicates keys that you must press simultaneously.
{ }	Indicates two or three choices. Type one of them, not the braces.
[ ]	Indicates a group of optional parameters. None are required, but you may select one of them. Type only the parameter in the brackets, not the brackets.
		Separates mutually exclusive choices in syntax. Type one of them, not the symbol.
...	Indicates that you can enter a parameter multiple times. Type only the parameter, not the ellipsis (...).

Convention	Description
. . .	Indicates that there are (or could be) intervening or additional commands.

Related Resources

Visit our Technical Content Library at *http://documentation.informationbuilders.com*. You can also contact the us at (800) 969-4636.

Focal Point Community

Join the Focal Point community. Focal Point is our online developer center and more than a message board. It is an interactive network of more than 3,000 developers from almost every profession and industry, collaborating on solutions and sharing tips and techniques. Access Focal Point at *http://forums.informationbuilders.com/eve/forums*.

Customer Support

You can also access support services electronically, 24 hours a day, with InfoResponse LIVE. InfoResponse LIVE is accessible through our website, *http://www.informationbuilders.com*. It connects you to the case-management system and additional Technical Support Center resources. Registered users can open, update, and view the status of cases and read descriptions of reported software issues. New users can register immediately for this service. The technical support section of *http://www.informationbuilders.com* also provides usage techniques, diagnostic tips, and answers to frequently asked questions.

Call Information Builders Customer Support Services (CSS) at (800) 736-6130 or (212) 736-6130. Customer Support Consultants are available Monday through Friday between 8:00 a.m. and 8:00 p.m. EST to address your questions. Information Builders consultants can also give you general guidance regarding product capabilities. Please be ready to provide your six-digit site code number (*xxxx.xx*) when you call.

To learn about the full range of available support services, ask your Information Builders representative about InfoResponse LIVE, or call (800) 969-INFO.

Information You Should Have

To help our consultants answer your questions effectively, be prepared to provide the following information when you call:

❑ Your six-digit site code (*xxxx.xx*).

❑ Your WebFOCUS configuration:

 ❑ The front-end software you are using, including vendor and release.

 ❑ The communications protocol (for example, TCP/IP or HLLAPI), including vendor and release.

 ❑ The software release.

 ❑ Your server version and release. You can find this information using the Version option in the Web Console.

❑ The stored procedure (preferably with line numbers) or SQL statements being used in server access.

❑ The Master File and Access File.

❑ The exact nature of the problem:

 ❑ Are the results or the format incorrect? Are the text or calculations missing or misplaced?

 ❑ Provide the error message and return code, if applicable.

 ❑ Is this related to any other problem?

❑ Has the procedure or query ever worked in its present form? Has it been changed recently? How often does the problem occur?

❑ What release of the operating system are you using? Has it, your security system, communications protocol, or front-end software changed?

❑ Is this problem reproducible? If so, how?

❑ Have you tried to reproduce your problem in the simplest form possible? For example, if you are having problems joining two data sources, have you tried executing a query containing just the code to access the data source?

❑ Do you have a trace file?

❑ How is the problem affecting your business? Is it halting development or production? Do you just have questions about functionality or documentation?

User Experience

Our goal is to support every customer's success. The Technical Content Management staff welcomes your feedback. To contact us, visit our website *https:// techsupport.informationbuilders.com/public/connections.html*.

Thank you, in advance, for your comments.

Information Builders Customer Education and Training

Interested in training? Information Builders Customer Education and Training Department offers a wide variety of training courses for this and other Information Builders products.

For information on course descriptions, locations, and dates, or to register for classes, visit our website (*http://education.informationbuilders.com*) or call (800) 969-INFO to speak to an Education Representative.

Introduction to WebFOCUS Release 8.2 Version 01M

WebFOCUS includes key features and enhancements across the product line.

Through continued innovation and the expansion of our unyielding commitments to support our customers, Information Builders will work in partnership to help ensure your success with WebFOCUS and beyond.

In this chapter:

❏ WebFOCUS 8.2.01 and 8.2.01M Key Features Summary

WebFOCUS 8.2.01 and 8.2.01M Key Features Summary

Use the tables below for descriptions of the Key Features for WebFOCUS Release 8.2 Version 01 and Release 8.2 Version 01M, and access the available key feature videos.

WebFOCUS 8.2.01M Key Features

Category	Key Feature
App Studio	*Microsoft Team Foundation Services (TFS) Source Control* on page 74.
Data Management and Preparation	*Business View Plus (BV+) Candidate for Release* on page 360.
	Optimize Load Option to Support MERGE on page 455.
Navigation and Analytics	*Esri On Premise (Offline) Mapping Capabilities in InfoAssist+* on page 32.
Business Intelligence Portal	*Collaborative Portal* on page 303.
	WebFOCUS Embedded Business Intelligence on page 310.

Category	Key Feature
Data Adapters	*Adapter for Cloudera Impala* on page 418.
	Adapter for Google BigQuery on page 419.
	Adapter for Jethro on page 420.
	Social Media Demonstration Application on page 448.

WebFOCUS 8.2.01 Key Features

Category	Key Feature
App Studio	*Maps: HTML5 Viewer and Developer UIs* on page 90.
	Responsive Design and Templates on page 79.
	Precision Reports on page 94.
	Maintain Data on page 81.
Data Management and Preparation	*Data Preparation* on page 307.
	Metadata-Driven Esri Integration on page 308.
	Managed Geographic Roles on page 92.
	New Upload Wizard on page 308.
Navigation and Analytics	*Dynamic Navigation: Auto Drill and Auto Linking* on page 33.
	Responsive Autoprompt on page 31.
	Mapping: Esri Online on page 33.
	Parameter-Driven Charts and Reports on page 35.
	Data Enrichment and Esri Tapestry Segmentation on page 35.

Category	Key Feature
Business Intelligence Portal	*User Experience Improvements* on page 304.
	Samples Generator on page 305.
	Responsive Design Enhancements on page 305.
	External CSS Theme Support on page 306.
Data Adapters	*Adapter for Esri ArcGIS* on page 426.
	Adapter for RStat Predictive Analytics on page 443.
	Adapter for Apache Drill on page 416.
	Adapter for Apache Phoenix for HBase on page 424.
	Adapter for EXASol ODBC on page 418.
	Adapter for MariaDB on page 420.

Reporting With WebFOCUS

WebFOCUS is a complete information control system with comprehensive features for retrieving and analyzing data that enables you to create reports quickly and easily from real-time transactional systems, relational data warehouses, cubes, and any ERP or legacy source.

WebFOCUS serves the needs of both end users with no formal training in data processing, and data processing professionals who need powerful tools for developing complete applications.

A variety of tools are available that enable you to create reports.

In this chapter:

❏ Responsive Autoprompt

❏ WebFOCUS InfoAssist+ Enhancements

❏ App Studio Enhancements

❏ Reporting Language Enhancements

Responsive Autoprompt

The WebFOCUS Autoprompting facility dynamically creates a launch page that prompts users for the parameters (amper variables) necessary to execute a procedure (FEX). The parameter values entered or selected by users on the Autoprompt launch page can be used as field values, or as the objects of the display and sort commands in the report request.

Release 8.2.01 introduces a new Responsive Autoprompt facility that provides a modern user interface design with responsive mobile support, chaining of dynamic lists for fields in a dimension hierarchy, and a calendar control for simple filters to select a date for a date field of YYMD format with modifiers. The date format must have all components (year, month, day) and not be a Date-Time field format.

Learn More

For more information on Responsive Autoprompt, see the *Responsive Autoprompt* topic in the *Developing Reporting Applications* Technical Library.

WebFOCUS InfoAssist+ Enhancements

InfoAssist+ is a powerful report generation tool that enables business users to leverage ad hoc functionality. With InfoAssist+, you can generate highly complex reports, charts, and documents from any enterprise information source without IT intervention. You can also analyze multiple reports and charts simultaneously and output report data in a variety of formats.

Esri On Premise (Offline) Mapping Capabilities in InfoAssist+

The Esri On Premise functionality enables you to download and access mapping files through the use of a local Application Programming Interface (API). Once you download and configure the API, you do not need an internet connection to utilize the robust mapping features that Esri provides.

The Esri On Premise functionality provides you with local access to Esri mapping files. The following components are supported when using this functionality:

❏ **Offline Basemaps**. Basemaps are an offering from ArcGIS. Standard basemaps are provided for your use offline. In InfoAssist+, these basemaps are known as backgrounds. In an online setting, there are 10 basemaps available. In order to use offline basemaps, you need to use a tiled mapservice published in the ArcGIS Server.

❏ **Offline Geographic Roles**. Geographic Roles are used to visualize measures with commonly known dimensions (for example, Country, State, Cities, and so on). These provide the location information often in the form of (x/y) needed to plot on a map. Geographic roles are pre-defined for online users through ArcGIS Online. In InfoAssist+, a geographic role defines the geographic component that you can select when creating a map (for example, State or Continent). For an offline user, the options that display can be customized in the geoservices.xml file.

Note: Demographic Layers are not supported in an Esri On Premise environment.

Learn More

For more information about this feature, see the *Creating Maps to Illustrate Trends* topic in the *InfoAssist+* Technical Library.

Or click here to watch the Key Feature video now!

Dynamic Navigation: Auto Drill and Auto Linking

Auto Drill and Auto Linking enable you to navigate your data and streamline the effort needed to create drill downs. Auto Drill enables you to navigate through different levels within the dimension hierarchy of your data source. This allows you to review underlying data for a particular area, and move through the structure of your data source based on your informational needs. All that is required is a hierarchical data source.

Auto Linking makes it easy to connect reports and charts in your development environment, expanding the reporting capabilities of your organization. Using Auto Linking, you can dynamically link HTML reports, active reports, and HTML5 charts with a single report or chart of any format, based on their common sort (BY) fields and parameters referenced in any filters. It is this commonality that dynamically links content in your WebFOCUS repository, allowing you to discover new possibilities in your data, and explore new relationships within your reporting enterprise. In addition, Auto Linking saves development time and effort, because drill downs do not need to be manually created and maintained.

Auto Drill and Auto Linking give you the advantage of navigating your data dynamically by simply selecting these report options. These features broaden your analytical insights, giving you access to different views of your data through these dynamic links.

Learn More

For more information about these features, see the *Using Auto Drill* and *Using the Auto Linking Feature to Link Content* topics in the InfoAssist+ Technical Library.

Or click here to watch the Key Feature video now!

Mapping: Esri Online

Using InfoAssist+, you can create maps to identify patterns or trends in your data. By converting data into values that can be displayed on a map, you are able to visualize scenarios, illustrate hot spots, and identify potential problem areas. For example, a law enforcement agency may use the mapping functionality to identify areas of higher crime within the locations they cover. You can also use maps to determine how places are related, understand where things are located, and identify the best actions to take. By illustrating trends on a map, a decision maker can identify patterns easily, and reach conclusions sooner.

There are two types of maps in InfoAssist+: Choropleth and Proportional Symbol (Bubble). A Choropleth map is a common thematic map that uses geographical measures (for example, states and countries), representing the values aerially while employing a varying intensity of colors. A Proportional Symbol (Bubble) map represents coordinates, such as an address or intersection, using symbols of different sizes to represent any measure. These maps focus on specific areas, for which data concentrations may vary. When the data concentration is larger, the bubble will be bigger. You can experiment with both types of maps to explore your data in different ways.

❏ Backgrounds. Display a layer that positions data as it is located, in context to other geographical features, such as streets, terrain, and imagery. Some standard Background options may combine road, aerial, and topographic data using a variety of symbols. Hosted on Arc GIS, you can change your background at any time, to review your data in a different context. When you apply a Background to your map, its appearance changes. You can then adjust the view of your data, showing different terrain or geographical views. Backgrounds provide at least 17 levels of zoom. For more information, see *https:// developers.arcgis.com/javascript/jsapi/esri.basemaps-amd.html*.

❏ Reference Layers. Display a layer of boundaries and locations that range from a continental scale to country, state, and even local neighborhood. For example, if you are viewing World data on electricity usage, you may want to add a Reference Layer that displays the borders and concentration of your data within each country.

❏ Demographic Layers. Display a layer of information about people and businesses in a specific demographic area. This includes the United States and 120 other countries. Demographic Layers are thematic maps that provide additional information about the location, such as spending habits, population, and lifestyles. You can add Demographic Layers to a map about sales data, to identify new locations for stores, based on the spending habits for a specific area.

WebFOCUS InfoAssist+ with the Esri integration delivers insight into your data, helping you illustrate and identify trends so that you can make informed decisions and take action quickly.

Learn More

For more information about this feature, see the *Creating Maps to Illustrate Trends* topic in the InfoAssist+ Technical Library.

Or click here to watch the Key Feature video now!

Parameter-Driven Charts and Reports

When creating reports, charts, or documents, you can add parameters to enable options for selection at run-time. This gives you the full advantage of reviewing and comparing your data using convenient drop-down lists that help you quickly gain insight into your data.

You add parameters by right-clicking on any field container, except Multi-graph, and simply clicking *New Parameter*. This creates a new, unique Parameter field container, into which you can place any number of measures and dimensions in accordance with how you want them to display at run time. You can also rename the parameter, using a relevant label, to organize different parameters categorically.

Once you have defined your parameters and selected the relevant data fields, run the report, chart or document. Using the drop-down lists for each parameter, you can select different options from the parameter lists to view the data in your report, chart, or document dynamically. You can then select different parameter options and re-run the report, chart, or document and your data is refreshed based on these new selections.

When you define parameters, you can dynamically select different options at run time, giving you the advantage of reviewing different data scenarios on the fly. Once your parameters are set up, the run- time options enable you to quickly and easily navigate different data relationships and make relevant, rapid decisions with your data.

Learn More

For more information about this feature, see the *Adding Parameters for Data Selection at Run Time* topic in the InfoAssist+ Technical Library.

Or click here to watch the Key Feature video now!

Data Enrichment and Esri Tapestry Segmentation

When working with maps, you can use Demographic Layers to enrich your BI data. These Demographic Layers display a layer of information about people and businesses in a specific demographic area. This includes the United States and 120 other countries. Demographic Layers are thematic maps that provide additional information about the location, such as spending habits, population, and lifestyles. You can add Demographic Layers to a map about sales data, to identify new locations for stores, based on the spending habits for a specific area.

The mapping functionality of InfoAssist+ with the Esri integration, through ArcGIS Online, supports the most recent demographic and Tapestry Segmentation lifestyle information. This includes metrics such as total population, family size, household income, and more. It also includes consumer spending information on many types of products. In InfoAssist+, you can access and apply these Demographic Layers, which provide added context and information to any map that you create.

When selecting Demographic Layers, you can choose from any of the pre-defined demographic profiles. You can select multiple options in either category (Lifestyle or Population) to gain additional insight into your data. Specifically, each Demographic Layer has its own profile and provides a layering option, when comparing values across different layers or profiles.

Demographic Layers give you the added insight that you need to make accurate, quick decisions. By providing you with layers that contain information about people, businesses, and other trends, you can easily identify patterns in your data and make the decisions that matter most.

Learn More

For more information about this feature, see the *Creating Maps to Illustrate Trends* topic in the InfoAssist+ Technical Library.

Or click here to watch the Key Feature video now!

InfoAssist+ Report, Chart and Visualization, Document, and General New Features

The following new features apply to InfoAssist+ reports, charts, visualizations, and documents. General new features are also described.

Reports

The following new features have been added for reports.

Using Auto Drill to Navigate the Hierarchy of Your Data

Auto Drill, which can be enabled from the Navigation group on the Format tab, allows you to navigate the hierarchy of your data. You can drill down or drill up on a data field, depending on your location in the hierarchy, as shown in the following image.

Note: This new feature is available in Report and Chart modes. Auto Drill is automatic in Visualization mode.
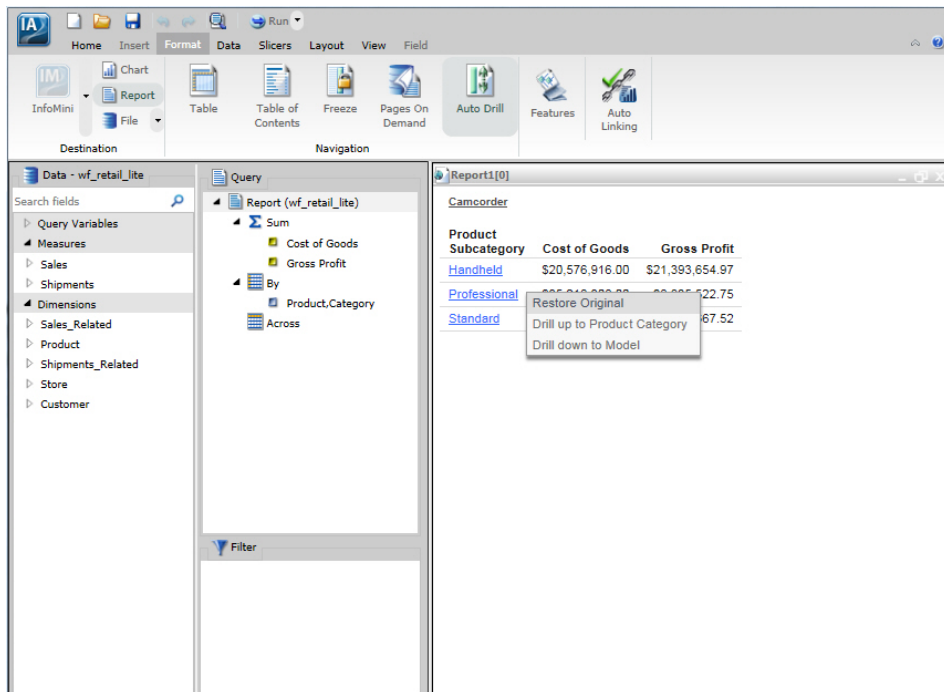
As you are navigating the levels of hierarchy in your data, Auto Drill places a breadcrumb header at the top of the report with identifying information about the current category that displays. This enables you to quickly identify your location in the structure of your data and aids in navigating the hierarchy.

Adding Parameters for Data Selection at Run-Time

You can add new parameters to your report or chart to create parameter options for selection at run-time. Each parameter that you add becomes a field container into which you can add one or more measures and dimensions. This feature offers on-demand, dynamic report and chart creation at run time.

Note: This new feature is available in Report and Chart mode, but not Visualization mode.

You can add one or more parameters to your report or chart. The parameters that you add and the data fields that you specify determine the parameter and drop-down list contents at run time, as shown in the following image.
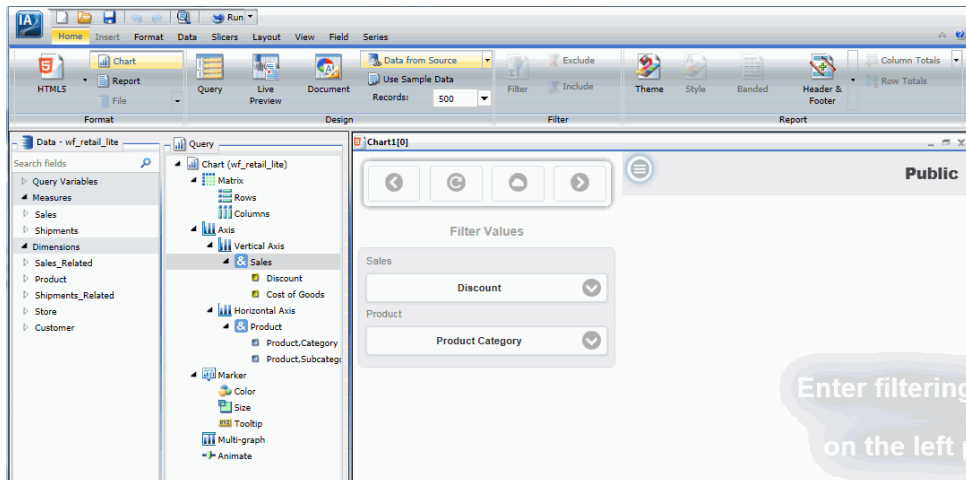
You add parameters by right-clicking a field container in the Query pane, as shown in the following image.
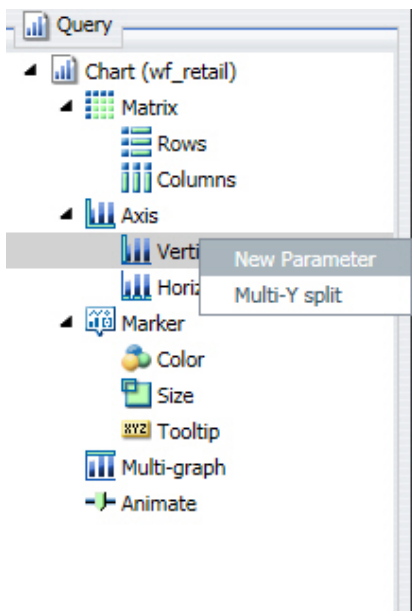
AutoFit Functionality

You can now use the AutoFit functionality when working with reports. To enable this functionality, on the *Layout* tab, in the *Report* group, click *AutoFit*, and then click *Report*. This feature enables HTML reports to grow proportionally at design time, as additional fields are added. It automatically resizes the report output at run time to fit into the container in which it is placed. The AutoFit button also allows you to specify Column, which compresses the report columns to the width of the widest data instance. Column is the default, as shown in the following image.
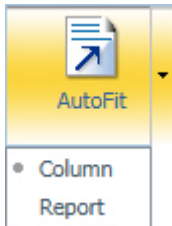
AutoFit functionality is also available in the Size & Arrange group on the Layout tab when working with charts.

Note: This new feature is also available in Chart mode.

Support for Date Field Values in Filter Dialog Box

When creating a filter using a date field, the Value option is set to Today. You can optionally select *Beginning of Month*, *End of Month*, *Beginning of Quarter*, *End of Quarter*, *Beginning of Year*, *End of Year*, or *Custom date* using the calendar that displays when you make that selection. These options are shown in the following image.

Note: This new feature applies to all modes, except Visualization mode.
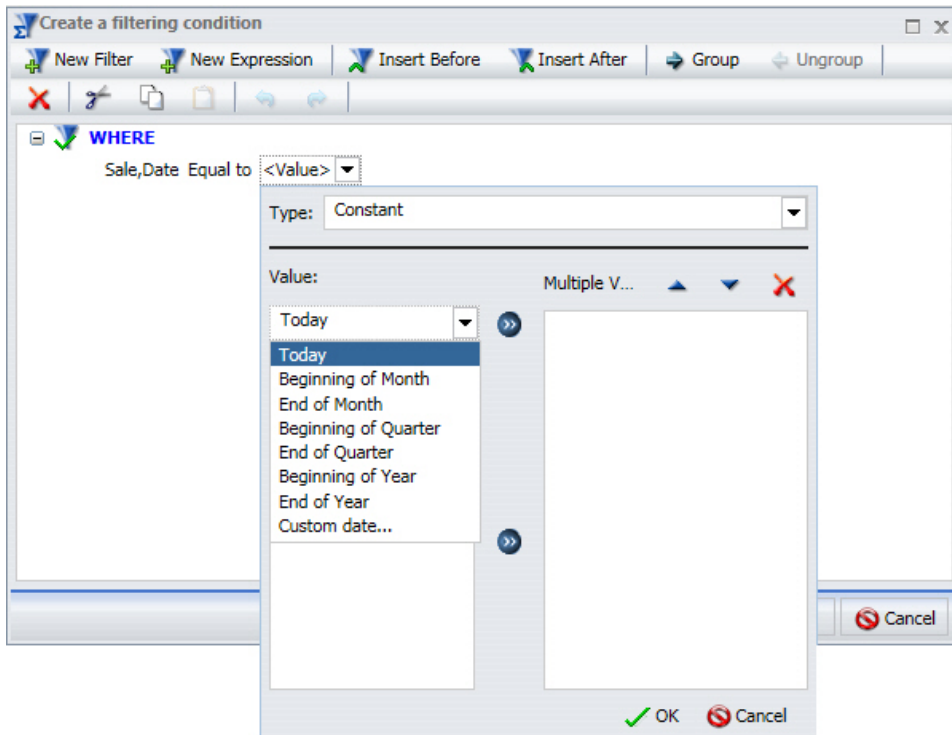
Options for Aligning Your Page Footer

The Additional alignment options icon , which is located in the Page Footer section of the Header & Footer dialog box, provides options for aligning your page footer. You can place the footing that you specify at the bottom of your report relative to the data or to the page.

Charts and Visualizations

The following new features have been added for charts and visualizations, as specified.

Narrative Charts

Narrative charts tell the story of your data. When creating a bar, line, area, or pie chart or visual in chart or visualization mode, respectively, you can bring it to life with words that describe your data, as shown in the following image.

The data represents the Gross Profit for the following Product Categories: Stereo Systems, Media Player, Camcorder, Accessories, Video Production, Computers and Televisions.
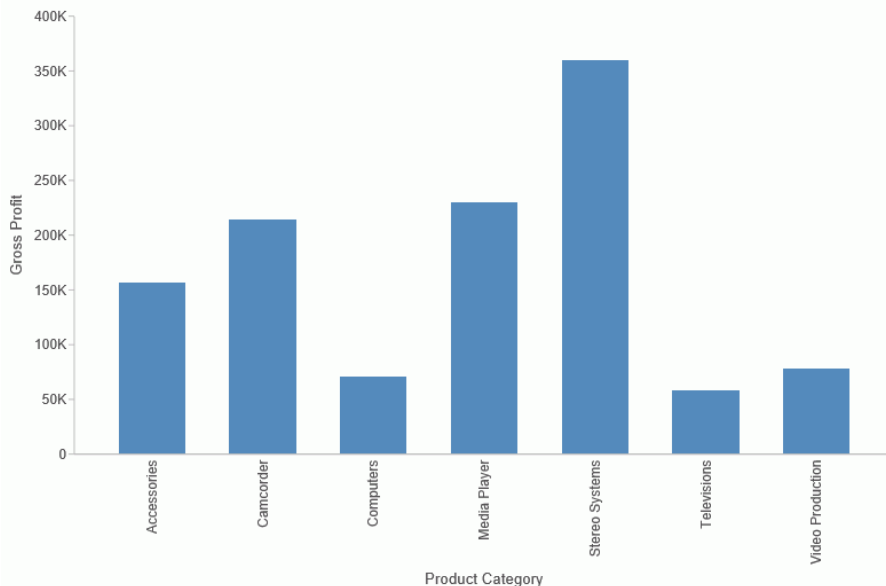
If your administrator has activated this feature for you, you can enable Narrative Charts from the ribbon. On the Format tab, in the Features group, click *Narrative*. This will add descriptive text for the current chart or visual.

Narrative charts let you communicate about your data, summarizing data values and providing an interpretation of the results. For more information on the syntax behind narrative charts, see the *Creating HTML5 Charts With WebFOCUS Language* manual.

New Legend Properties Added for Docking and Scrolling

When working with legends in InfoAssist+, you can now specify how your legend will be docked. This feature controls the display of entries in your legend.

The Docking State is set to *Expanded* by default, but you can optionally specify *Collapsed* or *None*. If your legend is set to Expanded, you can use the grey arrow to expand or collapse it, as needed. If you set the Docking State to *Collapsed*, InfoAssist+ will show that the legend is available (using the grey arrow). This option saves real estate in your chart by collapsing the categorical text labels in the legend while preserving the legend label colors. This is particularly useful when items in your legend have long labels and you wish to truncate them for the purposes of display. If you specify *None*, the ability to expand or collapse the legend is removed and the grey arrow no longer displays.

You can also enable and disable scrolling for your legend. The Enable Scrolling check box is selected, by default. The ability to scroll is particularly useful when you have numerous entries in your legend. To disable scrolling in your legend, clear the Enable Scrolling check box. All legend options display in columns and a scroll bar does not display.

The Docking State and Enable Scrolling options are shown in the following image.
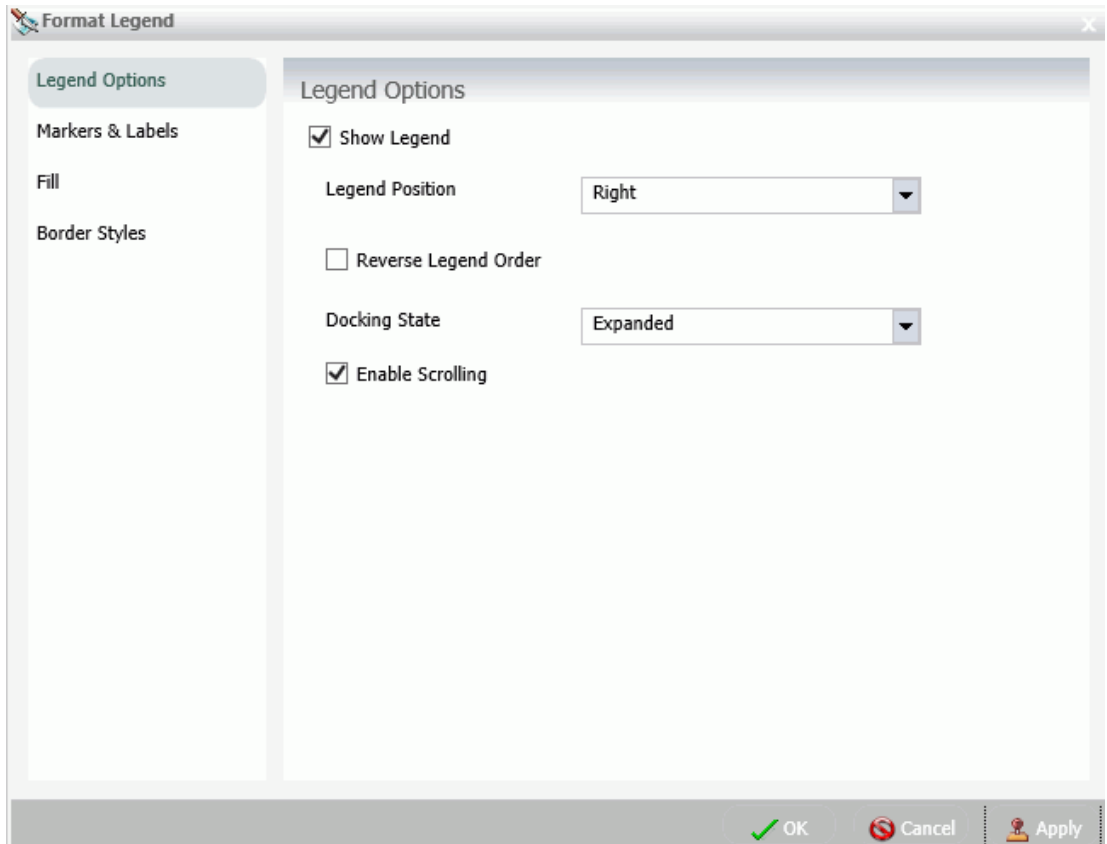
Show Axis Title Capability Added

Using the Show title option on the Format Axis (Horizontal or Vertical) dialog box, you can show or hide axis titles in your chart. This gives you control over the display of your axis titles, enabling you to show or hide them, as needed. The Show title option, which is located on the Title tab, is shown in the following image.
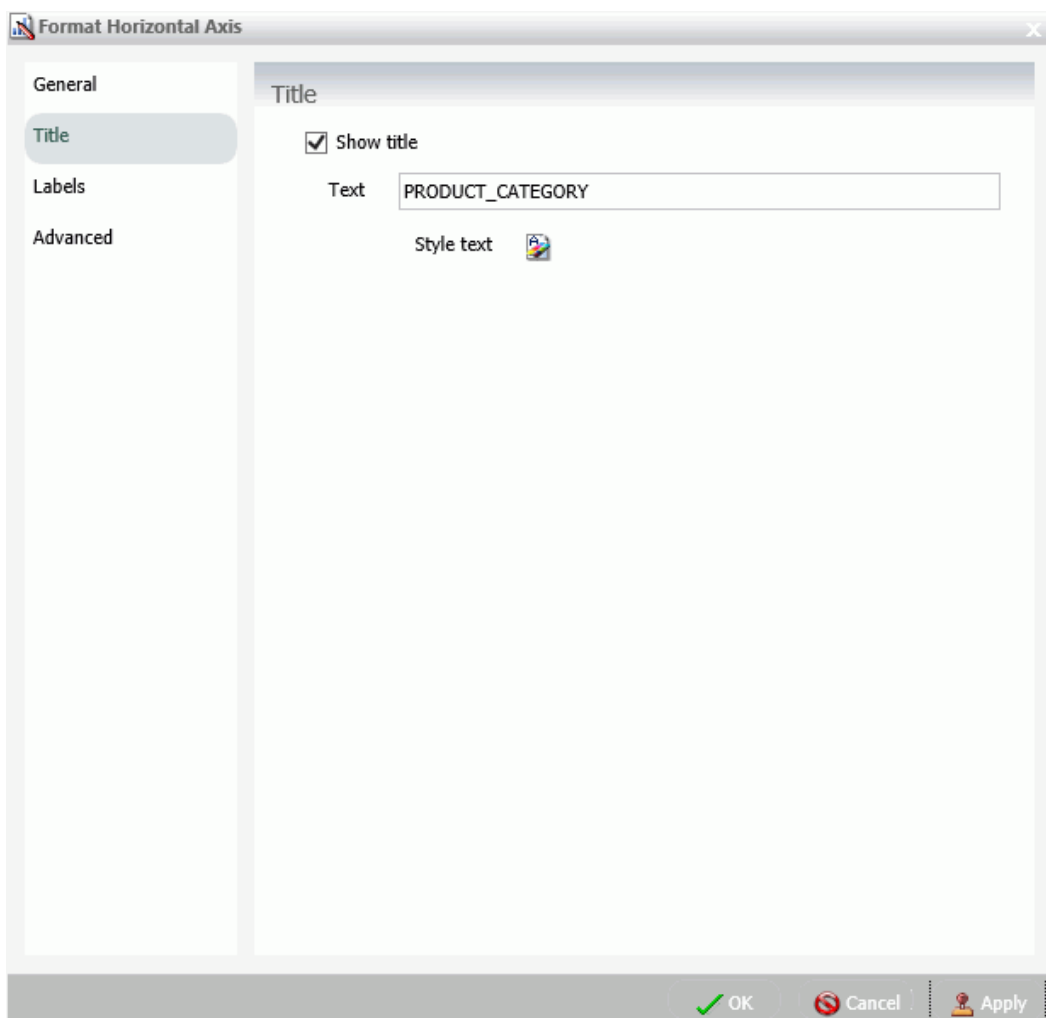
Scrolling Capability Added for Various Chart Types

The ability to scroll across a large dataset has been added for bar, line, area, scatter, bubble, and all matrix charts. When working in visualization mode, scrolling capability automatically engages when the underlying dataset is large enough to warrant scrolling. In all other modes, you must enable the functionality. You can enable or disable this functionality by selecting the *Auto Enable X-Axis Scrolling* check box in the Interactive Options dialog box, as shown in the following image.
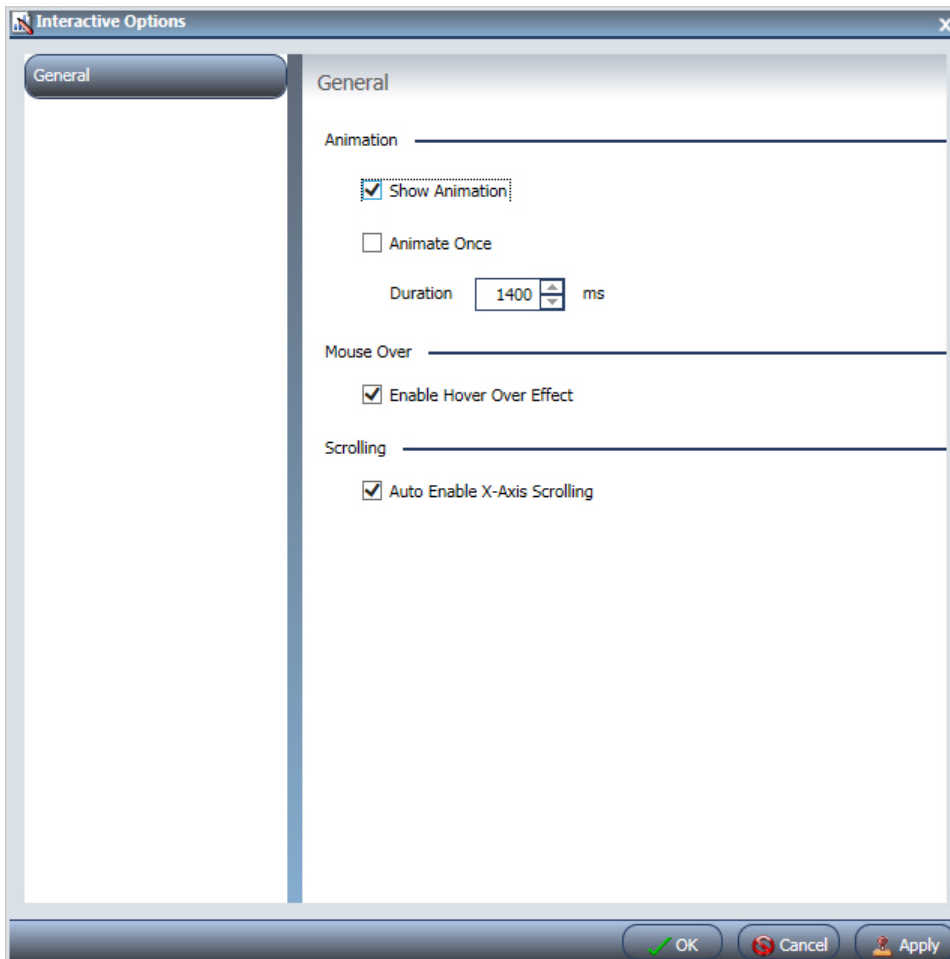
Color BY Option Changes Legend Heat Scale to Markers

When you place a numeric field in the Color field container when creating a chart, the legend displays as a heat scale. When you place an alphanumeric or a date field (non-measure) in the Color field container, the legend displays as colored markers. To change how the legend displays, right-click the Color field container and click *Color BY*, as shown in the following image.
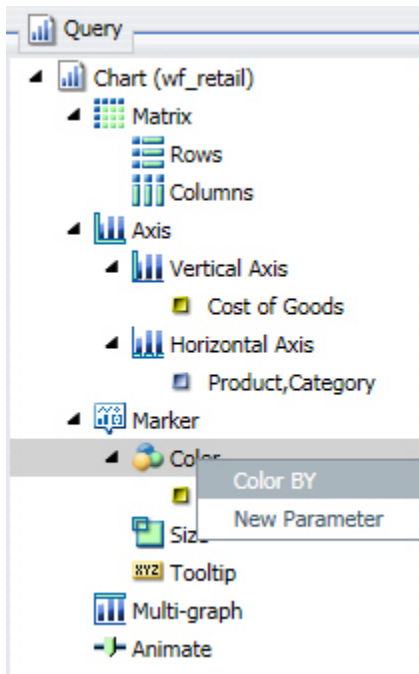
Ability to Select Chart Extensions in Visualization Mode

For visualization mode, you have access to the standard chart types, as well as a number of chart extensions that can be made available to you by your administrator. By default, a certain number of chart extensions are installed with WebFOCUS. Contact your administrator to access and use these extensions.

Enabling Trendlines in Charts and Visualizations

Using the Trendline option in the Properties group on the Series tab, you can add a trendline to your chart or visualization. A trendline is a line that is drawn over the plot area of a chart or visual to show the pattern of data points. The pattern reveals a statistical trend, as shown in the following image.
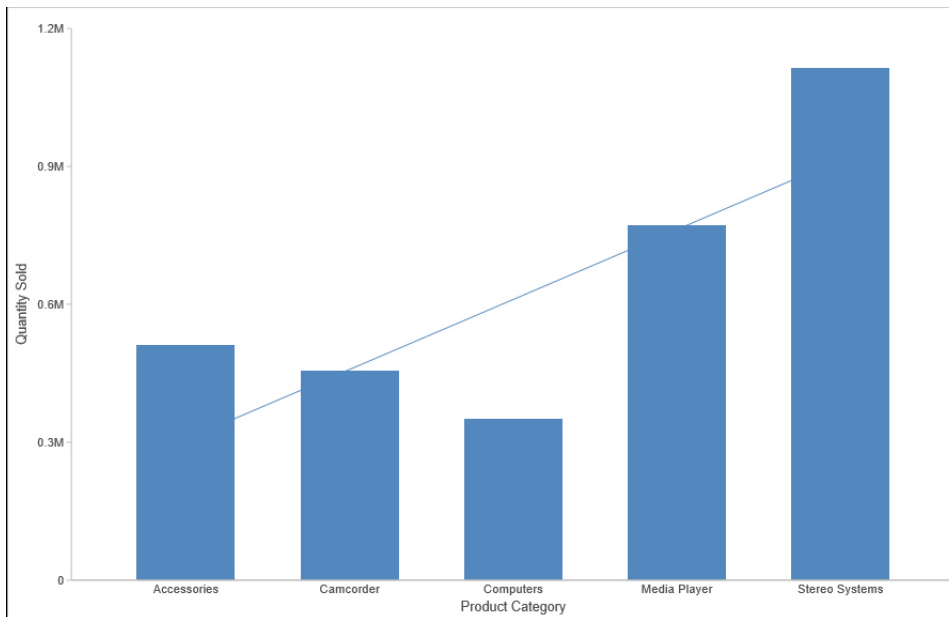
The mathematical equation for the selected trendline option is only available in chart mode. It is not available in visualization mode.

Addition of Heatmap Visual

Heatmaps have been added to visualization mode in InfoAssist+. A heatmap is a graphical representation of data where the individual values that comprise a matrix are represented as colors. Using radiant hues, you can track the intensity of a data relationship using the colors defined in the legend.

Heatmaps are useful when you are looking for hot spots in your data, or areas of focus or interest, as shown in the following image.
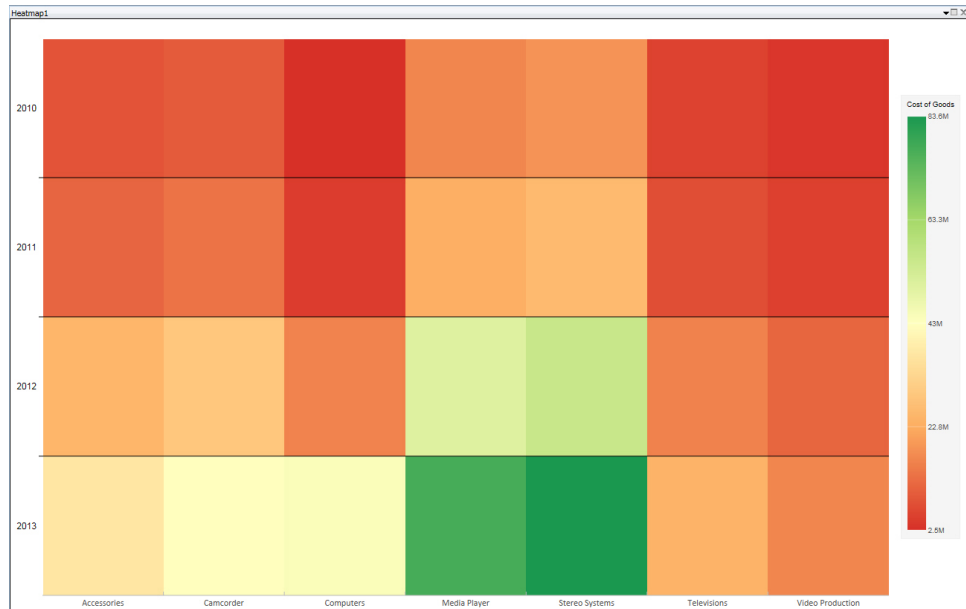
Drill Up and Down Through a Data Hierarchy in a Map

When working with maps in Visualization mode in InfoAssist+, you can drill up and down through the hierarchy of your data. To do so, use the tooltips that display when you hover over an area of a choropleth or proportional symbol (bubble) map, as shown in the following image.
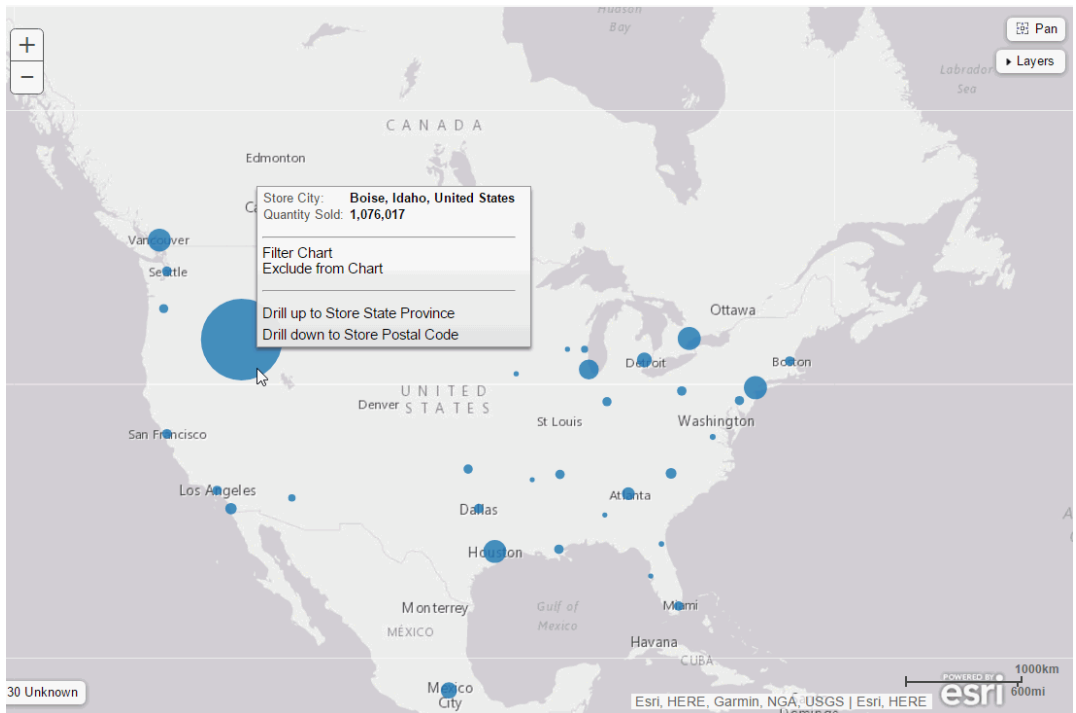
Bubbles on Proportional Symbol (Bubble) Map Sorted by Radius

When working with a Proportional Symbol (Bubble) map, bubbles are sorted by radius. The bubbles are layered on top of one another, with the smallest bubble on top, as shown in the following image.

This layering makes it easy to review tooltip information for the relevant bubble. This applies to a single series or multiple series.

New Global Preference Added for Leaflet Maps

A new global preference has been added for InfoAssist+ in the WebFOCUS Administration Console for Leaflet maps. The option is located in the Chart Types section. The Leaflet Maps option enables the icons required for the use of Leaflet maps in both chart and visualization mode. The two Leaflet map icons enable you to select either a Choropleth or a Proportional Symbol (Bubble) map based on the Leaflet open-source JavaScript library for mobile-friendly interactive maps.

In chart mode, these icons are available in the Select a chart dialog box. In visualization mode, these icons are available in the Select a Visual dialog box.

If this setting is not selected in the WebFOCUS Administration Console, the Leaflet map icons do not appear. The Leaflet Maps option is selected, by default.

New Animate Field Container

The Animate field container enables you to animate time progression using a slider control. When you place a data field in this field container, a slider control displays in Live Preview. As you move the control along the slider bar, an animation effect results. The slider control has a Play button that allows you to play and pause the animation. When you click *Play*, the Pause option is activated, enabling you to pause the progression and analyze your data. Slider controls are limited to one sort field and should be time or sequence related, such as month or year. This field container displays for many different chart types, including pie charts, as shown in the following image.

Note: This new feature is available in Chart mode only.
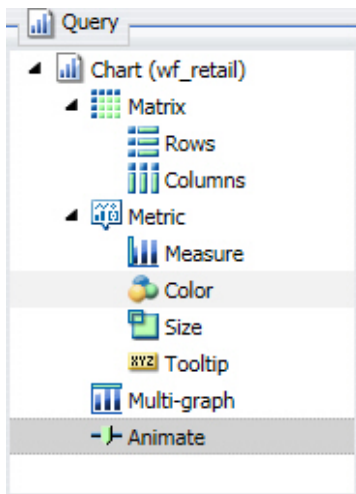
Improvements to the Tooltip Information for Streamgraphs

The tooltip information that displays for streamgraphs, which are HTML5 charts, has been improved. The tooltip now includes more detailed information about the underlying data source, as shown in the following image.

Note: This new feature is available in Chart mode only.
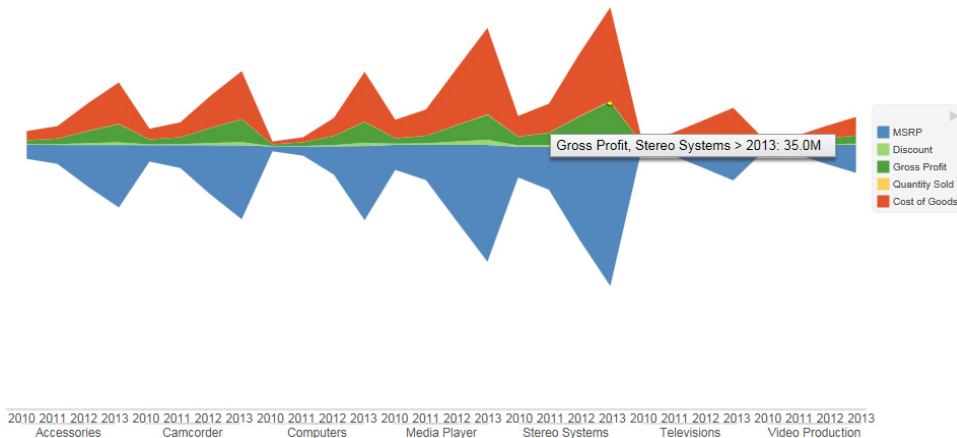
Updates to Description Information for Charts Listed in the Other Chart Types Dialog Box

When working with chart types in the Other Chart Types dialog box, the description information for each chart type dynamically changes as you rest your mouse over each unique chart type. This provides you with quick access to a description for each chart, enabling you to quickly identify the relevant chart type. This facilitates the creation of the right type of chart based on your data.

Note: This new feature is available in Chart mode only.

An example of the description information that is available is shown in the following image.
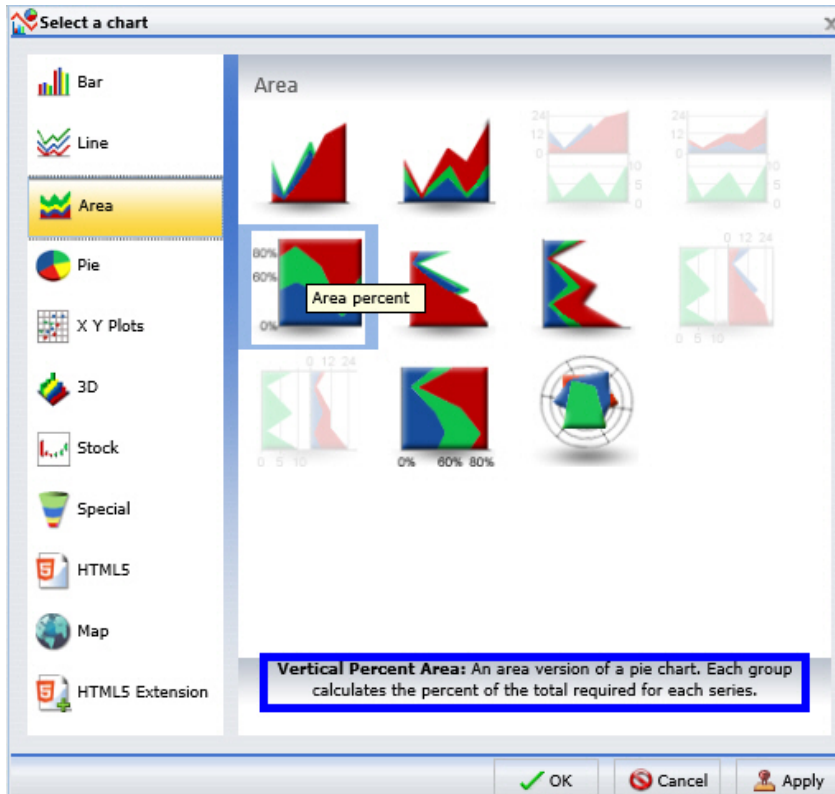
Documents

The following new features have been added for documents.

Ability to Sort in an Active Dashboard

You can now sort values (ascending or descending) in an active dashboard. This option is specified on the Active Dashboard Properties dialog box, as shown in the following image.
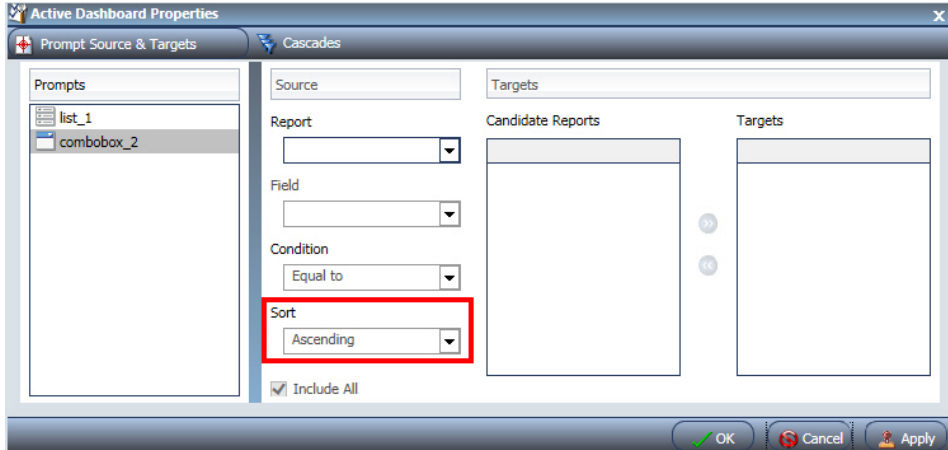
Inserting Images in Documents

When working in document mode, you can insert existing images from your WebFOCUS Content folder or browse to any other directory in the repository that contains the required image files. The Open dialog box is shown in the following image.
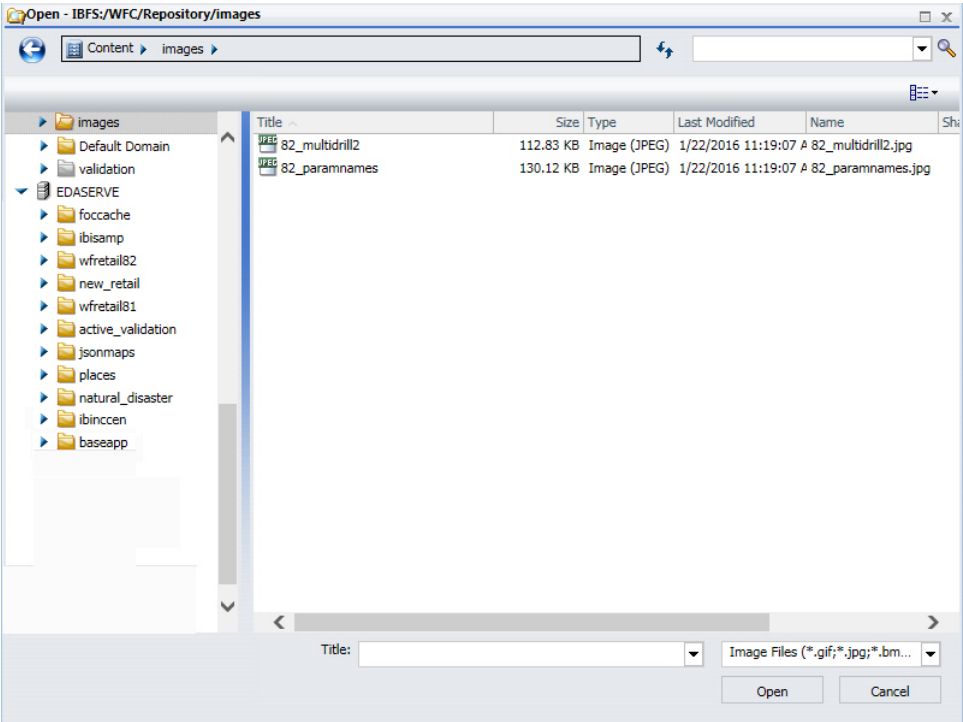
General

The following general new features have been added.

Using Auto Linking to Connect Reports and Charts in Your Development Environment

Using the powerful features of Auto Linking, you can connect reports and charts in your development environment. Auto Linking enables you to dynamically link HTML reports, active reports, and HTML5 charts with a single report or chart in any format, based on their common sort (BY) fields and parameters references in any filters. You set one report as your Auto Link enabled report. This sets the reports or charts that can be auto-linked. In addition, you must also set reports or charts to be Auto Link targets.

Once your reports and charts are set with the relevant parameters, they display, at run time, in a cascading list, as shown in the following image.

Note: This new feature is available in Report and Chart mode only.

New Multi-Drill Functionality

You can create multiple drill-down links on a data field to external procedures or websites using the Drill Down dialog box. This is accessible from the Drill Down option in the Links group on the Field tab. You can also access this functionality by right-clicking on a data field in the Query pane. A configured multi-drill scenario is shown in the following image.

Note: This new feature is available in all modes, except Visualization mode.
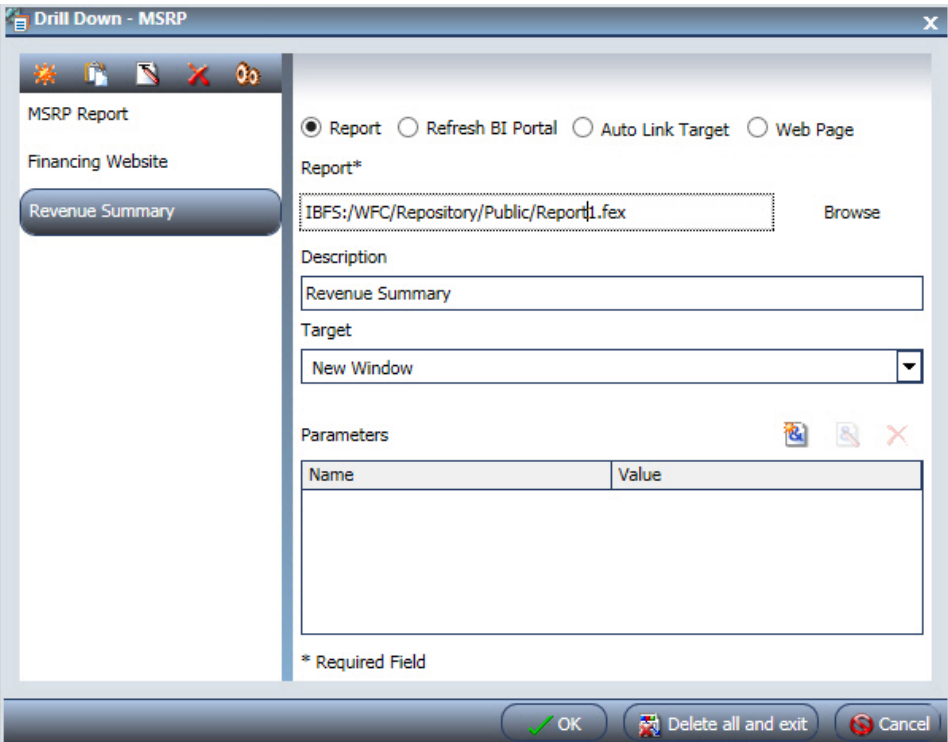
When you run the report, the multi-drill links that you defined display when you click on a hyperlinked component of the report, as shown in the following image.

When working with charts, the multi-drill items that you created display when you hover over an area of the chart for which you configured a multi-drill setting.

Replacing Existing Data Fields in the Query Pane

You can replace an existing field in the Query pane by dragging the new field from the Data pane so that it is over the data field in the Query pane. You can also drag fields from other field containers in the Query pane over a field in a different field container. A dotted line displays, indicating that this field will replace the existing field, as shown in the following image.
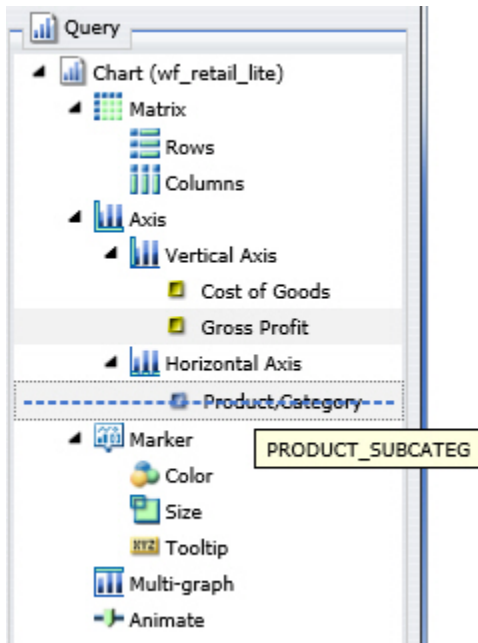
Release your mouse to confirm placement of the new data field. When replacing data fields, InfoAssist+ displays the field name of the replacement data field in a tooltip.

Multi-selecting Fields for Deletion in the Query Design Pane

In the Query Design pane, you can select and delete multiple data fields at one time. Press the Ctrl key, select two or more data fields, right-click, and then click *Delete*, as shown in the following image.
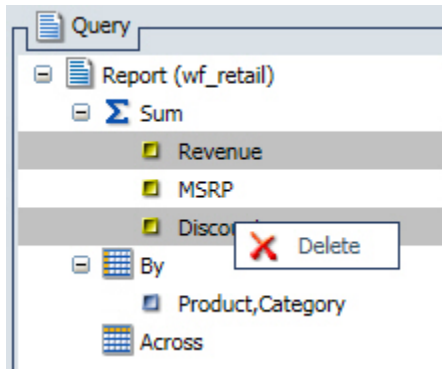
Enabling the Display of Missing Values for a DEFINE or COMPUTE

When working with DEFINEs and COMPUTEs, you can use the Missing Values option to enable or disable the display of missing values for a DEFINE or COMPUTE field. This allows you to accurately display missing values in reports, charts, and visualizations. The Missing Values option, which is accessible through the Additional Options button, is shown in the following image.
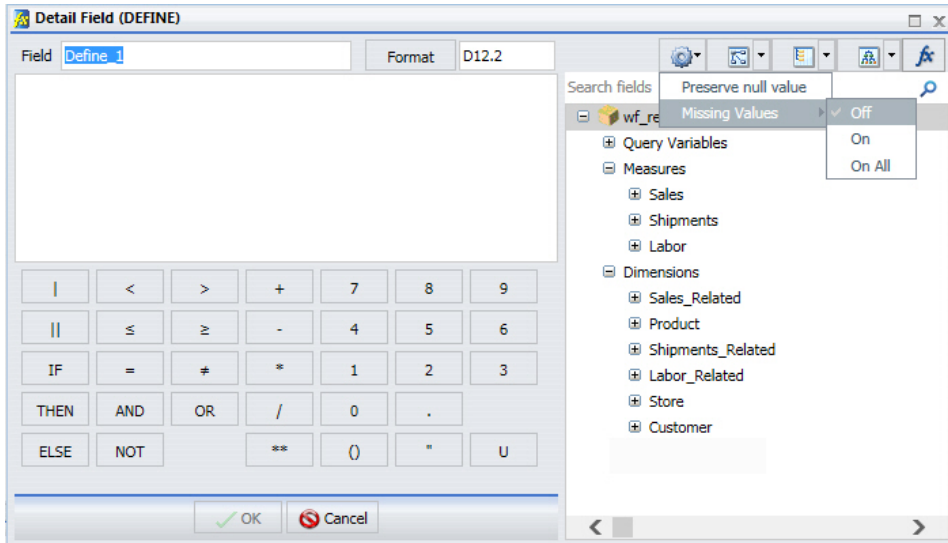
Search and Type Ahead When Creating Filters

When creating a filter, you can use the Search option to locate records in the list of values that displays, as shown in the following image.

Note: This new feature is available in all modes, except Visualization mode.
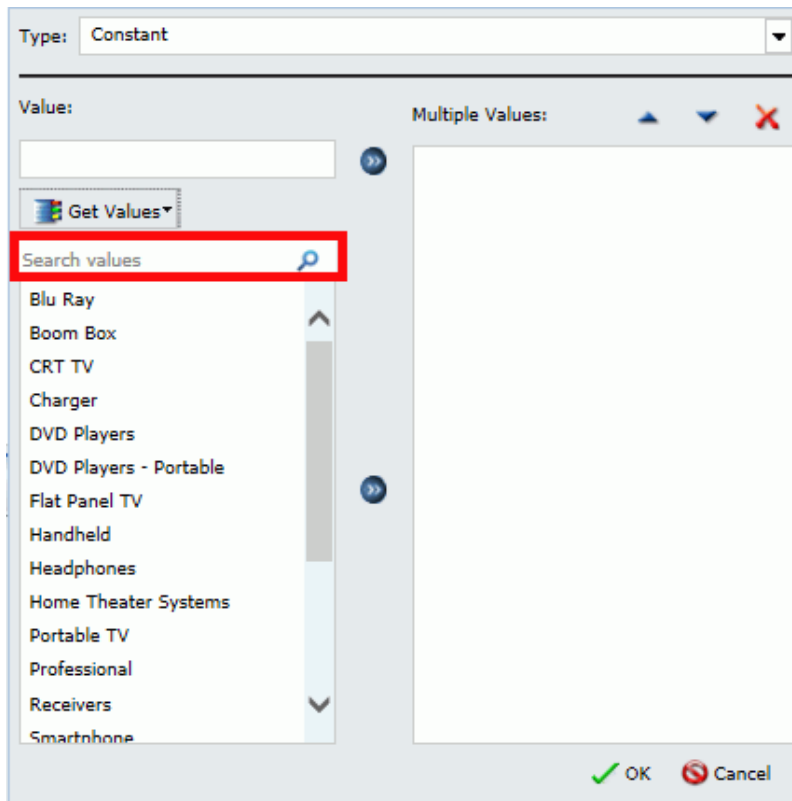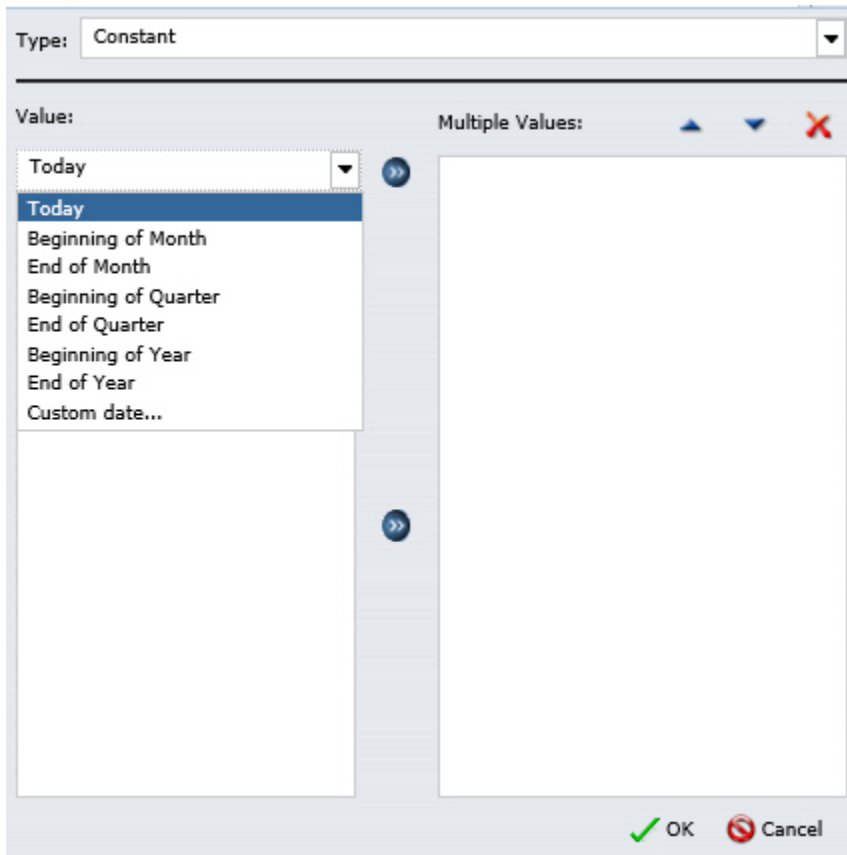
This functionality supports the ability to type ahead, as well as the use of wildcards, such as asterisks, to identify the values to include.

Integration of the Time Functions in the InfoAssist+ Filter Dialog Box

When working with date fields in the Filter dialog box in InfoAssist+, the Value field is set to Today. You can optionally select Beginning of Month, End of Month, Beginning of Quarter, End of Quarter, Beginning of Year, End of Year, or you can specify a custom date using the calendar that displays when you make that selection. The options in the Value field are shown in the following image.

Note: This new feature is available in all modes, except Visualization mode.

Additionally, if you create a filter on a full date field, the Value field will have a calendar icon adjacent to it, as shown in the following image.

You can use this icon to select a date using a calendar control.

Renaming a Report or Chart Component

You can define a custom title for a report or chart component in the Query pane by right-clicking on the component and clicking *Rename*, as shown in the following image.
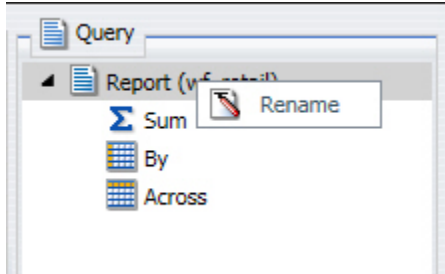
This allows you to override the default value of Report (data source) or Chart (data source). In addition, when working in Excel format, the name that you provide is used as the worksheet name in the workbook that is generated at run time.

Support for Double-Click on Folders in the Data Pane to Expand or Collapse Contents

When navigating folders and content in the Data pane, you can now double-click a folder to expand or collapse its contents. This applies to folders based on the hierarchy of your data source. It does not apply to fields that have additional fields within them.

You can also use the arrow adjacent to the folder name to expand and collapse folders.

New Default StyleSheet

In InfoAssist+, there is a new default StyleSheet, Warm.sty. It uses a clean and simple layout and design. You can take advantage of this StyleSheet when working with styling options for your reports and charts. It offers consistent text and color schemes, as well as a common look and feel. The primary difference between Warm.sty and ENWarm.sty, which is the new default StyleSheet for the WebFOCUS toolset, is that the selected font in Warm.sty should be language specific. This StyleSheet is selected, by default, in the Options dialog box, as shown in the following image.
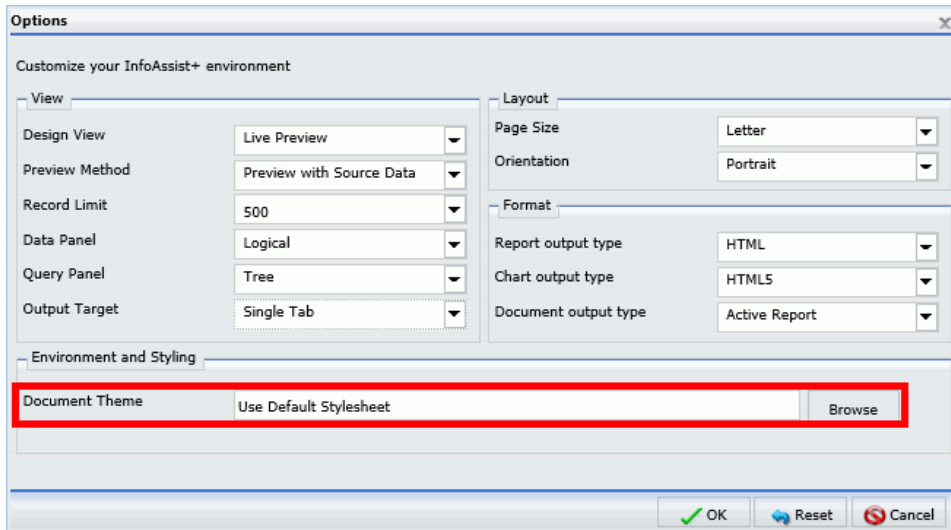
The Warm.sty StyleSheet is stored in the following directory: c:\ibi\WebFOCUS82\IBI_HTML \ibi_themes

Changes to the Themes Dialog Box

In InfoAssist+, the Environment and Styling area provides settings for styling reports and charts through the specification of a Document Theme. Click the *Browse* button to open the Templates - Browse predefined template files dialog box, in which you can search for an existing WebFOCUS StyleSheet. The default StyleSheet is Warm.sty, but you can select from the other themes that are available (Dark.sty or Flat.sty).

StyleSheets are stored in the following directory of your WebFOCUS installation:

drive:\ibi\WebFOCUS82\IBI_HTML\ibi_themes

In addition, you can access a repository of additional themes by accessing the Legacy Templates, under Libraries, as shown in the following image.
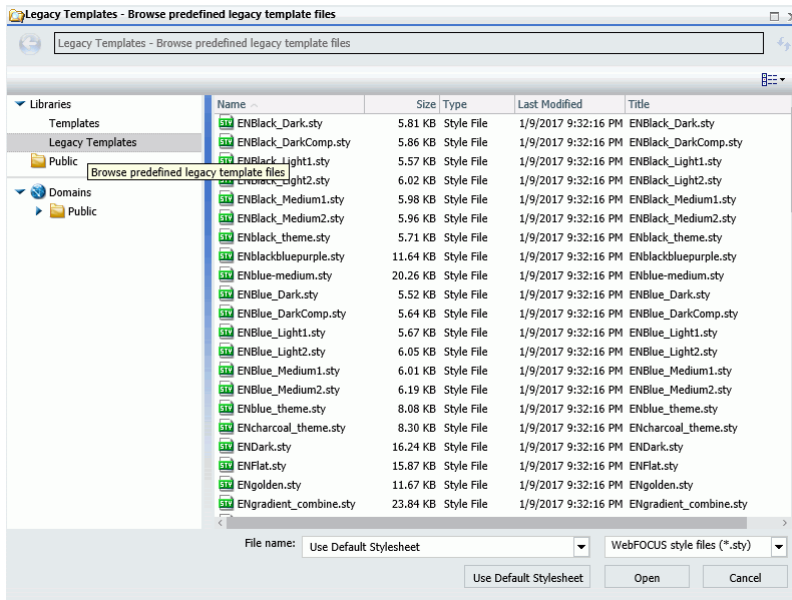
The theme that you select determines the coloring and hues that display within InfoAssist+, as shown in the following image.
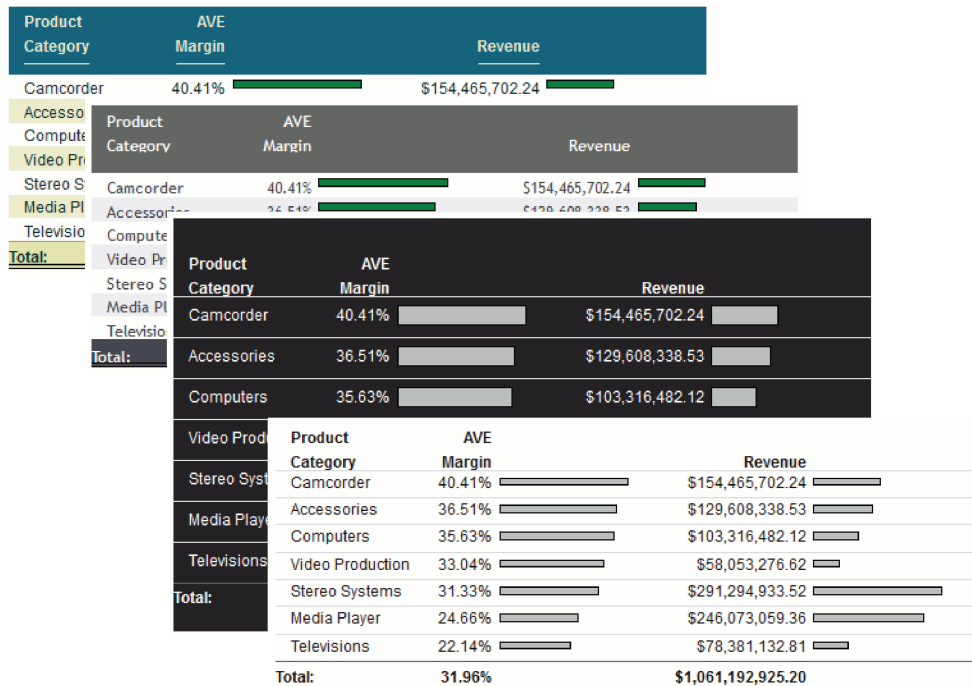
The default templates in the Templates section apply to all languages, whereas some of those in the Legacy Templates sections are specific to just one language (for example, EN=English).

Change in Default State of Excel Formats in InfoAssist+ Global Preferences

The default values for Microsoft Excel include: Excel 2000 format, Excel 2000 Formula, Excel 2007 Format, and Excel 2007 Formula. Enabled by default, you can modify their display by disabling them in the WebFOCUS Administration Console, in the Format tab section.

Updates to the Save As Dialog Box

When saving a read-only, non-writable procedure (.fex) in the Save As dialog box, the first writable folder is selected in the Resources tree, by default.

Opening Multiple Dashboards or Visualizations

From within InfoAssist+, you can use the Open option on the Quick Access Toolbar or the Application Main Menu to open one or more dashboards or visualizations at the same time. The Open option on the Application Main Menu is shown in the following image.
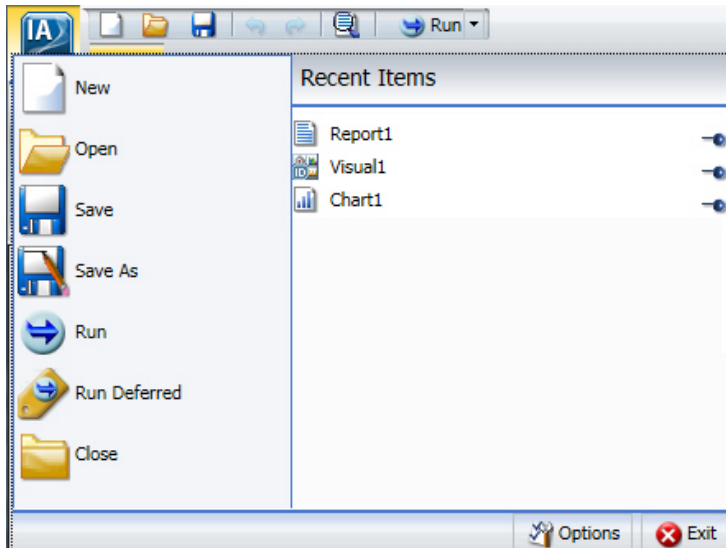
Using Field Containers to Control the Display of Data

InfoAssist+ provides a number of field containers that allow you to control the display of data. Field containers, which are part of the Query pane, hold the data fields that you select for inclusion in your report, chart, or visualization. This can be for an axis of a bar chart or the color of the pie slices in your pie chart. To add a data field to a field container, you can double-click a data field in the Data pane, or drag the data field to the desired field container. You can also rearrange data fields once they have been placed into a field container.

Some field containers are used for developing matrix charts, while others add size, color, and tooltip information to your chart or visualization. For example, the Tooltip field container allows you to specify the display of information in the tooltip for a data field that you place in this field container. Once you have added fields into certain field containers, InfoAssist+ allows you to specify additional options on the Field tab or through the shortcut menu. For a full list of field containers in InfoAssist+, see the InfoAssist+ Online Help.

The field containers that are available for charts are shown in the following image.
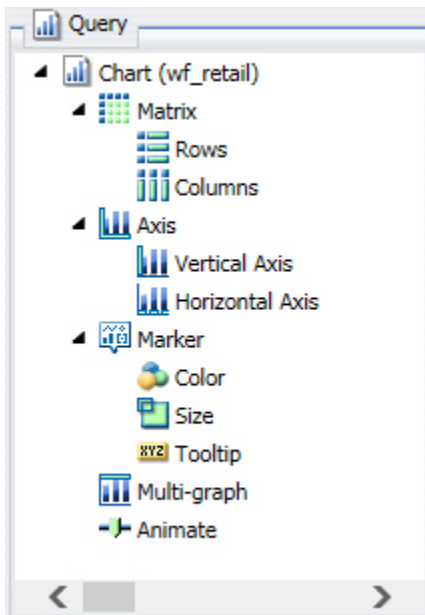
RStat Scoring Routines in InfoAssist+

RStat Scoring Routines have been added to InfoAssist+. The Define and Compute functionality in InfoAssist+, which is used to create virtual fields, supports the use of functions. These functions can be used to create expressions and calculations for use in your reports and charts.

Predictive models or scoring routines, built with the separately licensed WebFOCUS RStat for Predictive Analytics, allow you to add predictive analytics to your reports and charts in InfoAssist+. In order to access a scoring routine, an administrator or other designated individual must first deploy the scoring routine using App Studio. Once the scoring routine is deployed, it will appear in the RStat Scoring Routines folder and can be used when creating a virtual field. The following image shows RStat Scoring Routines that have been deployed and are ready for use.
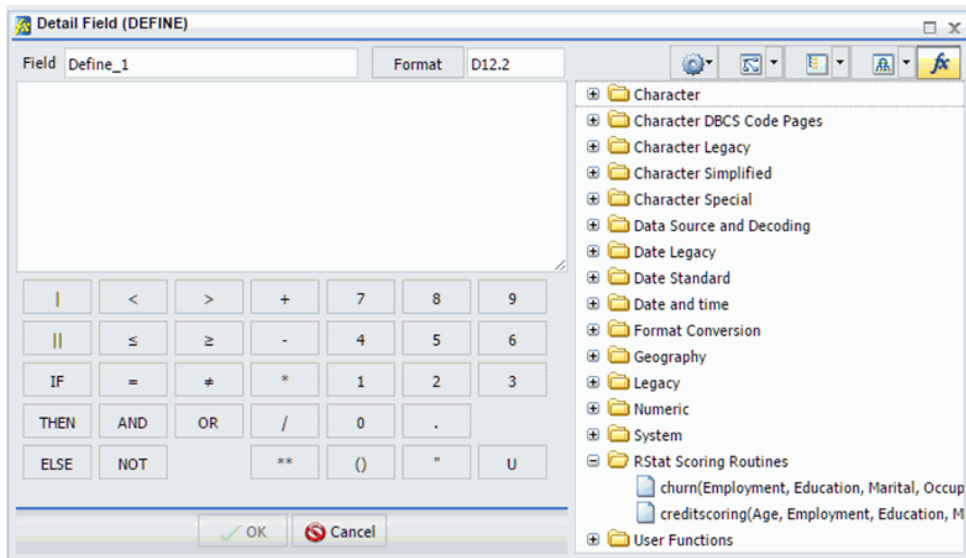
Updated InfoAssist+ Splash Screen

The InfoAssist+ splash screen has been updated with the new Build a Visualization option. Selecting this option brings you directly to Visualization mode in InfoAssist+, where you can build visualizations and create storyboards. The updated splash screen is shown in the following image.
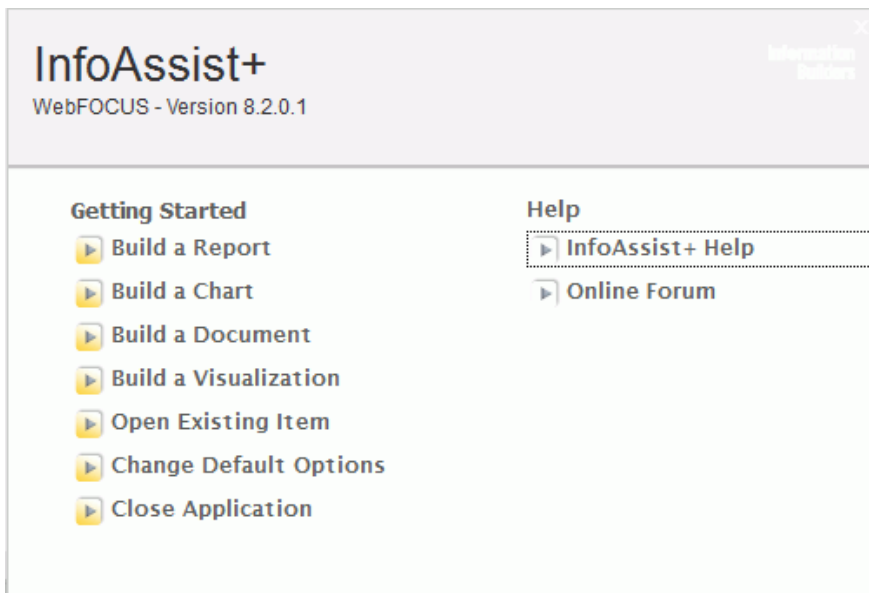
Running a Report or Chart with Default Parameter Values

From the Quick Access toolbar, you can now seamlessly run a report or chart with default parameter values. If you have parameters defined, the default value is the first data field defined for the parameter. If you do not have parameters defined, the report or chart will run, regardless.

The Run with Default Parameter Values option is shown in the following image.
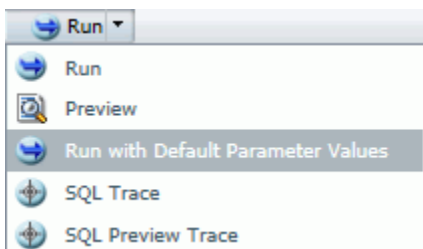
App Studio Enhancements

App Studio is a Windows-based GUI development environment for creating WebFOCUS applications. App Studio provides innovative features and functions that simplify development, thereby allowing you to concentrate on interface design, business logic, and data manipulation. Features include data visualization, color exception reporting, intelligent drilldowns, and the ability to generate HTML pages without writing code.

Environments and Data

The following are new features and enhancements for environments and data in App Studio Release 8.2 Version 01.

App Studio Upload Data

Previously, the App Studio Upload Data function opened an explorer window which you used to select a file to be uploaded.

Now, the App Studio Upload Data function links you to the Upload Desktop File utility in the Reporting Server Console, as shown in the following image. Using this utility, you can upload new data to an application. The data is converted using default master data options and is displayed for your verification before the load is initiated.

You can access the Upload Desktop File utility from the Environments Tree panel in two ways:

❑ Right-click a folder under Domains and select *Upload Data*, or

❑ Right-click an Applications folder under Data Servers and select *New* and *Upload Data*.
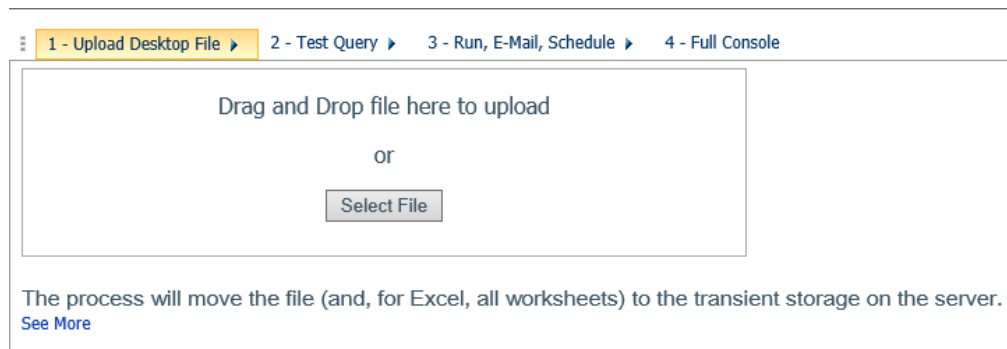
Show Master File Descriptions

You can now use a new reporting option to display Master File suffixes and descriptions in the Environments Tree, and in the Chart Wizard and the Report Wizard. In the App Studio Options dialog box, click *Reporting*. The new Retrieve master file descriptions option appears, as shown in the following image.
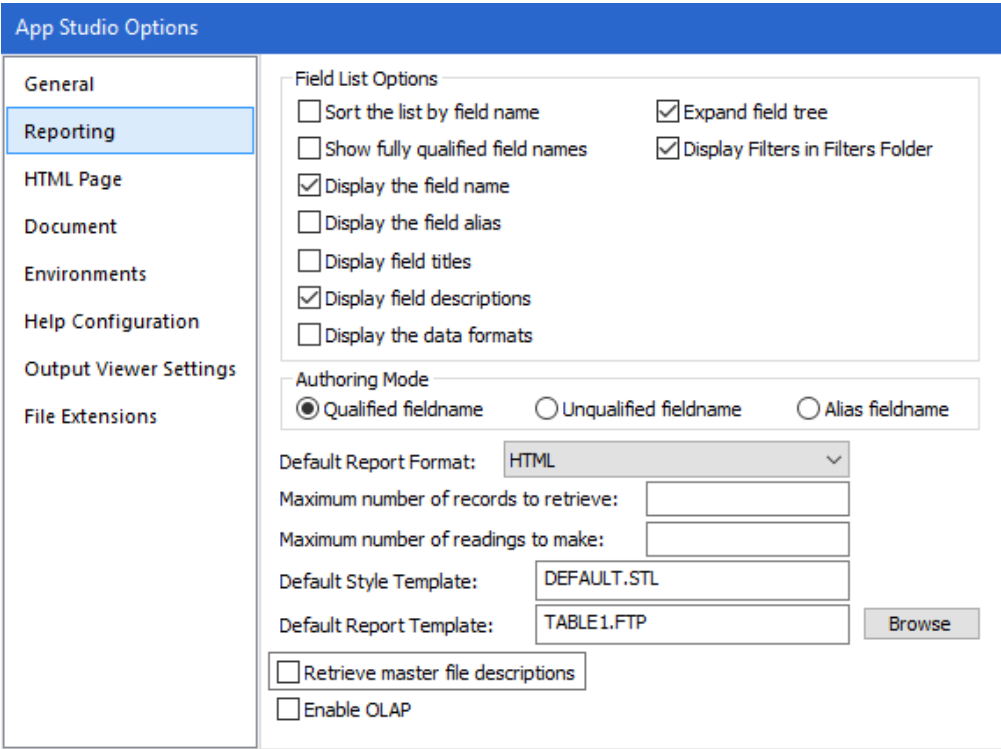
System performance may be affected if there are a large number of Master Files. The default value is unselected. If you change this option, you must exit App Studio and reopen it for the change to take effect.

Supported File Extensions

A File Extensions tab has been added to the App Studio Options dialog box. This tab lists the currently supported file extensions which are all checked by default, as shown in the following image. You can clear the check box for any file types that you do not want retrieved from the server. Limiting the file types may result in improved performance. You must exit and restart App Studio for your selections to take effect.
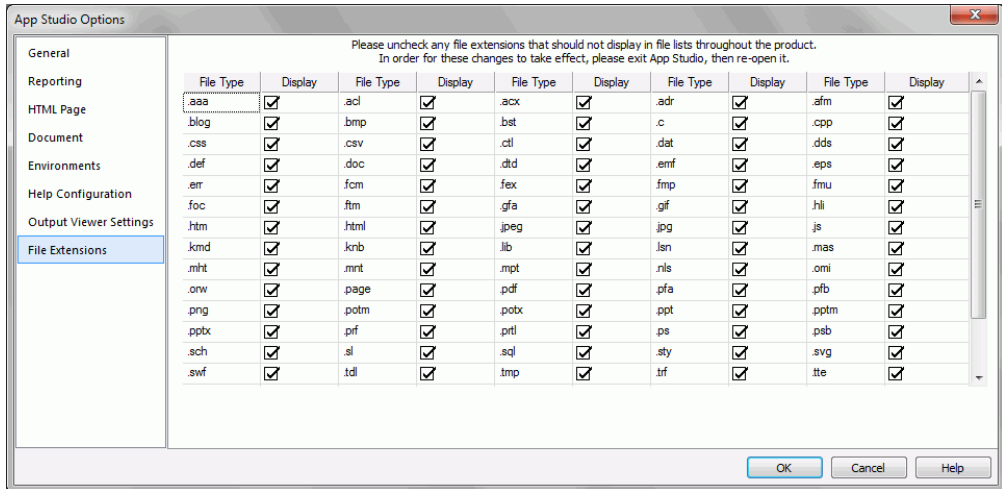
Blending Data

The Blend option has been added to the Join group on the Join tab, as shown in the following image.
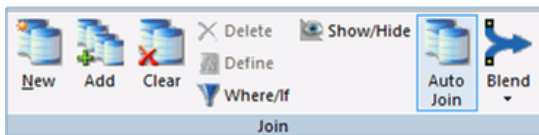
Blending data is the process of gathering data from various sources and combining the useful data into a customized, functioning data set. For example, you may have some of the basic fields available in the current data source. You can use the Blend option to add relevant data fields from a different data source to the current data source in order to create a unique data set.

The Blend functionality allows you to explicitly select the data fields you want to include. More specifically, you can join multi-fact data structures and combine pertinent external data into your current data source, creating a blended data resource. This can be from local or other system resources.

General Functionality

The following are new features and enhancements for general functionality in App Studio Release 8.2 Version 01 and Release 8.2 Version 01M.

Microsoft Team Foundation Services (TFS) Source Control

WebFOCUS Release 8.2 Version 01M includes a new web-tier Source Control implementation. At this time, Microsoft Team Foundation Services (TFS) is supported. Additional version control systems will be supported in upcoming releases. Source Control functionality is available through App Studio and provides version control for your individual and multi-user application resources. The Source Control system manages access to source code and keeps track of all code changes.

Once your Source Control provider is configured in the WebFOCUS Administration Console, you can use the Configured Environments Tree to check out and check in WebFOCUS files through the App Studio interface. A Source Control system allows a user to check out a file for editing and prevents other users from checking it out until the first user checks it back in.

When you start App Studio, it checks your system to determine if WebFOCUS is configured for Source Control, and if so, it enables the optional use of that product for the management of App Studio application resources through the Source Control integration.

The Source Control feature provides many benefits, including the following:

❏ A valuable feature for companies that need to audit changes made to their applications.

❏ A repository to store your source code, providing backup in a central location.

❏ A historical record of changes over time.

❏ Ability to review and compare changes.

❏ Ability to retrieve a specific version of a file.

❏ Ability to compare files between WebFOCUS and Source Control.

Learn More

For more information, see the *WebFOCUS App Studio User's Manual* in the App Studio Technical Library.

Auto Drill for Reports, Charts, and Visualizations

App Studio supports Auto Drill functionality for reports, charts, and visualizations. This new feature lets you automatically create dynamic hyperlinks that enable you to drill down and pass parameters to existing reports, or to ad hoc reports that are generated on the fly. This allows you to quickly explore your information and gain better analytical insights, while eliminating the need to manually build numerous drill downs.

Learn More

For more information, see the *WebFOCUS App Studio User's Manual* in the App Studio Technical Library.

Copy From the File/Folder Properties Panel

You can now copy a property value from the File/Folder Properties panel. Right-click a property value and click *Copy* to copy it to the clipboard, as shown in the following image.
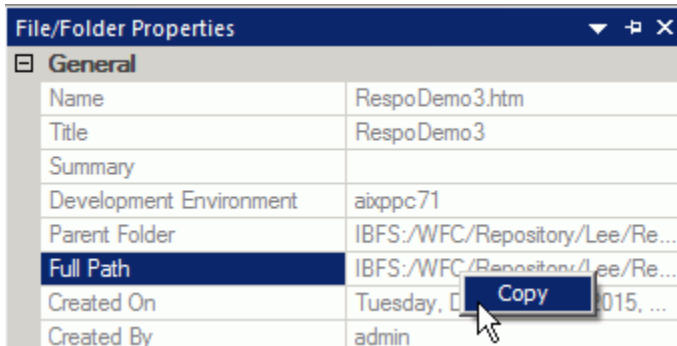
This is particularly useful if you want to capture the full path of an open file.

Auto Open Folder

You can now set a Content folder to be open using the new Automatically Open property on the File/Folder Properties tab. This saves you from having to click to expand a commonly used content folder each time you initiate a new App Studio session.

Neutral StyleSheet

Both the Report and HTML canvases in App Studio use a new theme as the default StyleSheet. This theme, known as a Neutral theme, is in keeping with the industry standard of simplicity.

Navigator Page Removed From Wizards

The navigator pane has been removed from the Report/Chart, SQL Report/SQL Chart, and HTML/Document Wizards when using the shortcut menu. Since you have already selected where you want to add content, the navigator pane is no longer necessary.

Previously, when right-clicking a folder in the Environments Tree panel, the first page of Report/ Chart, SQL Report/SQL Chart, and HTML/Document Wizards included a navigator pane.

Now, when you select *Report* or *Chart*, you are immediately presented with the Select Data Source (formerly named Select a Master File) dialog box, as shown in the following image.
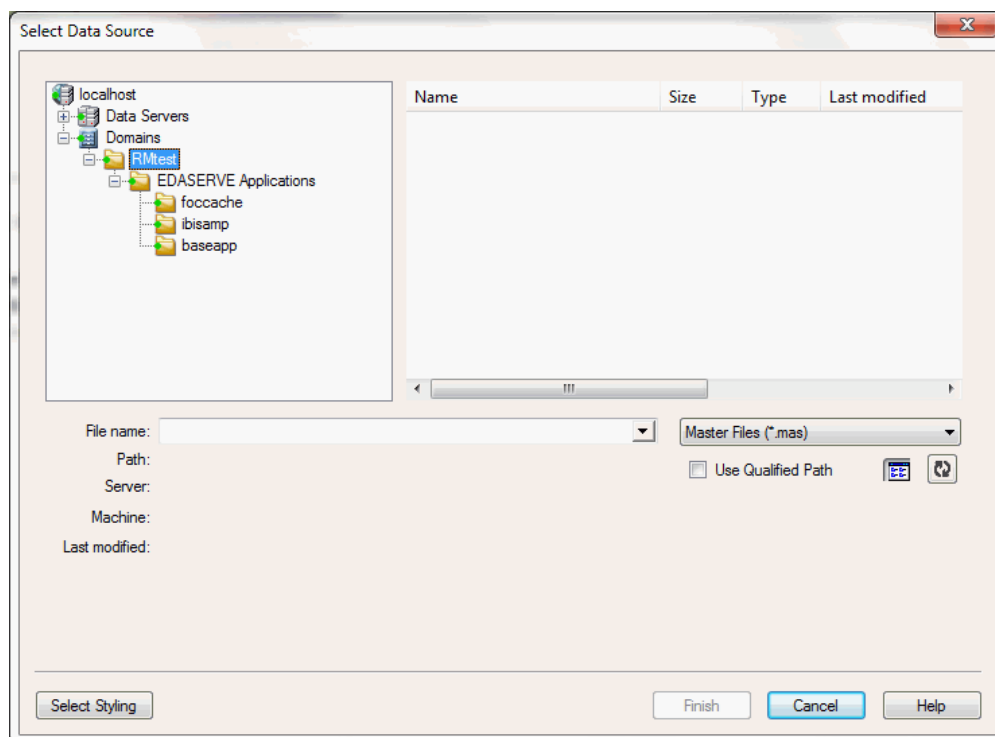
When you select *SQL Report* or *SQL Chart* from the shortcut menu, you are immediately presented with the appropriate SQL Report Wizard - Welcome (or SQL Chart Wizard - Welcome) page, as shown in the following image.
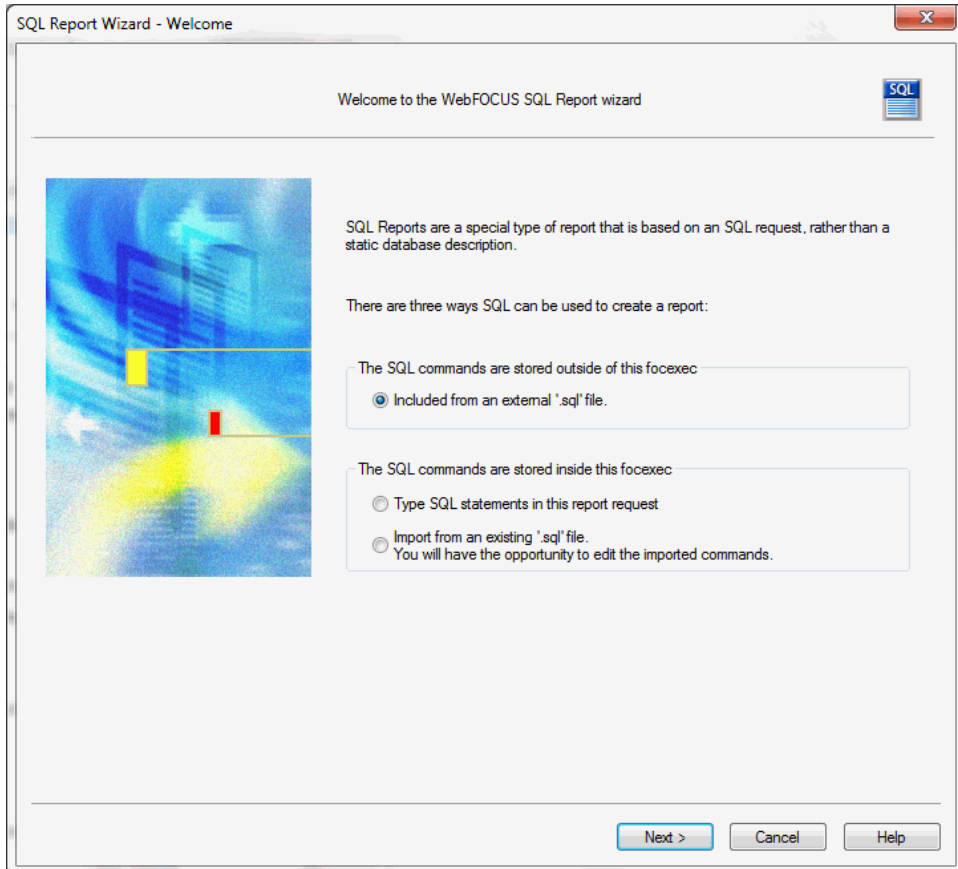
When you select *HTML/Document* from the shortcut menu, the first page of the wizard enables you to create a new HTML page or document, or select an existing one, as shown in the following image.
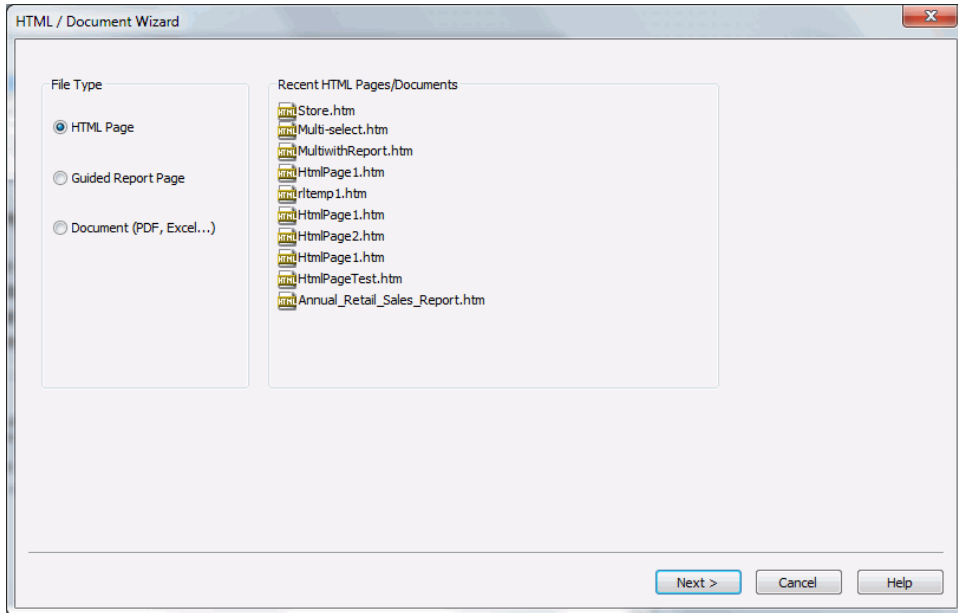
Default Action for Double-Clicking

Previously, you could select the editing tool to open a file when right-clicking on it in the Environments Tree or Environments Detail panels, but you could not select when double-clicking the same file. Double-clicking defaulted to the Edit in App Studio canvas.

Now, you can set the default action using the Default file editor setting on the General tab of the App Studio Options dialog box, as shown in the following image. The same options are available here as when right-clicking the file.
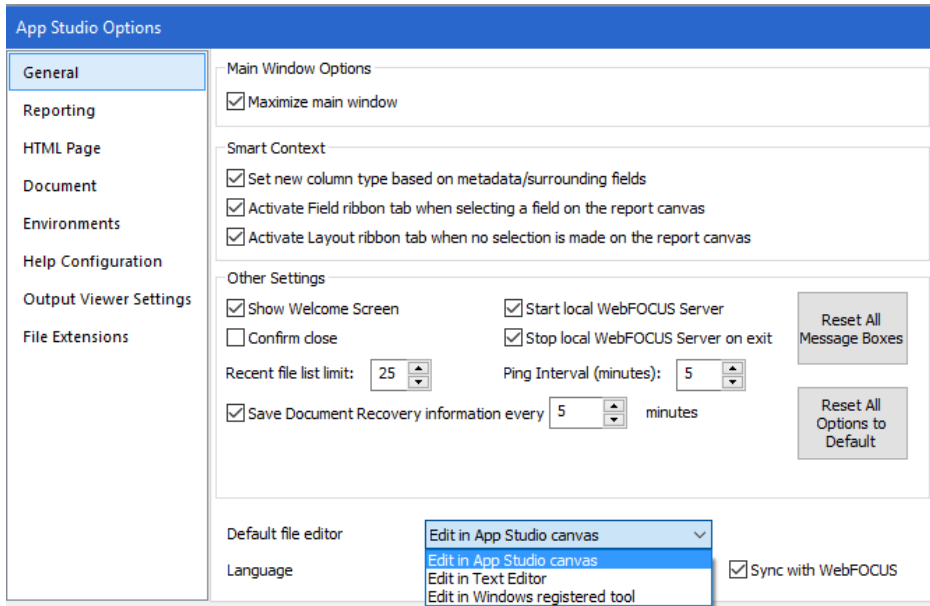
HTML Canvas

The following are new features and enhancements for the HTML canvas in App Studio Release 8.2 Version 01.

Responsive Design and Templates

Responsive web design is an approach to webpage creation where content automatically realigns to fit a variety of different window sizes and screen sizes. This allows the content from one HTML file to automatically adapt to multiple footprints such as a desktop, laptop, tablet, or smartphone.

App Studio supports multiple ways of creating responsive pages:

Responsive Templates

This method lets you create a page by populating responsive Output Widget containers in a pre-defined template. The Output Widget is a feature-rich container that includes an individual title bar, a toggle to show or hide controls, and a toggle to make the widget full screen or original size. You use the HTML/Document Wizard to specify a responsive template that is either row-based or column-based, as shown in the following image.
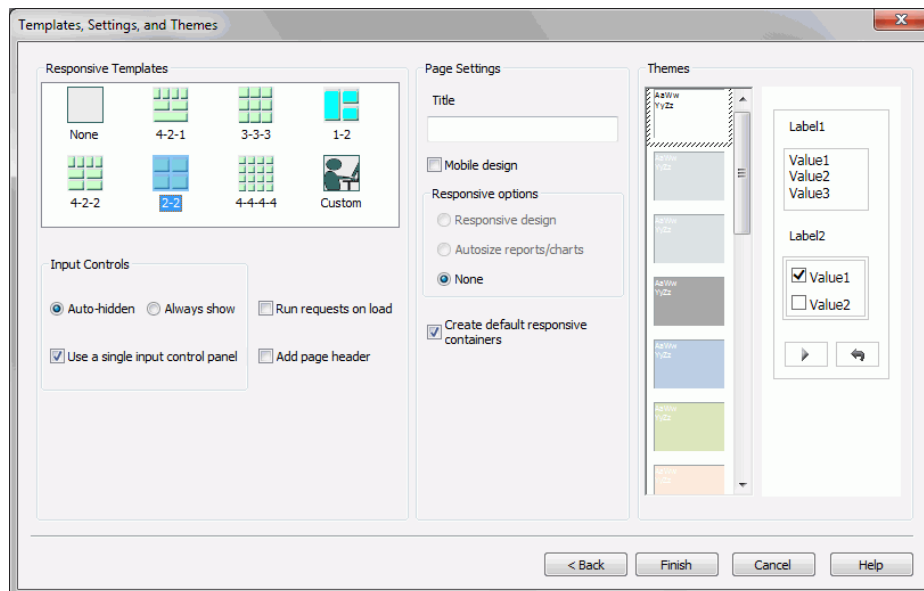
Custom Layouts

This method also uses Output Widget containers, but you can define a custom layout at design time. Using an easy dialog box, you specify the number of rows you want and the number of widgets per row.

The HTML Canvas in Responsive Mode

This "free form" method lets you create a responsive page with no pre-defined layout. This manual approach is perhaps not as fast as using a template, but may be preferable if you want to create a responsive page with containers of many different types. This method is also very useful if you want to convert an existing HTML file to responsive.

Learn More

For more information, see the *App Studio User's Guide* in the App Studio Technical Library.

Or click here to watch the Key Feature video now!

Maintain Data

App Studio Maintain Data is an application development feature, which creates web-based data maintenance applications. Using App Studio Maintain Data and its multi-platform 4GL language, you can easily create, test, and deploy complex business applications that span the Internet, IBM mainframes, midrange servers, and workstations.

Using App Studio Maintain Data, you can:

❏ Easily develop web-based data maintenance applications with no prior knowledge of HTML, Java®, or complex 3GLs.

❏ Access and update data on every major operating system and every major database system (using the power of the Reporting Server).

❏ Access and update data from different platforms at the same time. For example, the inventory system on MVS and the accounting system on UNIX.

❏ Partition your application among the platforms that can support them.

To develop an application in Maintain Data, you can:

❏ Use Update Assist, which provides a simple way to create web-based data source file browsers and data maintenance applications, without having to write code.

❏ Use the Language Wizard in the Maintain Data Editor, which prompts you to answer questions about the logic you need to create, and automatically generates the required commands.

❏ Code the commands yourself in the Maintain Data Editor.

How App Studio Maintain Data Works

Using the HTML canvas in the Repository area, you develop the application front-end (or user interface). Then, you develop the code that extracts data from your data sources and updates the data sources with new data. When a Maintain Data file is added to an HTML page, it displays as a request in the Requests & Data Sources panel. Maintain Data requests display all functions, data sources, forms, variables, stacks, and parameters that are used in the Maintain file. You can create new functions, variables, and stacks, as well as adding additional data sources and parameters, by using the shortcut menu on the nodes.

You can use the Components and Controls tabs, along with the Requests & Data sources, Settings, and Tasks & Animations panels to take full advantage of the HTML canvas and create robust Maintain applications. With the addition of Maintain Data as an HTML canvas request type, Maintain Data procedures can be embedded or referenced, just like other procedures used on HTML pages.

At run time, users start the application and access a Reporting Server where the data or procedures reside. The application extracts data from the data source, displays it for the users to see, updates the data source with new information, and runs any procedures.

The HTML canvas has three new object types that are needed for Maintain Data:

❏ HTML Table: A control to show columnar data display, as well as controls within the table cells, if needed.

❏ Menu: A control that allows creation of a vertical or horizontal menu as seen in many webpages. Each entry can invoke an event.

❏ Grid: A control that lends itself to database updates by allowing the user to type data directly in a grid cell.

Maintain Data HTML pages also inherit the existing functionality of the HTML canvas, for example, animations, use of multipage containers, such as windows and accordions, themes, API functions, CSS Editor, and much more.

Migrating Existing Maintain Procedures

If you have existing Maintain procedures, you can migrate the procedures to App Studio Maintain Data by creating a new HTML page in the HTML canvas and then using the Requests & Data sources panel to create a request for an External existing Maintain. You then select the Maintain procedure file, and the migration process begins.

Learn More

For more information about the Maintain Data feature, you can access the *App Studio User's Manual*, the *Maintain Data Getting Started*, and the *Maintain Data Language Reference* technical content from the App Studio Technical Library.

Or click here to watch the Key Feature video now!

Missing Security Menu Items

Previously, only two options, Access Rules and Effective Policy, were available when you right-clicked a Domain folder and selected *Security* from the shortcut menu in the Environments Tree or Environments Detail panels.

Now, there are four options when you right-click a Domain folder and select Security: Rules, Rules on this Resource, Effective Policy, and Owner.

❏ **Rules on this Resource.** Opens the Rules on this Resource dialog box where you can view and run reports on the security rules defined for the repository.

❏ **Owner.** Opens the Set Owner dialog box where you can set the user, set the group to which the user belongs, and publish.

Note: The Owner option is not available for the folders and files under a Domain, since ownership is set at the Domain level.
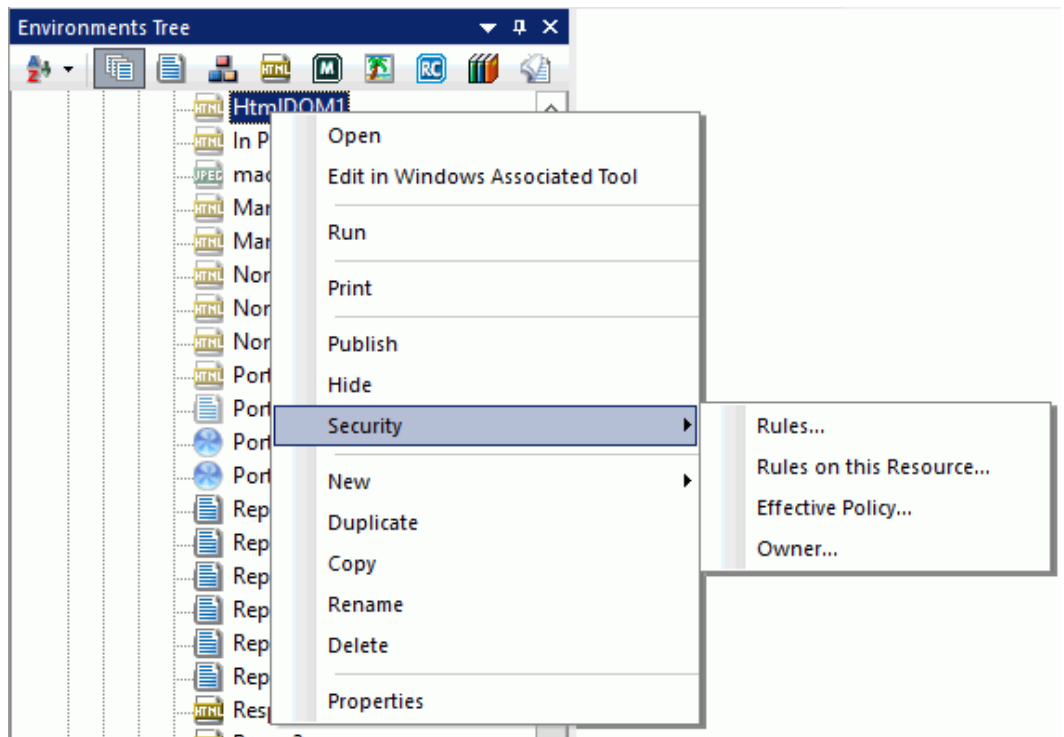
Adding a Size Property for an Object in an HTML Page

A Location property for a selected object has been added to the Style attributes section in the Properties panel in the HTML page, as shown in the following image. This read-only field displays the Left, Top, Width, and Height settings of the object and is displayed in pixels.

Style attributes	
Basic	
Location: Left; Top; W...	460; 140; 250; 230
Color	☐
Font	
Font-size	
Background-color	☐
Display	
Visibility	
Position	absolute
Left	460px
Top	140px
Overflow	
Width	250px
Min-width	
Max-width	
Height	230px
Min-height	

Execution of One Task From Another

You can now run the contents of an existing task from another so that the actions of the selected task will be invoked. An Execute Task option has been added to the Requests selections drop-down menu in the Requests/Actions section of the Tasks & Animation panel, as shown in the following image.
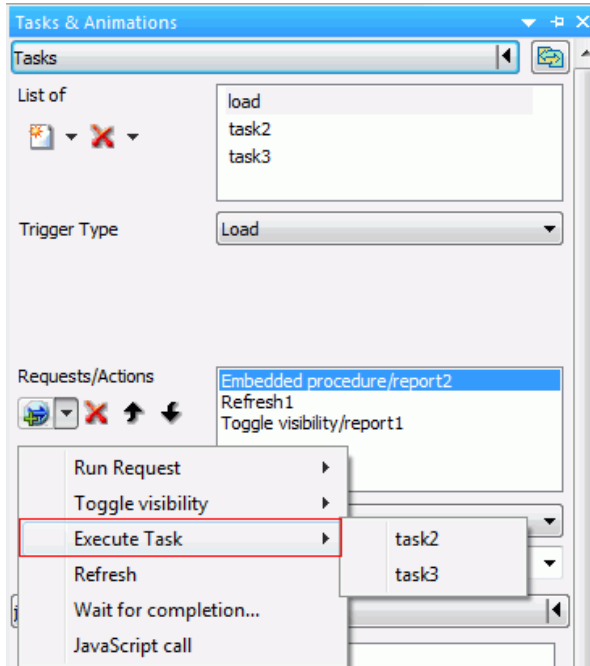
Separate Tabs for JavaScript and Embedded CSS Options

Previously, the App Studio HTML canvas had a combined Embedded JavaScript/CSS tab.

Now, this tab has been divided in two: Embedded JavaScript and Embedded CSS tabs.

Installation and Configuration

The following are new features and enhancements for App Studio in Release 8.2 Version 01 and Release 8.2 Version 01M.

64-Bit Installation

App Studio is now a 64-bit application and must be run on a 64-bit operating system. This change enables it to make use of larger models and databases and allows for integration with 64-bit RStat and the 64-bit Reporting Server.

French Language Support

App Studio Release 8.2 Version 01M provides support for French during the installation process of the App Studio product. The languages presented during the installation process depend on the system locale of your machine. When the locale is set to English, English and French are available from the Language drop-down list. App Studio will be configured to use the language you select during the installation process. When French is selected, the App Studio user interface is configured to be in French. You can update the language App Studio uses post-installation, using the Language selection drop-down list on the General tab of the App Studio Options dialog box.

Learn More

For more information, see the *App Studio Installation and Configuration* technical content from the App Studio Technical Library.

Language Support in App Studio

You can change the language of the App Studio screen text using the Language drop down list. After you change the language, you must restart App Studio.

The Language option has been added to the General tab on the WebFOCUS App Studio Options dialog box, as shown in the following image. The languages listed are selected in the Dynamic Language Switch setting in the WebFOCUS Administration Console.

Dynamic Languages

In App Studio, you can dynamically switch to another language to display screen text in that language. Available languages are determined by your settings in the WebFOCUS Administration Console.

Now, you can additionally enter your file and folder titles and summaries in multiple languages using the new Language Properties dialog boxes. The following image shows the Language Properties dialog box for title. The Language Properties dialog box for summary is identical, except the right-most column heading is Summary.
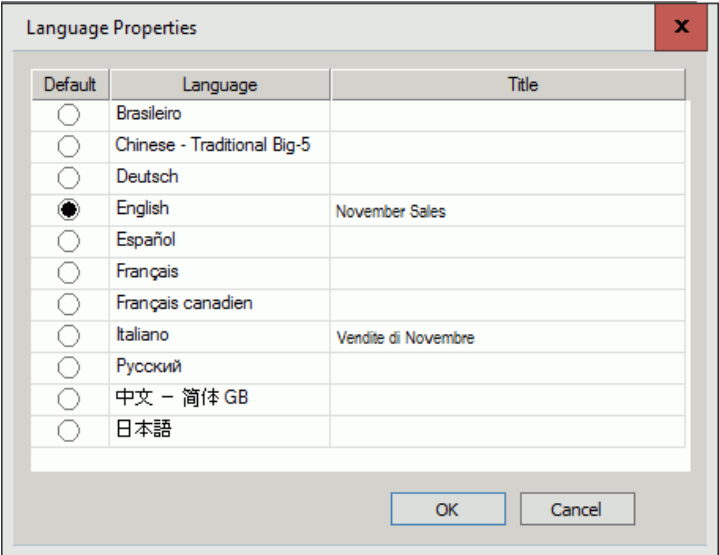
When you enter a title or summary for a language in the Language Properties dialog box, that text automatically appears when you switch to the specified language. This can help streamline your collaborative, multi-language development work.

Preview Responsive HTML Pages

A Preview Runtime option has been added to the Preview group on the App Studio Utilities tab. It is available for Responsive HTML pages only and uses your default browser to preview your HTML run-time layout with simulated data. This may be faster than running the page if it contains large amounts of data.

Progress Bar

App Studio now displays a progress bar while the product is loading, as shown in the following image.
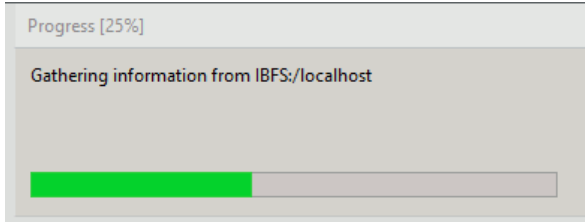
Launching in Safe Mode

On rare occasions, App Studio may fail to initialize correctly. If this happens, you can start the product in safe mode.

On the Start menu in Windows, there is a new option in the Information Builders section. Immediately below *WebFOCUS App Studio* is *WebFOCUS App Studio (Safe Mode)*, as shown in the following image.
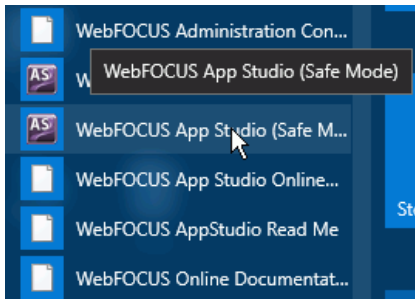
Physical View

When viewing Domain folders in the Environments Tree, you can now use the shortcut menu to toggle between Physical View and Shared View, as shown in the following image.
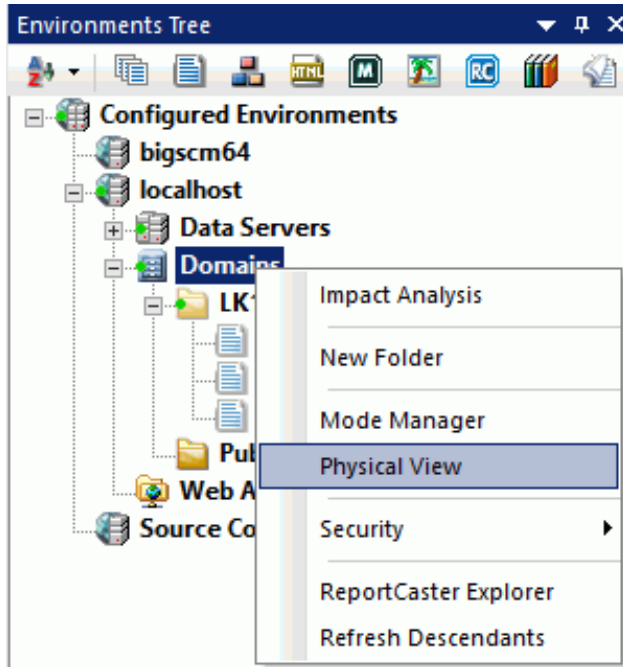
Physical View displays all folders (including empty folders) in the hierarchy that includes shared content. Shared View suppresses empty folders in the hierarchy that includes shared content. Shared View displays all folders that contain shared content.

Mapping

The following are new features and enhancements for creating and working with maps in App Studio Release 8.2 Version 01.

Maps: HTML5 Viewer and Developer UIs

The App Studio Esri map component allows you to visualize your BI data superimposed on background maps (basemaps) available from ArcGIS Online using any commonly used geographic dimensions, for example, countries, states, and cities.

The Esri HTML5 Viewer enables developers to create map applications using a simple User Interface for configuring map layers, properties, interactions with other components and controls on an html page.

Following are the configuration steps needed to generate a map application using the Esri HTML5 Viewer:

1. Create a standard WebFOCUS report with appropriate geographic dimensions in XML format. The geographic dimensions can be supplied as X (Longitude) and Y (Latitude) values or geographic areas such as State, Country, Cities, Zip3, or Zip5.

2. Create a new HTML page, click the Esri component on the ribbon, and drag the mouse on the canvas to create a frame for the map component. Select a background map image (basemap) on the Properties panel.

3. Use the Settings panel for the Map Component to select a geographic role and the field that represents that role, and configure one of the many symbol options, for example, Color or Size. You can also turn on advanced visualization options for example, Clustering, Heatmap, Popup, and Transparency.

When you run the HTML page, the run-time viewer contains all of the layers you configured in the previous steps, with a set of widgets you can use to interact with individual map layers, as shown in the following image.
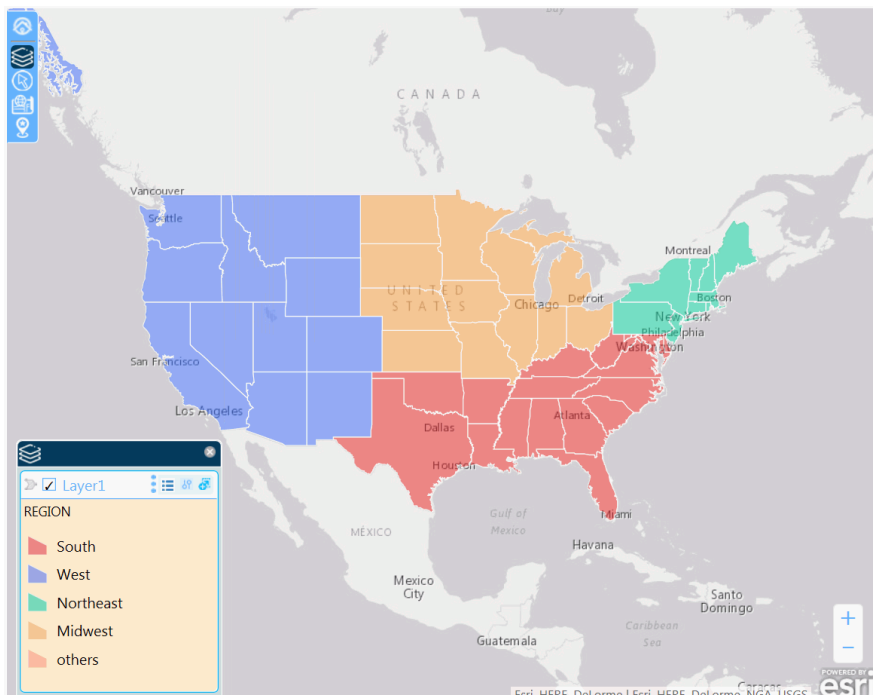
Learn More

For more information, see *Creating Esri Maps* in the App Studio Technical Library.

Or click here to watch the Key Feature video now!

Managed Geographic Roles

The Reporting Server configuration file geo_services.xml contains elements that describe all of the geographic roles known to the server. The geographic role selections that you can make in the WebFOCUS tools when you configure a map layer are built dynamically using this configuration file. To add a custom geographic role, you must add the necessary elements to this file.

For example, the known geographic role, Country (Name) is defined as follows.

```
<geo_role id="COUNTRY" type="alpha" role_name="COUNTRY"
role_name_title="Country"
      role_format="NAME" role_format_title="Name" geo_type="geography">
      <vocabulary_rules><vocabulary>+%country%-%capital%-%population%</
vocabulary>
      </vocabulary_rules>
 </geo_role>
```

The Country geographic role is part of the World hierarchy, part of which follows. Defining the hierarchical relationships between geographic roles provides WebFOCUS the information it needs to perform Auto Drilling from a geographic role at a higher level of the geographic hierarchy to a role at a lower level of the geographic hierarchy.

```
<hier id="world">
  <lev level="1" geo_role="CONTINENT"/>
  <lev level="1" geo_role="CONTINENT_ISO_CC"/>
    <lev level="2" geo_role="COUNTRY"/>
 …
</hier>
```

Also needed is the URI to the Esri map service that visualizes this role. This provides WebFOCUS information about where to draw the shapes for individual geographies. This URI can be either a GeoJSON object, an Esri Mapservice URL, or any spatial database. For example:

```
<uri description="World Countries (ISO2 code)">
<returned_geometry>GEOMETRY_AREA
 </returned_geometry>
<returned_georole>COUNTRY_ISO_CC</returned_georole>
<url type="esri"     authorization="none"
synonym="geo_uri_countries">http://services.arcgis.com/P3ePLMYs2RVChkJx/
arcgis/rest/services/World_Countries_(Generalized)/FeatureServer/0</url>
<parameters>     <parm order="1" parm_name="ISO"
parm_georole="COUNTRY_ISO_CC"/>     </parameters>
</uri>
```

To add your custom role, add the elements needed to define it to the geo_services.xml file.

Learn More

For more information, see *Creating Esri Maps* in the *App Studio User's Guide*.

Or click here to watch the Key Feature video now!

Report Development

The following are new features and enhancements for developing reports in App Studio Release 8.2 Version 01.

Autoprompt

The Report canvas in App Studio Release 8.2 Version 01 allows for chaining input controls in the Autoprompt page. Chaining lets you link two or more input controls when they call the same dimension hierarchy. For example, if you had chained input controls for State and City, the available list of cities would automatically be limited to those in the specified state. This saves users from scrolling through a list of invalid options when specifying a parameter value, as shown in the following image.

Calendar Control for Autoprompt Page

The Autoprompt page now displays a calendar control when you filter on full date fields, as shown in the following image.
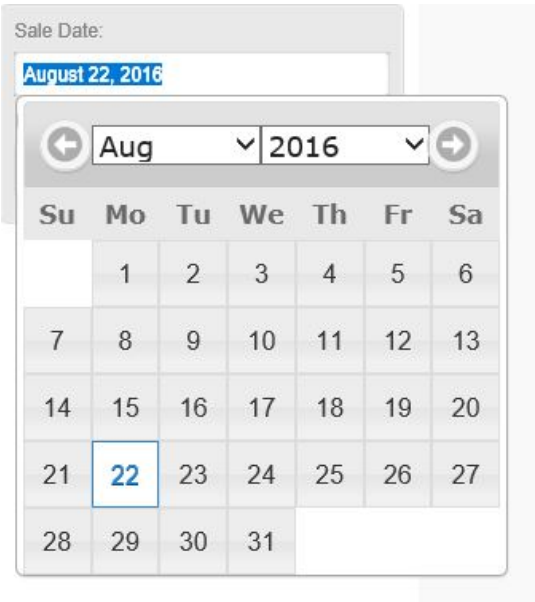
You build the WHERE filter with the Expression Builder using a full date Column to Filter and a simple parameter Compare Type. This is enabled by the new (|FORMAT=YYMD) syntax, which is now inserted in this and all other expressions.

Precision Reports

With Precision reports, you can create perfectly aligned PDF, PS, and DHTML output for a pre-printed form, such as a Bill of Sale. Precision reports offer all of the benefits of the Report canvas, as well as access to specific tools for controlling items on a form, including fields, images, and other objects required by the form. It also offers additional tools and tabs that enable you to precisely match the format of your pre-printed form.

Precision reports are created in the Precision Report canvas by using the Data Matrix layer as the reporting object, and by inserting objects in the other layers as fields. You can then build the layout of the form, and add headings or footings to it, including embedded fields.

You can access the Precision Report canvas by converting an existing report or by creating a new Precision report.

Learn More

For more information about the Precision Reports feature, see the *Accessing the Precision Reports Canvas* topic in the App Studio Technical Library.

Or click here to watch the Key Feature video now!

Chaining Input Controls Using Autoprompt

You can now create filters with parameter options for Responsive Autoprompt cascading filters, as well as simple filter date controls, from the App Studio Report canvas.

Learn More

For more information, see the *WebFOCUS App Studio User's Manual* in the App Studio Technical Library.

Use Title for Deferred Report

The new property Use Title for Deferred Report Description gives you an alternative to being prompted for a custom deferred report description when the report is run deferred. When selected, the Title of the report is assigned as the deferred report description. For additional information, see *Prompt for Custom Deferred Report Description Setting* on page 336. This property now appears on the File/Folder Properties panel for files that can be scheduled to run on a deferred basis.

Default Title for Column and Row Totals

The default title for column and row totals now appears in the Report canvas as {TOTAL}. At run time, this is automatically translated into the language that you have selected for App Studio. For example, if you have selected Italian, the title appears as *TOTALE*.

To specify a different title, right-click the total and select Title (for row) or Column Title (for columns) from the shortcut menu. The Title dialog box opens, as shown in the following image.
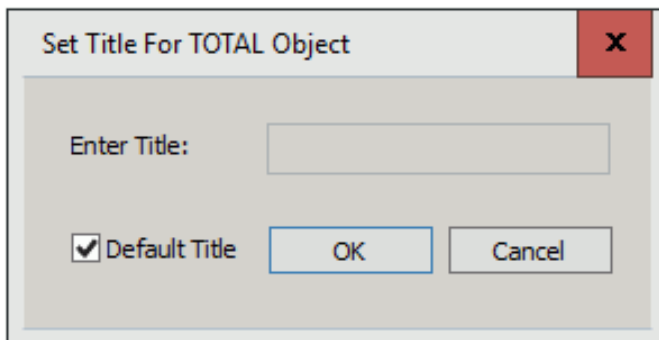
Clear the Default Title check box and type the desired title in the Enter Title field.

Dynamic Linking

When you view a report, you can now enhance your analytical insight by drilling down from a summary to a detailed report. Similarly, you may want to drill up from a detailed report, to a summary report, or drill across to see similar information in different contexts.

The App Studio Report canvas now provides two new features that automate the creation of links that enable these drilldowns:

❑ Auto Linking lets you connect predefined reports, charts, and visualizations together through common filters.

❑ Auto Drill lets you create ad hoc reports, within a dimension hierarchy, that connect to a source report.

These features magnify your analytical capabilities while saving you the significant development and maintenance time required by numerous manual links.

MAGNIFY Engine

The following two options have been added to the New shortcut menu when creating a procedure or component in the Procedure View panel:

❑ MAGNIFY Engine has been added and opens the MAGNIFY Engine canvas.

❑ Engine has replaced SQL Engine to open the Engine canvas.

The New shortcut menu, with these options highlighted, is shown in the following image.
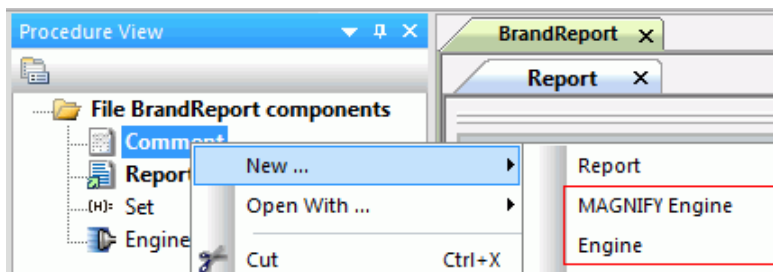
The MAGNIFY Engine canvas contains a list of ENGINE SET statements which are available for selection. When you click on a Property Name, its description is displayed in the lower portion of the canvas, as shown in the following image.

Publishing and Sharing Content

The following are new features and enhancements for publishing and sharing content using App Studio Release 8.2 Version 01.

Push Button Color

You can now apply background color to push buttons to distinguish between selected and unselected values. When you create a Radio Button or Check Box control, you can use the Type property to select *Push button*. You can specify background color using the two new properties: *Selected pushbutton background color* and *Unselected pushbutton background color*, as shown in the following image.
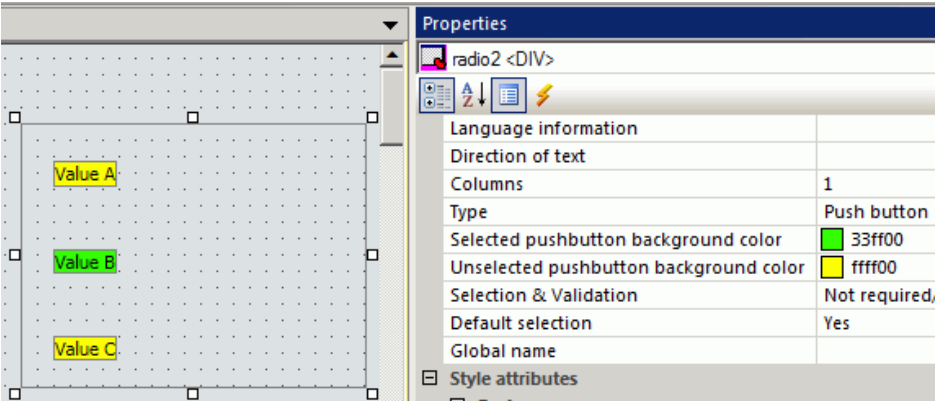
Share Unpublished Content

An Analytical user can share unpublished content with a Developer. Shared content is designated in the Environments Tree by the shared icon overlayed on the shared folder or file. When sharing is removed, and the Environments Tree is refreshed, the icon is removed.

Sharing Multiple Folders At Once

App Studio has added the ability to publish, unpublish, hide, or show multiple folders at the same time. This functionality uses the standard methodology of pressing the Ctrl key while selecting the desired folders in the Environments Tree.

Multi-Select Functionality

A multi-select drop-down function has been added to App Studio. This multi-select control allows you to specify more than one value at a time. This functionality creates a drop-down list and uses a check box adjacent to each value for selection, as shown in the following image.
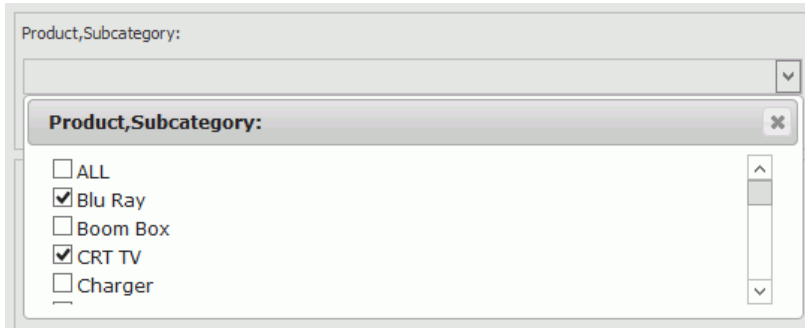
Multi-Select Folders to Publish, Hide, and Show

App Studio has added the ability to duplicate, copy, and delete multiple folders at the same time. This functionality uses the standard methodology of pressing the Ctrl key while selecting the desired folders in the Environments Tree panel.

Reporting Language Enhancements

WebFOCUS is a complete information control system with comprehensive features for retrieving and analyzing data. It enables you to create reports quickly and easily. It also provides facilities for creating highly complex reports, but its strength lies in the simplicity of the request language. You can begin with simple queries and progress to complex reports as you learn about additional facilities.

Release 8.2.01 includes the Reporting Language new features available in Server Release 7707.

Additional Support for Alignment Grid

The HEADALIGN=BODY (Alignment Grid) feature has been expanded to support the following additional formats: PPTX and DHTML. The HEADALIGN=BODY feature enables you to insert a grid of cells in a heading to support more sophisticated styling.

For more information on the HEADALIGN=BODY feature, see the *Creating Reports With WebFOCUS Language manual*.

Defining Internal Borders in an Alignment Grid

The BORDERALL feature allows for the definition of internal borders within a HEADALIGN=BODY (Alignment Grid) element of a report.

The following example shows a DHTML request against the GGSALES data source. The request contains a subhead with HEADALIGN=BODY and BORDERALL=ON. The alignment grid in the subhead aligns with the data, and each item within the subhead is presented as fully bordered individual cells.

```
TABLE FILE GGSALES
SUM DOLLARS/D12CM AS '' UNITS/D12C AS ''
BY REGION PAGE-BREAK NOPRINT
BY CATEGORY AS ''
BY PRODUCT AS ''
ON REGION SUBHEAD
"<REGION <+0> &DATE <+0> "
"Category<+0>Product<+0>Dollars<+0>Units"
ON REGION SUBFOOT
""
ON TABLE PCHOLD FORMAT DHTML
WHERE REGION EQ 'West';
ON TABLE SET STYLE *
TYPE=REPORT, LEFTMARGIN=.75,RIGHTMARGIN=1,FONT=TAHOMA,SIZE=10,GRID=OFF,$
TYPE=SUBHEAD,HEADALIGN=BODY,BORDERALL=ON,$
TYPE=SUBHEAD,LINE=1,ITEM=3,COLSPAN=2, JUSTIFY=RIGHT, $
TYPE=SUBHEAD,LINE=2,STYLE=BOLD,$
END
```

The output is:

West			08/17/16
Category	**Product**	**Dollars**	**Units**
Coffee	Capuccino	$895,495	71,168
	Espresso	$907,617	71,675
	Latte	$2,670,405	213,920
Food	Biscotti	$863,868	70,436
	Croissant	$2,425,601	197,022
	Scone	$912,868	72,776
Gifts	Coffee Grinder	$603,436	48,081
	Coffee Pot	$613,624	47,432
	Mug	$1,188,664	93,881
	Thermos	$571,368	45,648

For more information on how the HEADALIGN=BODY and BORDERALL features work together, see the *Creating Reports With WebFOCUS Language* manual.

Enhancements to PPTX Output Format

The following are enhancements to the PPTX output format.

PNG Charts Embedded in Slides

The output image format for charts embedded in slides has been changed from JPG to PNG. PNG images are preferred as they produce better quality graph images, especially when displaying gradients, as well as provide support for transparency.

The PPTXGRAPHTYPE attribute enhances the quality of charts embedded into PowerPoint (PPTX) slides. As of Release 8.2.01M, you can use the PNG output format to enhance the image and text quality and support transparency.

This is useful for a number of important scenarios, including use of templates with background color and for overlapping a chart with other components and drawing objects.

The syntax is:

```
SET PPTXGRAPHTYPE={PNG|PNG_NOSCALE|JPEG}
```

where:

PNG

Scales the PNG image to twice its dimensions to get significantly improved quality. This may cause problems if you have non-scalable items in the chart, such as text with absolute point sizes (including embedded scales headings). The output file is also larger due to the larger bitmap. Text within the chart is noticeable sharper than the legacy JPEG format.

PNG preserves font sizes in the chart when it is internally rescaled for increased resolution. It converts absolute font sizes set in the stylesheet (*GRAPH_SCRIPT) to sizes expressed in virtual coordinates (which are relative to the dimensions of the chart) and generates font sizes for embedded headings and footings in virtual coordinates.

PNG_NOSCALE

Renders in PNG, but does not scale. This produces slightly better quality than JPEG. Going from JPEG to PNG_NOSCALE makes the chart sharper, but has only a slight effect on the text.

JPEG

Indicates legacy format. This is the default value.

For more information, see the *Creating Reports With WebFOCUS Language* manual.

PPTX Template Masters and Slide Layouts for Expanded Styling

A Microsoft PPTX template can contain one or more Slide Masters, defining a variety of different Slide Layouts. A Slide Master is the top slide in a hierarchy of slides that stores information about the theme and Slide Layouts of a presentation, including the background, color, fonts, effects, placeholder sizes, and positioning. You can incorporate two or more different styles or themes, such as backgrounds, color schemes, fonts, and effects, by inserting an individual Slide Master into the template for each different theme.

Note: Additional information on Microsoft PowerPoint Slide Layouts is available in an article titled What is a slide layout? on the Microsoft support site.

By default, the first Slide Layout in the first Slide Master is applied to slides on which WebFOCUS data is displayed.

With this new feature, WebFOCUS enables the developer to select any Slide Layout in any Slide Master in a PowerPoint template (POTX/POTM) or Presentation file (PPTX/PPTM). One Slide Layout may be applied to a slide or slides, displaying the output of a standard report, while one or different Slide Layouts may be applied to each Page Layout in a PPTX formatted Compound Document. The WebFOCUS generated output is placed on top of the styling on the selected Slide Layout.

For more information, see the *Creating Reports With WebFOCUS Language* manual.

Support for Page Size and Orientation

You can select the page size and orientation (Portrait or Landscape) for a PPTX formatted report, using the PAGESIZE and ORIENTATION style sheet attributes.

For more information, see the *Creating Reports With WebFOCUS Language* manual.

ReportCaster Bursting Support

Bursting PPTX formatted reports, including single reports and compound reports, is supported. Drill downs can be included in any of these burst reports.

For more information on ReportCaster bursting, see the *ReportCaster* manual.

Enhanced PDF Support for JPG Compression

The compression algorithm used for JPG images embedded in PDF documents has been enhanced to generate considerably smaller PDF files, and to allow users to control elements of the JPEG compression method. The following new SET commands allow users to select the compression methodology (SET JPEGENCODE) and the image quality (SET JPEGQUALITY).

Syntax: **How to Select the Compression Algorithm**

```
SET JPEGENCODE = [FLATE|DCT]
```

where:

FLATE

   Fixed quality defined

   Is a compression method, introduced in WebFOCUS Release 7.7 Version 03, which allows images within PDF files to be individually compressed. This method is the default for WebFOCUS Release 7.7 Version 03 through WebFOCUS Release 7.7 Version 06.

DCT

   Discrete Cosine Transform

   Is a compression method, introduced in WebFOCUS Release 8.2 Version 01, which allows for the designation of the percentage of quality to retain. This method is the default in WebFOCUS Release 8.2 Version 01.

   Note: In some images, quality loss is not noticeable when higher degrees of compression are applied. Generally, the higher the compression applied, the lower the image quality. Use SET JPEGQUALITY with the DCT setting to set the quality value.

Syntax: **How to Select the Image Quality**

```
SET JPEGQUALITY = n
```

where:

n

   Is the percentage of quality used with the DCT setting. This value can be from1-100. The default value is 100, where no quality is lost and minimal compression is applied.

Defining Hyperlink Colors

You can use the HYPERLINK-COLOR attribute to designate a color for a hyperlink within a report. This applies to all hyperlinks generated in the report. You can define a single color for the entire report or different colors for each individual element.

Syntax: **How to Set Hyperlink Colors**

```
TYPE = type, HYPERLINK-COLOR = color
```

where:

type

Is the report component you wish to affect. You can apply this keyword to the entire report using TYPE=REPORT. The attribute can also individually be set for any other element of the report.

color

Can use any style sheet supported color value designation.

For more information, see the *Creating Reports With WebFOCUS Language* manual.

Automatically Resizing the Width of a Window or Frame With HFREEZE

In an HTML HFREEZE report, you can use the SET AUTOFIT command to automatically resize HTML report output to 100% of the current container width of the window or frame.

Enhanced Implementation of Peer Graphs

The following are enhancements to peer graphs.

HEX and RGB Color Designations

For HTML output format, in addition to named colors, you can now use hex and RGB for color designations in a StyleSheet.

The syntax is:

```
GRAPHCOLOR={color|RGB({r g b|#hexcolor}}
```

For more information, see the *Creating Reports With WebFOCUS Language* manual.

Setting a Color for Data Visualization Bar Graphs

For all output formats, you can use the GRAPHCOLORNEG StyleSheet attribute to set a color for the data visualization bar graphs that represent negative values.

The syntax is:

```
GRAPHNEGCOLOR={color|RGB({r g b|#hexcolor}}
```

For more information, see the *Creating Reports With WebFOCUS Language* manual.

SET FLOATMAPPING: Expanded Numeric Functionality

SET FLOATMAPPING enables you to take advantage of decimal-based precision numbers available in DB2 and Oracle, and extends that functionality to all numeric processing for floating point numbers. With this processing, you gain both precision, including improved rounding, and enhanced performance.

The syntax is

```
SET FLOATMAPPING = {D|M|X}
```

where:

D

    Uses the standard double-precision processing. This is the default value.

M

    Uses a new internal format that provides decimal precision for double-precision floating point numbers up to 16 digits.

X

    Uses a new internal format that provides decimal precision for double-precision floating point numbers up to 34 digits.

Note: If the field is passed to a HOLD file, the internal data types X or M will be propagated to the USAGE and ACTUAL formats in the HOLD Master File.

New LOCALE Settings

New set parameters have been introduced to override locale-based attributes in a Master File.

These locale parameters can be accessed in the Web Console from the Workspace page, using the LOCALE button on the ribbon.

When set from this page, these parameter values are stored in the server global profile, edasprof.prf. You can also set them in a TABLE request, a FOCEXEC, or in any supported profile. Some of these parameters also have been implemented at the field level as display format options.

Note that the LANGUAGE parameter, which used to be stored in nlscfg.err, will also be saved in edasprof.prf.

Reference: **Aliases for CDN Parameter Values**

Aliases have been added to the existing CDN parameter values to make their meanings more clear. The following list describes the values from prior releases and the aliases that can now be used.

❏ **OFF.** Uses a dot (.) as the decimal separator and comma (,) as the thousands separator. The alias for OFF is *COMMAS_DOT*. This is the default value.

❏ **ON.** Uses a comma as the decimal separator and dot as the thousands separator. The alias for ON is *DOTS_COMMA*.

❏ **SPACE.** Uses a comma as the decimal separator and space as the thousands separator. The alias for SPACE is *SPACES_COMMA*.

❏ **QUOTE.** Uses a comma as the decimal separator and single quotation mark (') as the thousands separator. The alias for QUOTE is *QUOTES_COMMA*.

❏ **QUOTEP.** Uses a dot as the decimal separator and single quotation mark as the thousands separator. The alias for QUOTEP is *QUOTES_DOT*.

Reference: **New Currency Locale Parameters and Display Options**

The following SET parameters have been added for specifying locale-based currency display, when the :C currency display option is used. All other currency display options are unaffected by these settings.

CURRENCY_ISO_CODE

This parameter defines the ISO code for the currency symbol to use.

The syntax is:

```
SET CURRENCY_ISO_CODE = iso
```

where:

iso

Is a standard three-character currency code such as USD for US dollars or JPY for Japanese yen. The default value is *default*, which uses the currency code for the configured language code.

CURRENCY_DISPLAY

This parameter defines the position of the currency symbol relative to the monetary number.

The syntax is:

```
SET CURRENCY_DISPLAY = pos
```

where:

pos

> Defines the position of the currency symbol relative to a number. The default value is *default*, which uses the position for the format and currency symbol in effect. Valid values are:

> ❏ **LEFT_FIXED.** The currency symbol is left-justified preceding the number.

> ❏ **LEFT_FIXED_SPACE.** The currency symbol is left-justified preceding the number, with at least one space between the symbol and the number.

> ❏ **LEFT_FLOAT.** The currency symbol precedes the number, with no space between them.

> ❏ **LEFT_FLOAT_SPACE.** The currency symbol precedes the number, with one space between them.

> ❏ **TRAILING.** The currency symbol follows the number, with no space between them.

> ❏ **TRAILING_SPACE.** The currency symbol follows the number, with one space between them.

CURRENCY_PRINT_ISO

This parameter defines what will happen when the currency symbol cannot be displayed by the code page in effect.

The syntax is:

```
SET CURRENCY_PRINT_ISO = {DEFAULT|ALWAYS|NEVER}
```

where:

DEFAULT

> Replaces the currency symbol with its ISO code, when the symbol cannot be displayed by the code page in effect. This is the default value.

ALWAYS

> Always replaces the currency symbol with its ISO code.

NEVER

> Never replaces the currency symbol with its ISO code. If the currency symbol cannot be displayed by the code page in effect, it will not be printed at all.

Note: Using a Unicode environment allows the printing of all currency symbols, otherwise this setting is needed.

Currency Display Options

The CURRENCY_ISO_CODE, CURRENCY_DISPLAY, and CURRENCY_PRINT_ISO parameters can be applied on the field level as display parameters in a Master File DEFINE, a DEFINE command, or in a COMPUTE using the :C display option. The syntax is:

```
fld/fmt:C(CURRENCY_DISPLAY='pos',
    CURRENCY_ISO_CODE='iso',CURRENCY_PRINT_ISO='prt')= expression;
```

where:

fld

Is the field to which the parameters are to be applied.

fmt

Is a numeric format that supports a currency value.

iso

Is a standard three-character currency code, such as USD for US dollars or JPY for Japanese yen. The default value is *default*, which uses the currency code for the configured language code.

pos

Defines the position of the currency symbol relative to a number. The default value is *default*, which uses the position for the format and currency symbol in effect. Valid values are:

❏ **LEFT_FIXED.** The currency symbol is left-justified preceding the number.

❏ **LEFT_FIXED_SPACE.** The currency symbol is left-justified preceding the number, with at least one space between the symbol and the number.

❏ **LEFT_FLOAT.** The currency symbol precedes the number, with no space between them.

❏ **LEFT_FLOAT_SPACE.** The currency symbol precedes the number, with one space between them.

❏ **TRAILING.** The currency symbol follows the number, with no space between them.

❏ **TRAILING_SPACE.** The currency symbol follows the number, with one space between them.

prt

Can be one of the following print options.

DEFAULT

Replaces the currency symbol with its ISO code, when the symbol cannot be displayed by the code page in effect. This is the default value.

ALWAYS

Always replaces the currency symbol with its ISO code.

NEVER

Never replaces the currency symbol with its ISO code. If the currency symbol cannot be displayed by the code page in effect, it will not be printed at all.

expression

Is the expression that creates the virtual field.

Note: If currency parameters are specified at multiple levels, the order of precedence is:

1. Field level parameters.

2. Parameters set in a request (ON TABLE SET).

3. Parameters set in a FOCEXEC outside of a request.

4. Parameters set in a profile, using the precedence for profile processing.

Example: Specifying Currency Parameters in a DEFINE

The following request creates a virtual field named Currency_parms that displays the currency symbol on the right using the ISO code for Japan, 'JPY'

```
DEFINE FILE WF_RETAIL_LITE
Currency_parms/D20.2:C(CURRENCY_DISPLAY='TRAILING',CURRENCY_ISO_CODE='JPY')
= COGS_US;
END
TABLE FILE WF_RETAIL_LITE
SUM COGS_US Currency_parms
BY BUSINESS_REGION AS 'Region'
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
END
```

The output is shown in the following image.

Region	Cost of Goods	Currency_parms
EMEA	$1,247,925.00	1,247,925.00¥
North America	$1,457,020.00	1,457,020.00¥
Oceania	$9,613.00	9,613.00¥
South America	$235,800.00	235,800.00¥

Reference: **New Date and Time Locale Parameters**

The following SET parameters have been added to specify the order of date components, the date separator character, and the time separator character for the &TOD system variable.

DATE_ORDER

This parameter defines the order of date components for display. The syntax is:

```
SET DATE_ORDER = {DEFAULT|DMY|MDY|YMD}
```

where:

DEFAULT

    Respects the original order of date components. This is the default value.

DMY

    Displays all dates in day/month/year order.

MDY

    Displays all dates in month/day/year order.

YMD

    Displays all dates in year/month/day order.

DATE_SEPARATOR

This parameter defines the separator for date components for display.

The syntax is:

```
SET DATE_SEPARATOR = separator
```

where:

separator

    Can be one of the following values.

- ❏ **DEFAULT**, which respects the separator defined by the USAGE format of the field.
- ❏ **SLASH**, which uses a slash (/) to separate date components.
- ❏ **DASH**, which uses a dash (-) to separate date components.
- ❏ **BLANK**, which uses a blank to separate date components.
- ❏ **DOT**, which uses a dot (.) to separate date components.
- ❏ **NONE**, which does not separate date components.

TIME_SEPARATOR

This parameter defines the separator for time components for the &TOD system variable.

The syntax is:

```
SET TIME_SEPARATOR = {DOT|COLON}
```

where:

DOT

    Uses a dot (.) to separate time components. This is the default value.

COLON

    Uses a colon (:) to separate time components.

Reference: Usage Notes for Locale-Based Date and Time Parameters

❑ DATE_ORDER and DATE_SEPARATOR override the specified date order for all date and date-time displays unless they include a translation display option (T, Tr, t, or tr), in which case the specified order is produced. To limit the scope to a request, use the ON TABLE SET phrase.

❑ To use these settings with the Dialogue Manager system variables, (for example, &DATE, &TOD, &YMD, &DATEfmt, and &DATXfmt) append the suffix .DATE_LOCALE to the system variable. This allows system variables that are localized to coexist with non-localized system variables.

Example: Setting Date and Time Parameters for System Variables

The following applies the DATE_ORDER and DATE_SEPARATOR parameters to the &DATE system variable.

```
SET DATE_SEPARATOR = DASH
SET DATE_ORDER = DMY
-TYPE NON-LOCALIZED: &DATE
-TYPE LOCALIZED: &DATE.DATE_LOCALE
```

The output is:

```
NON-LOCALIZED: 04/07/17
LOCALIZED: 07-04-17
```

Applying Selection Criteria to the Internal Matrix Prior to COMPUTE Processing

WHERE TOTAL tests are applied to the rows of the internal matrix after COMPUTE calculations are processed in the output phase of the report. WHERE_GROUPED tests are applied to the internal matrix values prior to COMPUTE calculations. The processing then continues with COMPUTE calculations, and then WHERE TOTAL tests. This allows the developer to control the evaluation, and is particularly useful in recursive calculations.

Syntax: ### How to Apply WHERE_GROUPED Selection Criteria

```
WHERE_GROUPED expression
```

where:

expression

Is an expression that does not refer to more than one row in the internal matrix. For example, it cannot use the LAST operator to refer to or retrieve a value from a prior record.

Example: ### Using a WHERE_GROUPED Test

The following request has two COMPUTE commands. The first COMPUTE checks to see if the business region value has changed, incrementing a counter if it has. This allows us to sequence the records in the matrix. The second COMPUTE creates a rolling total of the days delayed within the business region.

```
TABLE FILE WF_RETAIL_LITE
SUM  DAYSDELAYED AS DAYS
COMPUTE CTR/I3 = IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN CTR+1 ELSE
1;
COMPUTE NEWDAYS = IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN NEWDAYS
+DAYSDELAYED ELSE DAYSDELAYED;
BY BUSINESS_REGION AS Region
BY TIME_MTH
WHERE BUSINESS_REGION NE 'Oceania'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Region	Sale Month	DAYS	CTR	NEWDAYS
EMEA	1	191	1.00	191.00
	2	205	2.00	396.00
	3	224	3.00	620.00
	4	213	4.00	833.00
	5	185	5.00	1,018.00
	6	234	6.00	1,252.00
	7	223	7.00	1,475.00
	8	234	8.00	1,709.00
	9	249	9.00	1,958.00
	10	290	10.00	2,248.00
	11	1	11.00	2,249.00
North America	1	253	1.00	253.00
	2	205	2.00	458.00
	3	293	3.00	751.00
	4	319	4.00	1,070.00
	5	273	5.00	1,343.00
	6	268	6.00	1,611.00
	7	219	7.00	1,830.00
	8	248	8.00	2,078.00
	9	220	9.00	2,298.00
	10	326	10.00	2,624.00
	11	8	11.00	2,632.00
South America	1	64	1.00	64.00
	2	87	2.00	151.00
	3	29	3.00	180.00
	4	39	4.00	219.00
	5	29	5.00	248.00
	6	49	6.00	297.00
	7	16	7.00	313.00
	8	26	8.00	339.00
	9	54	9.00	393.00
	10	54	10.00	447.00

The following version of the request adds a WHERE TOTAL test to select only those months where DAYSDELAYED exceeded 200 days..

```
TABLE FILE WF_RETAIL_LITE
SUM  DAYSDELAYED AS DAYS
COMPUTE CTR/I3 = IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN CTR+1 ELSE
1;
COMPUTE NEWDAYS= IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN NEWDAYS
+DAYSDELAYED ELSE DAYSDELAYED;
BY BUSINESS_REGION AS Region
BY TIME_MTH
WHERE BUSINESS_REGION NE 'Oceania'
WHERE TOTAL DAYSDELAYED GT 200
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image. The COMPUTE calculations for CTR and NEWDAYS was processed prior to eliminating the rows in which TOTAL DAYSDELAYED were 200 or less, so their values are the same as in the original output. This does not correctly reflect the sequence of records and the rolling total of the values that are actually displayed on the output. To do this, we need to select the appropriate months (DAYSDELAYED GT 200) before the COMPUTE expressions are evaluated. This requires WHERE_GROUPED.

Region	Sale Month	DAYS	CTR	NEWDAYS
EMEA	2	205	2.00	396.00
	3	224	3.00	620.00
	4	213	4.00	833.00
	6	234	6.00	1,252.00
	7	223	7.00	1,475.00
	8	234	8.00	1,709.00
	9	249	9.00	1,958.00
	10	290	10.00	2,248.00
North America	1	253	1.00	253.00
	2	205	2.00	458.00
	3	293	3.00	751.00
	4	319	4.00	1,070.00
	5	273	5.00	1,343.00
	6	268	6.00	1,611.00
	7	219	7.00	1,830.00
	8	248	8.00	2,078.00
	9	220	9.00	2,298.00
	10	326	10.00	2,624.00

The following version of the request replaces the WHERE TOTAL test with a WHERE_GROUPED test.

```
TABLE FILE WF_RETAIL_LITE
SUM  DAYSDELAYED AS DAYS
COMPUTE CTR/I3 = IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN CTR+1 ELSE
1;
COMPUTE NEWDAYS= IF BUSINESS_REGION EQ LAST BUSINESS_REGION THEN NEWDAYS
+DAYSDELAYED ELSE DAYSDELAYED;
BY BUSINESS_REGION AS Region
BY TIME_MTH
WHERE BUSINESS_REGION NE 'Oceania'
WHERE_GROUPED DAYSDELAYED GT 200
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image. The COMPUTE calculation for NEWDAYS was processed after eliminating the rows in which TOTAL DAYSDELAYED were 200 or less, so its values are based on fewer rows than the calculations in the original request. This is verified by the CTR values, which are now in a continuous sequence. The rolling total now reflects the values that are actually displayed on the report output.

Region	Sale Month	DAYS	CTR	NEWDAYS
EMEA	2	205	1.00	205.00
	3	224	2.00	429.00
	4	213	3.00	642.00
	6	234	4.00	876.00
	7	223	5.00	1,099.00
	8	234	6.00	1,333.00
	9	249	7.00	1,582.00
	10	290	8.00	1,872.00
North America	1	253	1.00	253.00
	2	205	2.00	458.00
	3	293	3.00	751.00
	4	319	4.00	1,070.00
	5	273	5.00	1,343.00
	6	268	6.00	1,611.00
	7	219	7.00	1,830.00
	8	248	8.00	2,078.00
	9	220	9.00	2,298.00
	10	326	10.00	2,624.00

Reference: Usage Notes for WHERE_GROUPED

❑ If the expression refers to multiple rows in the internal matrix, the following message is generated and processing stops.

```
(FOC32692) WHERE_GROUPED CANNOT REFER TO OTHER LINES OF REPORT
```

❑ A COMPUTE that does not reference multiple lines will be evaluated prior to WHERE_GROUPED tests, and may, therefore, be used in an expression and evaluated as part of a WHERE_GROUPED test.

❑ WHERE_GROUPED can be optimized for SQL data sources by creating a GROUP BY *fieldname* HAVING *expression* clause, where the expression is the WHERE_GROUPED selection criteria.

PARTITION_AGGR: Creating Rolling Calculations

Using the PARTITION_AGGR function, you can generate rolling calculations based on a block of rows from the internal matrix of a TABLE request. In order to specify how to determine the limits of the rolling calculations, you specify a partition of the data based on either a sort field or the entire TABLE. Within either type of break, you can start calculating from the beginning of the break or a number of rows prior to the current row. You can stop the rolling calculation at the current row or the end of the partition.

By default, the field values used in the calculations are the summed values of a measure in the request. Certain prefix operators can be used to add a column to the internal matrix and use that column in the rolling calculations. The rolling calculation can be SUM, AVE, CNT, MIN, MAX, FST, or LST.

Syntax: How to Generate Rolling Calculations Using PARTITION_AGGR

```
PARTITION_AGGR([prefix.]measure,{sortfield|TABLE},from,to,operation)
```

where:

prefix.
Defines an aggregation operator to apply to the measure before using it in the rolling calculation. Valid operators are:

❑ **SUM.** which calculates the sum of the measure field values. SUM is the default operator.

❑ **CNT.** which calculates a count of the measure field values.

❏ **AVE.** which calculates the average of the measure field values.

❏ **MIN.** which calculates the minimum of the measure field values.

❏ **MAX.** which calculates the maximum of the measure field values.

❏ **FST.** which retrieves the first value of the measure field.

❏ **LST.** which retrieves the last value of the measure field.

Note: The operators PCT., RPCT., TOT., MDN., and DST. are not supported. COMPUTEs that reference those unsupported operators are also not supported.

measure

Is the measure field to be aggregated. It can be a real field in the request or a calculated value generated with the COMPUTE command, as long as the COMPUTE does not reference an unsupported prefix operator.

sortfield

Is a BY or ACROSS field that defines the boundary of the partition. Operations will not cross a boundary. In the request the BY HIGHEST phrase to sort high-to-low is supported. ACROSS COLUMNS AND is also supported, but BY ROWS OVER and FOR are not supported.

Specifying TABLE as the boundary makes the partition boundary the entire internal matrix.

For example, if the sort is BY YEAR BY MONTH, with data from both 2014 and 2015, specifying the boundary as YEAR means that January 2015 - 2 will be valued as zero (0) or MISSING, as two months prior to January 2015 would cross the YEAR boundary. However, specifying TABLE as the boundary and requesting - 2 months would return the data for November 2014.

from

Identifies the starting point for the rolling calculation. Valid values are:

❏ **-n**, which starts the calculation *n* rows back from the current row.

❏ **B**, which starts the calculation at the beginning of the current sort break (the first line with the same sort field value as the current line).

to

Identifies the ending point of the rolling calculation. Valid values are:

❏ **C**, which ends the rolling calculation at the current row in the internal matrix.

❏ **E**, which ends the rolling calculation at the end of the sort break (the last line with the same sort value as the current row.)

operation

Specifies the rolling calculation used on the values in the internal matrix. Supported operations are:

- ❏ **SUM.** which calculates a rolling sum.

- ❏ **AVE.** which calculates a rolling average.

- ❏ **CNT.** which counts the rows in the partition.

- ❏ **MIN.** which returns the minimum value in the partition.

- ❏ **MAX,** which returns the maximum value in the partition.

- ❏ **FST.** which returns the first value in the partition.

- ❏ **LST.** which returns the last value in the partition.

The calculation is performed prior to any WHERE TOTAL tests, but after WHERE_GROUPED tests.

Example: **Calculating a Rolling Average**

The following request calculates a rolling average of the current line and the previous line in the internal matrix within the quarter.

```
TABLE FILE WF_RETAIL_LITE
SUM COGS_US
COMPUTE AVE1/D12.2M = PARTITION_AGGR(COGS_US, TIME_QTR, -1, C, AVE);
BY BUSINESS_REGION
BY TIME_QTR
BY TIME_MTH
WHERE BUSINESS_REGION EQ 'North America' OR 'South America'
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image. Within each quarter, the first average is just the value from Q1, as going back 1 would cross a boundary. The second average is calculated using the first two rows within that quarter, and the third average is calculated using rows 2 and 3 within the quarter.

Customer Business Region	Sale Quarter	Sale Month	Cost of Goods	AVE1
North America	1	1	$131,745.00	$131,745.00
		2	$138,150.00	$134,947.50
		3	$166,097.00	$152,123.50
	2	4	$147,770.00	$147,770.00
		5	$143,461.00	$145,615.50
		6	$144,101.00	$143,781.00
	3	7	$140,641.00	$140,641.00
		8	$138,756.00	$139,698.50
		9	$131,858.00	$135,307.00
	4	10	$172,837.00	$172,837.00
		11	$1,604.00	$87,220.50
South America	1	1	$33,895.00	$33,895.00
		2	$35,753.00	$34,824.00
		3	$13,753.00	$24,753.00
	2	4	$24,339.00	$24,339.00
		5	$29,076.00	$26,707.50
		6	$22,726.00	$25,901.00
	3	7	$16,475.00	$16,475.00
		8	$12,504.00	$14,489.50
		9	$19,753.00	$16,128.50
	4	10	$27,526.00	$27,526.00

The following changes the rolling average to start from the beginning of the sort break.

```
COMPUTE AVE1/D12.2M = PARTITION_AGGR(COGS_US, TIME_QTR ,B, C, AVE);
```

The output is shown in the following image. Within each quarter, the first average is just the value from Q1, as going back would cross a boundary. The second average is calculated using the first two rows within that quarter, and the third average is calculated using rows 1 through 3 within the quarter.

Customer Business Region	Sale Quarter	Sale Month	Cost of Goods	AVE1
North America	1	1	$131,745.00	$131,745.00
		2	$138,150.00	$134,947.50
		3	$166,097.00	$145,330.67
	2	4	$147,770.00	$147,770.00
		5	$143,461.00	$145,615.50
		6	$144,101.00	$145,110.67
	3	7	$140,641.00	$140,641.00
		8	$138,756.00	$139,698.50
		9	$131,858.00	$137,085.00
	4	10	$172,837.00	$172,837.00
		11	$1,604.00	$87,220.50
South America	1	1	$33,895.00	$33,895.00
		2	$35,753.00	$34,824.00
		3	$13,753.00	$27,800.33
	2	4	$24,339.00	$24,339.00
		5	$29,076.00	$26,707.50
		6	$22,726.00	$25,380.33
	3	7	$16,475.00	$16,475.00
		8	$12,504.00	$14,489.50
		9	$19,753.00	$16,244.00
	4	10	$27,526.00	$27,526.00

The following command uses the partition boundary TABLE.

```
COMPUTE AVE1/D12.2M = PARTITION_AGGR(COGS_US, TABLE, B, C, AVE);
```

The output is shown in the following image. The rolling average keeps adding the next row to the average until a break in the business region sort field.

Customer Business Region	Sale Quarter	Sale Month	Cost of Goods	AVE1
North America	1	1	$131,745.00	$131,745.00
		2	$138,150.00	$134,947.50
		3	$166,097.00	$145,330.67
	2	4	$147,770.00	$145,940.50
		5	$143,461.00	$145,444.60
		6	$144,101.00	$145,220.67
	3	7	$140,641.00	$144,566.43
		8	$138,756.00	$143,840.13
		9	$131,858.00	$142,508.78
	4	10	$172,837.00	$145,541.60
		11	$1,604.00	$132,456.36
South America	1	1	$33,895.00	$124,242.92
		2	$35,753.00	$117,436.00
		3	$13,753.00	$110,030.07
	2	4	$24,339.00	$104,317.33
		5	$29,076.00	$99,614.75
		6	$22,726.00	$95,091.88
	3	7	$16,475.00	$90,724.28
		8	$12,504.00	$86,607.42
		9	$19,753.00	$83,264.70
	4	10	$27,526.00	$80,610.48

Reference: Usage Notes for PARTITION_AGGR

❏ Fields referenced in the PARTITION_AGGR parameters but not previously mentioned in the request, will *not* be counted in column notation or propagated to HOLD files.

❏ Using the WITHIN phrase for a sum is the same as computing PARTITION_AGGR on the WITHIN sort field from B (beginning of sort break) to E (end of sort break) using SUM, as in the following example.

```
TABLE FILE WF_RETAIL_LITE
SUM COGS_US WITHIN TIME_QTR AS 'WITHIN Qtr'
COMPUTE PART_WITHIN_QTR/D12.2M = PARTITION_AGGR(COGS_US, TIME_QTR, B, E,
SUM);
BY BUSINESS_REGION AS Region
BY TIME_QTR
BY TIME_MTH
WHERE BUSINESS_REGION EQ 'North America' OR 'South America'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Region	Sale Quarter	Sale Month	WITHIN Qtr	PART_WITHIN_QTR
North America	1	1	$435,992.00	$435,992.00
		2	$435,992.00	$435,992.00
		3	$435,992.00	$435,992.00
	2	4	$435,332.00	$435,332.00
		5	$435,332.00	$435,332.00
		6	$435,332.00	$435,332.00
	3	7	$411,255.00	$411,255.00
		8	$411,255.00	$411,255.00
		9	$411,255.00	$411,255.00
	4	10	$174,441.00	$174,441.00
		11	$174,441.00	$174,441.00
South America	1	1	$83,401.00	$83,401.00
		2	$83,401.00	$83,401.00
		3	$83,401.00	$83,401.00
	2	4	$76,141.00	$76,141.00
		5	$76,141.00	$76,141.00
		6	$76,141.00	$76,141.00
	3	7	$48,732.00	$48,732.00
		8	$48,732.00	$48,732.00
		9	$48,732.00	$48,732.00
	4	10	$27,526.00	$27,526.00

With other types of calculations, the results are not the same. For example, the following request calculates the average within quarter using the WITHIN phrase and the average with quarter using PARTITION_AGGR.

```
TABLE FILE WF_RETAIL_LITE
SUM  COGS_US AS Cost
CNT.COGS_US AS Count AVE.COGS_US WITHIN TIME_QTR AS 'Ave Within'
COMPUTE PART_WITHIN_QTR/D12.2M = PARTITION_AGGR(COGS_US, TIME_QTR, B, E,
AVE);
BY BUSINESS_REGION AS Region
BY TIME_QTR
ON TIME_QTR SUBTOTAL COGS_US CNT.COGS_US
BY TIME_MTH
WHERE BUSINESS_REGION EQ 'North America'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image. The average using the WITHIN phrase divides the total cost for the quarter by the total count of instances for the quarter (for example, $435,992.00/1514 =$287.97), while PARTITION_AGGR divides the total cost for the quarter by the number of report rows in the quarter (for example, $435,992.00/3 = $145,330.67).

Region	Sale Quarter	Sale Month	Cost	Count	Ave Within	PART_WITHIN_QTR
North America	1	1	$131,745.00	483	$287.97	$145,330.67
		2	$138,150.00	485	$287.97	$145,330.67
		3	$166,097.00	546	$287.97	$145,330.67
*TOTAL TIME_QTR 1			$435,992.00	1514		
	2	4	$147,770.00	497	$298.79	$145,110.67
		5	$143,461.00	502	$298.79	$145,110.67
		6	$144,101.00	458	$298.79	$145,110.67
*TOTAL TIME_QTR 2			$435,332.00	1457		
	3	7	$140,641.00	451	$299.97	$137,085.00
		8	$138,756.00	451	$299.97	$137,085.00
		9	$131,858.00	469	$299.97	$137,085.00
*TOTAL TIME_QTR 3			$411,255.00	1371		
	4	10	$172,837.00	569	$302.32	$87,220.50
		11	$1,604.00	8	$302.32	$87,220.50
*TOTAL TIME_QTR 4			$174,441.00	577		
TOTAL			$1,457,020.00	4919		

❑ If you use PARTITION_AGGR to perform operations for specific time periods using an offset, for example, an operation on the quarters for different years, you must make sure that every quarter is represented. If some quarters are missing for some years, the offset will not access the correct data. In this case, generate a HOLD file that has every quarter represented for every year (you can use BY QUARTER ROWS OVER 1 OVER 2 OVER 3 OVER 4) and use PARTITION_AGGR on the HOLD file.

PARTITION_REF: Using Prior Field Values in Calculations

Use of LAST in a calculation retrieves the LAST value of the specified field the last time this calculation was performed. The PARTITION_REF function enables you to specify both how many rows back to go in order to retrieve a prior value, and a sort break within which the prior value calculation will be contained.

Syntax: **How to Retrieve Prior Field Values for Use in a Calculation**

```
PARTITION_REF([prefix.]field, {sortfield|TABLE}, -offset)
```

where:

prefix

Is optional. If used, it can be one of the following aggregation operators:

❏ **AVE.** Average

❏ **MAX.** Maximum

❏ **MIN.** Minimum

❏ **CNT.** Count

❏ **SUM.** Sum

field

Is the field whose prior value is to be retrieved.

{*srtfield*|TABLE}

Is the sort break within which to go back to retrieve the value. TABLE means retrieve the value without regard to sort breaks. Operations will not cross a partition boundary.

The Sort field may use BY HIGHEST to indicate a HIGH-TO-LOW sort. ACROSS COLUMNS AND is supported. BY ROWS OVER and FOR are not supported.

-offset

Is the integer number of records back to go to retrieve the value.

If the offset is prior to the partition boundary sort value, the return will be the default value for the field. The calculation is performed prior to any WHERE TOTAL tests, but after WHERE_GROUPED tests.

Example: Retrieving a Previous Record With PARTITION_REF

The following request retrieves the previous record within the sort field PRODUCT_CATEGORY.

```
TABLE FILE WF_RETAIL_LITE
SUM DAYSDELAYED
COMPUTE NEWDAYS/I5=PARTITION_REF(DAYSDELAYED, PRODUCT_CATEGORY, -1);
BY PRODUCT_CATEGORY
BY PRODUCT_SUBCATEG
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image. The first value within each sort break is zero because there is no prior record to retrieve.

Product Category	Product Subcategory	Days Delayed	NEWDAYS
Accessories	Charger	164	0
	Headphones	335	164
	Universal Remote Controls	264	335
Camcorder	Handheld	430	0
	Professional	21	430
	Standard	324	21
Computers	Smartphone	342	0
Media Player	Blu Ray	1,102	0
	DVD Players	31	1102
	Streaming	85	31
Stereo Systems	Home Theater Systems	652	0
	Receivers	220	652
	Speaker Kits	404	220
	iPod Docking Station	520	404
Televisions	Flat Panel TV	144	0
Video Production	Video Editing	317	0

The following request retrieves the average cost of goods from two records prior to the current record within the PRODUCT_CATEGORY sort field.

```
TABLE FILE WF_RETAIL_LITE
SUM COGS_US AVE.COGS_US AS Average
COMPUTE PartitionAve/D12.2M=PARTITION_REF(AVE.COGS_US, PRODUCT_CATEGORY,
-2);
BY PRODUCT_CATEGORY
BY PRODUCT_SUBCATEG
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Product Category	Product Subcategory	Cost of Goods	Average	PartitionAve
Accessories	Charger	$8,573.00	$26.96	$.00
	Headphones	$199,325.00	$292.69	$.00
	Universal Remote Controls	$134,979.00	$278.31	$26.96
Camcorder	Handheld	$90,607.00	$114.11	$.00
	Professional	$159,048.00	$3,614.73	$.00
	Standard	$203,550.00	$351.55	$114.11
Computers	Smartphone	$109,281.00	$182.13	$.00
Media Player	Blu Ray	$754,249.00	$374.32	$.00
	DVD Players	$15,096.00	$215.66	$.00
	Streaming	$10,248.00	$62.49	$374.32
Stereo Systems	Home Theater Systems	$245,581.00	$199.98	$.00
	Receivers	$159,790.00	$369.88	$.00
	Speaker Kits	$343,113.00	$458.09	$199.98
	iPod Docking Station	$108,558.00	$116.85	$369.88
Televisions	Flat Panel TV	$227,820.00	$853.26	$.00
Video Production	Video Editing	$180,540.00	$279.91	$.00

Replacing the function call with the following syntax changes the partition boundary to TABLE.

```
COMPUTE PartitionAve/D12.2M=PARTITION_REF(AVE.COGS_US, TABLE, -2);
```

The output is shown in the following image.

Product Category	Product Subcategory	Cost of Goods	Average	PartitionAve
Accessories	Charger	$8,573.00	$26.96	$.00
	Headphones	$199,325.00	$292.69	$.00
	Universal Remote Controls	$134,979.00	$278.31	$26.96
Camcorder	Handheld	$90,607.00	$114.11	$292.69
	Professional	$159,048.00	$3,614.73	$278.31
	Standard	$203,550.00	$351.55	$114.11
Computers	Smartphone	$109,281.00	$182.13	$3,614.73
Media Player	Blu Ray	$754,249.00	$374.32	$351.55
	DVD Players	$15,096.00	$215.66	$182.13
	Streaming	$10,248.00	$62.49	$374.32
Stereo Systems	Home Theater Systems	$245,581.00	$199.98	$215.66
	Receivers	$159,790.00	$369.88	$62.49
	Speaker Kits	$343,113.00	$458.09	$199.98
	iPod Docking Station	$108,558.00	$116.85	$369.88
Televisions	Flat Panel TV	$227,820.00	$853.26	$458.09
Video Production	Video Editing	$180,540.00	$279.91	$116.85

Reference: ### Usage Notes for PARTITION_REF

❏ Fields referenced in the PARTITION_REF parameters but not previously mentioned in the request, will *not* be counted in column notation or propagated to HOLD files.

Increased Number of ACROSS Columns in a Report

The limit on the number of ACROSS columns has been removed. The total number of sort fields (BY and ACROSS) still has a maximum of 128.

Increased Number of Verb Objects in a TABLE Request

The number of verb objects supported in a TABLE request is unlimited. However, errors can occur if the output is being sent to a format that has a limit on the number of columns, if the system has a maximum record length that cannot contain the number of columns of output, or if the amount of memory needed to store the output is unavailable.

Specifying a Geographic Role in a DEFINE or COMPUTE

If you define a virtual field or create a calculated value that is location-related, you can specify a geographic role. This may be helpful when using the field in a location-based chart request.

Syntax: How to Specify a Geographic Role in a DEFINE or COMPUTE

```
DEFINE name/fmt (GEOGRAPHIC_ROLE = georole)
   [MISSING ON NEEDS {SOME|ALL} DATA] = expression;


COMPUTE name/fmt (GEOGRAPHIC_ROLE = georole)
   [MISSING ON NEEDS {SOME|ALL} DATA] = expression;
```

where:

name

Is a name for the virtual field or calculated value.

fmt

Is a valid format specification for the geographic value.

georole

Is a valid geographic role. Geographic roles can be names, postal codes, ISO (International Organization for Standardization) codes, FIPS (Federal Information Processing Standards) codes, or NUTS (Nomenclature of Territorial Units for Statistics) codes. The following is a list of supported geographic roles.

❏ **ADDRESS_FULL.** Full address.

❏ **ADDRESS_LINE.** Number and street name.

❏ **CITY.** City name.

❏ **CONTINENT.** Continent name.

- ❏ **CONTINENT_ISO2.** Continent ISO-3166 code.

- ❏ **COUNTRY.** Country name.

- ❏ **COUNTRY_FIPS.** Country FIPS code.

- ❏ **COUNTRY_ISO2.** Country ISO-3166-2 code

- ❏ **COUNTRY_ISO3.** Country ISO-3166-3 code

- ❏ **GEOMETRY_AREA.** Geometry area.

- ❏ **GEOMETRY_LINE.** Geometry line.

- ❏ **GEOMETRY_POINT.** Geometry point.

- ❏ **LATITUDE.** Latitude.

- ❏ **LONGITUDE.** Longitude.

- ❏ **NUTS0.** Country name (NUTS level 0).

- ❏ **NUTS0_CC.** Country code (NUTS level 0).

- ❏ **NUTS1.** Region name (NUTS level 1).

- ❏ **NUTS1_CC.** Region code (NUTS level1).

- ❏ **NUTS2.** Province name (NUTS level 2).

- ❏ **NUTS2_CC.** Province code (NUTS level 2).

- ❏ **NUTS3.** District name (NUTS level 3).

- ❏ **NUTS3_CC.** District code (NUTS level 3).

- ❏ **POSTAL_CODE.** Postal code.

- ❏ **STATE.** State name.

- ❏ **STATE_FIPS.** State FIPS code.

- ❏ **STATE_ISO_SUB.** US State ISO subdivision code.

- ❏ **USSCITY.** US city name.

- ❏ **USCITY_FIPS.** US city FIPS code.

- ❏ **USCOUNTY.** US county name.

- ❏ **USCOUNTY_FIPS.** US county FIPS code.

- ❏ **USSTATE.** US state name.

- ❏ **USSTATE_ABBR.** US state abbreviation.

- ❏ **USSTATE_FIPS.** US state FIPS code.

- ❏ **ZIP3.** US 3-digit postal code.

- ❏ **ZIP5.** US 5-digit postal code.

Example: Specifying a Geographic Role in a DEFINE

The following defines a field whose geographic role is the state name.

```
DEFINE FILE WF_RETAIL_LITE
STATENAME/A20 (GEOGRAPHIC_ROLE = STATE) = STATE_PROV_NAME;
END
```

Limiting the Number of Stacked Commands and Loop Iterations

As WebFOCUS commands are encountered in a procedure, they are placed on a stack in memory (called FOCSTACK). The procedure is executed and the stack counter reset to zero (0) as a result a -RUN command, certain system variables, or the end of the procedure.

The parameter DMH_STACKLIM sets the maximum number of lines allowed in the FOCSTACK. This parameter is designed to prevent runaway tasks that generate a FOCSTACK that uses an inordinate amount of memory.

If users are not careful in designing loops in Dialogue Manager, they can inadvertently cause an infinite looping condition.

The parameter DMH_LOOPLIM sets the maximum number of Dialogue Manager loop iterations allowed, using -REPEAT or -GOTO commands.

DMH_STACKLIM and DMH_LOOPLIM should be set high enough to run your existing reports and procedures without error for your entire session. It is recommended that if you set these parameters, you should set them in a profile.

Syntax: How to Limit the Number of Stacked Commands

```
SET DMH_STACKLIM = n
```

where:

n

    Sets the maximum number of lines allowed in FOCSTACK. The default value is zero (0), which does not limit the number of stacked commands.

Syntax: **How to Limit the Number of Loop Iterations**

```
SET DMH_LOOPLIM = n
```

where:

n

    Sets the maximum number of loop iterations allowed. The default value is zero (0), which does not limit the number of loop iterations.

New Report-Level Prefix Operators

Prefix operators have been added for headings, footings, subheadings, subfootings, verb objects, and calculated values (COMPUTEs) that calculate the average, maximum, minimum, and count for the entire report. They are based on the TOT. operator, which calculates total values to include in a heading.

These operators cannot be referenced in WHERE or WHERE TOTAL tests. However, they can be used in a COMPUTE command to generate a calculated value that can be used in a WHERE TOTAL test.

Syntax: **How to Calculate Report-Level Average, Maximum, Minimum, and Count Values**

```
operator.field
```

where:

operator

    Can be one of the following prefix operators.

    ❏ **TOTAVE.** Calculates the average value of the field for the entire table.

    ❏ **TOTMAX.** Calculates the maximum value of the field for the entire table.

    ❏ **TOTMIN.** Calculates the minimum value of the field for the entire table.

    ❏ **TOTCNT.** Calculates the count of the field instances for the entire table.

field

    Is a verb object or calculated value in the request.

Example: Using Prefix Operators in a Heading

The following request uses prefix operators in the heading.

```
TABLE FILE WF_RETAIL_LITE
HEADING
"Heading Calculations:"
"Total:       <TOT.COGS_US"
"Count:                   <TOTCNT.COGS_US"
"Average:             <TOTAVE.COGS_US"
"Minimum:          <TOTMIN.COGS_US"
"Maximum:       <TOTMAX.COGS_US"
SUM COGS_US CNT.COGS_US AS Count AVE.COGS_US AS Average
MIN.COGS_US AS Minimum MAX.COGS_US AS Maximum
BY BUSINESS_REGION AS Region
BY PRODUCT_CATEGORY AS Category
WHERE BUSINESS_REGION NE 'Oceania'
ON TABLE SUBTOTAL COGS_US CNT.COGS_US  AS Total
ON TABLE SET PAGE NOPAGE
ON TABLE SET SHOWBLANKS ON
ON TABLE SET STYLE *
type=report,grid=off, size=11,$
ENDSTYLE
END
```

The output is shown in the following image.

```
Heading Calculations:
Total:      $2,940,745.00
Count:             9961
Average:        $295.23
Minimum:         $16.00
Maximum:      $9,750.00
```

Region	Category	Cost of Goods	Count	Average	Minimum	Maximum
EMEA	Accessories	$143,987.00	630	$228.55	$16.00	$2,850.00
	Camcorder	$187,000.00	611	$306.06	$60.00	$8,610.00
	Computers	$47,616.00	266	$179.01	$81.00	$668.00
	Media Player	$328,401.00	956	$343.52	$36.00	$1,640.00
	Stereo Systems	$361,756.00	1412	$256.20	$48.00	$2,295.00
	Televisions	$100,443.00	120	$837.02	$275.00	$6,500.00
	Video Production	$78,722.00	276	$285.22	$78.00	$1,880.00
North America	Accessories	$171,306.00	743	$230.56	$16.00	$2,040.00
	Camcorder	$242,967.00	692	$351.11	$60.00	$6,000.00
	Computers	$53,329.00	284	$187.78	$81.00	$668.00
	Media Player	$386,681.00	1118	$345.87	$36.00	$1,600.00
	Stereo Systems	$412,036.00	1636	$251.86	$48.00	$2,700.00
	Televisions	$101,212.00	121	$836.46	$275.00	$6,500.00
	Video Production	$89,489.00	325	$275.35	$78.00	$1,410.00
South America	Accessories	$25,723.00	103	$249.74	$16.00	$1,470.00
	Camcorder	$22,686.00	110	$206.24	$60.00	$1,000.00
	Computers	$7,845.00	47	$166.91	$81.00	$501.00
	Media Player	$60,183.00	161	$373.81	$36.00	$1,480.00
	Stereo Systems	$81,823.00	284	$288.11	$48.00	$2,700.00
	Televisions	$25,800.00	25	$1,032.00	$275.00	$9,750.00
	Video Production	$11,740.00	41	$286.34	$78.00	$1,410.00
Total		$2,940,745.00	9961			

Reference: **Usage Notes for Report-Level Prefix Operators**

❏ These operators can be used on a field in a heading or footing without being referenced in a display command in the request.

❑ They work in a heading or footing for real or virtual (DEFINE) fields. They work in a display command field list on real fields, virtual (DEFINE) fields, and calculated (COMPUTE) values that are calculated prior to their use in the request.

❑ They can be used in subheadings and subfootings to reference the total value for the entire report.

Controlling Processing of Delimited Files

The SET PCOMMA=DFIX command causes delimited files with SUFFIX=COM, COMT, TAB, and TABT to be processed through the Adapter for DFIX. This processing provides more complete and meaningful messages and some changes to the processing of missing values when two delimiters in a row are encountered. With DFIX processing, a missing value is assigned to the field.

In order to be eligible for DFIX processing, the delimited file must satisfy the following requirements.

❑ Each record must be completely contained on one line and terminated with the crlf (carriage return/line feed) character combination. If a break is found within a record, the following message displays.

```
(FOC229) ERROR READING EXTERNAL DATA FILE: file
```

❑ The ENCLOSURE can be only in the first position after the delimiter for COM (new) and COMT records. Otherwise, it will not be recognized.

❑ The number of fields on a line cannot exceed the number of fields defined in the Master File. If there are more, the following message displays.

```
(FOC416) MORE VALUES SUPPLIED THAN FIELDS IN THE MASTER FILE DESCRIPTION
```

Format Display Option for Percentage Calculation

The lowercase p display option converts a number to a percent by multiplying it by 100. It then displays the number followed by a percent symbol (%). This is different from the % format option, which does not calculate a percent, it just displays a percent symbol after the number.

Note: This option is not supported for output formats XLSX and EXL2K.

Syntax: **How to Display a Percentage**

```
field/floatfmtp
```

where:

field
> Is a numeric field.

floatfmt
> Is a numeric format of type F or D.

Example: **Displaying a Percentage Using Display Option p**

The following request displays the PCT_INC field (which is a decimal value) and redisplays it as a percentage:

```
TABLE FILE EMPLOYEE
PRINT PCT_INC PCT_INC/F10p
END
```

The output is:

```
PCT_INC         PCT_INC
-------         -------
    .10             10%
    .12             12%
    .10             10%
    .04              4%
    .00              0%
    .05              5%
    .00              0%
    .00              0%
    .10             10%
    .00              0%
    .00              0%
    .15             15%
    .00              0%
    .07              7%
    .00              0%
    .04              4%
    .00              0%
    .05              5%
    .00              0%
```

Start of Week Parameter for the DTRUNC Function

Given a date or date-time value and a time period, the DTRUNC function returns the date that is the beginning of that period. The parameter WEEK has been added, which returns the date that represents the first date of the given week. By default, the first day will be Sunday, but this can be changed using the WEEKFIRST parameter.

Example: **Using the Start of Week Parameter for DTRUNC**

The following request returns the date that is the start of the week for the start date of certain employees:

```
DEFINE FILE WF_RETAIL
DAY1/WT = DTRUNC(START_DATE, DAY);
WKSTART/YYMD = DTRUNC(START_DATE, WEEK);
DAY2/WT = DTRUNC(WKSTART, DAY);
END
TABLE FILE WF_RETAIL
PRINT START_DATE
DAY1 AS 'DOW 1'
WKSTART AS 'Start,of Week'
DAY2 AS 'DOW 2'
BY EMPLOYEE_NUMBER
WHERE START_DATE GT '20130101'
WHERE EMPLOYEE_NUMBER CONTAINS 'AH'
ON TABLE SET PAGE NOPAGE
END
```

The output is:

```
Employee     Start                 Start
Number       Date        DOW 1   of Week      DOW 2
--------     -----       -----   -------      -----
AH118        2013/01/15  TUE     2013/01/13   SUN
AH2272       2013/01/17  THU     2013/01/13   SUN
AH288        2013/11/11  MON     2013/11/10   SUN
AH3520       2013/09/23  MON     2013/09/22   SUN
AH3591       2013/09/22  SUN     2013/09/22   SUN
AH5177       2013/07/21  SUN     2013/07/21   SUN
```

Function DTRUNC Returns the Last Day of a Calendar Period

Given a date or timestamp and a component, DTRUNC returned the first date within the period specified by that component.

The following components have been added that return the last date within the period specified by the component.

❏ YEAR_END

❏ QUARTER_END

❏ MONTH_END

❏ WEEK_END

This function is available in both WebFOCUS and SQL.

The calculators in the Synonym Editor and Data Flow show the new parameter values.

Note: You can change which day is considered the first day of the week using the WEEKFIRST parameter. By default, it is Sunday.

Example: **Returning the Date of the First and Last Days of a Week**

The following request returns the dates that corresponds to the first day of the week and the last day of the week for the given date.

```
DEFINE FILE WF_RETAIL
WEEKSTART/YYMD = DTRUNC(START_DATE, WEEK);
WEEKEND/YYMD = DTRUNC(START_DATE, WEEK_END);
END
TABLE FILE WF_RETAIL
PRINT START_DATE WEEKSTART AS 'Start,of Week'
WEEKEND AS 'End,of Week'
BY EMPLOYEE_NUMBER
WHERE EMPLOYEE_NUMBER CONTAINS 'AH1'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Employee Number	Start Date	Start of Week	End of Week
AH118	2013/01/15	2013/01/13	2013/01/19
AH1348	2009/11/19	2009/11/15	2009/11/21
AH1398	2009/11/11	2009/11/08	2009/11/14
AH1994	2006/01/01	2006/01/01	2006/01/07

Simplified Numeric Functions

New numeric functions have been developed that make it easier to understand and enter the required arguments. These functions have streamlined parameter lists, similar to those used by SQL functions. In some cases, these simplified functions provide slightly different functionality than previous versions of similar functions.

The simplified functions do not have an output argument. Each function returns a value that has a specific data type.

When used in a request against a relational data source, these functions are optimized (passed to the RDBMS for processing).

Note:

❏ The simplified numeric functions are supported in Dialogue Manager.

❏ The simplified numeric functions are not supported in WebFOCUS Maintain.

CEILING: Returning the Smallest Integer Value Greater Than or Equal to a Value

CEILING returns the smallest integer value that is greater than or equal to a number.

Syntax: **How to Return the Smallest Integer Greater Than or Equal to a Number**

```
CEILING(number)
```

where:

number

Numeric

Is the number whose ceiling will be returned. The output data type is the same as the input data type.

Example: **Returning the Ceiling of a Number**

In the following request, CEILING returns the smallest integer greater than or equal to the GROSS_PROFIT_US value.

```
DEFINE FILE WF_RETAIL_LITE
CEIL1/D7.2= CEILING(GROSS_PROFIT_US);
END
TABLE FILE WF_RETAIL_LITE
PRINT GROSS_PROFIT_US/D9.2  CEIL1
ON TABLE SET PAGE NOPAGE
END
```

The partial output follows. Note that even though the value returned is an integer, it is returned with the same format as the CEIL1 field (D7.2):

```
Gross Profit       CEIL1
------------       -----
      165.00      165.00
       13.99       14.00
       60.99       61.00
      225.98      226.00
       79.99       80.00
       44.59       45.00
       94.30       95.00
      238.50      239.00
      199.99      200.00
       68.99       69.00
       63.58       64.00
      129.99      130.00
       37.49       38.00
       75.99       76.00
       13.99       14.00
      119.00      119.00
      -30.01      -30.00
       54.99       55.00
      189.98      190.00
       44.59       45.00
       91.98       92.00
       89.00       89.00
       59.50       60.00
      129.99      130.00
       54.00       54.00
      109.98      110.00
       98.99       99.00
       98.99       99.00
       99.99      100.00
       44.59       45.00
```

EXPONENT: Raising e to a Power

EXPONENT raises the constant *e* to a power.

Syntax: ## How to Raise the Constant e to a Power

```
EXPONENT(power)
```

where:

power

Numeric

Is the power to which to raise *e*. The output data type is numeric.

Example: **Raising e to a Power**

The following request prints the value of e and the value of e raised to the fifth power.

```
DEFINE FILE WF_RETAIL_LITE
EXP1/D12.5 = EXPONENT(1);
EXP2/D12.5 = EXPONENT(5);
END
TABLE FILE WF_RETAIL_LITE
PRINT EXP1 EXP2
BY BUSINESS_REGION AS Region
WHERE BUSINESS_REGION EQ 'EMEA'
WHERE RECORDLIMIT EQ 1
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Region	EXP1	EXP2
EMEA	2.71828	148.41316

FLOOR: Returning the Largest Integer Less Than or Equal to a Value

FLOOR returns the largest integer value that is less than or equal to a number.

Syntax: **How to Return the Largest Integer Less Than or Equal to a Number**

```
FLOOR(number)
```

where:

number

Numeric

Is the number whose floor will be returned. The output data type is the same as the input data type.

Example: **Returning the Floor of a Number**

In the following request, FLOOR returns the largest integer less than or equal to the GROSS_PROFIT_US value.

```
DEFINE FILE WF_RETAIL_LITE
FLOOR1/D7.2= FLOOR(GROSS_PROFIT_US);
END
TABLE FILE WF_RETAIL_LITE
PRINT GROSS_PROFIT_US/D9.2  FLOOR1
ON TABLE SET PAGE NOPAGE
END
```

Partial output follows. Note that even though the value returned is an integer, it is returned with the same format as the FLOOR1 field (D7.2):

```
Gross Profit    FLOOR1
------------    ------
      165.00    165.00
       13.99     13.00
       60.99     60.00
      225.98    225.00
       79.99     79.00
       44.59     44.00
       94.30     94.00
      238.50    238.00
      199.99    199.00
       68.99     68.00
       63.58     63.00
      129.99    129.00
       37.49     37.00
       75.99     75.00
       13.99     13.00
      119.00    119.00
      -30.01    -31.00
       54.99     54.00
      189.98    189.00
       44.59     44.00
       91.98     91.00
       89.00     89.00
       59.50     59.00
      129.99    129.00
       54.00     54.00
      109.98    109.00
       98.99     98.00
       98.99     98.00
       99.99     99.00
       44.59     44.00
```

MOD: Calculating the Remainder From a Division

MOD calculates the remainder from a division. The output data type is the same as the input data type.

Syntax: **How to Calculate the Remainder From a Division**

```
MOD(dividend, divisor)
```

where:

dividend

    Numeric

    Is the value to divide.

divisor

    Numeric

    Is the value to divide by.

If the divisor is zero (0), the dividend is returned.

Example: **Calculating the Remainder From a Division**

In the following request, MOD returns the remainder of PRICE_DOLLARS divided by DAYSDELAYED:

```
DEFINE FILE WF_RETAIL_LITE
MOD1/D7.2= MOD(PRICE_DOLLARS, DAYSDELAYED);
END
TABLE FILE WF_RETAIL_LITE
PRINT PRICE_DOLLARS/D7.2  DAYSDELAYED/I5 MOD1
WHERE DAYSDELAYED GT 1
ON TABLE SET PAGE NOPAGE
ON TABLE PCHOLD FORMAT WP
END
```

Partial output follows:

```
Price     Days
   Dollars  Delayed      MOD1
   -------  -------
----

    399.00        3       .00
    489.99        3       .99
    786.50        2       .50
    599.99        4      3.99
     29.99        4      1.99
    169.00        2      1.00
    219.99        2      1.99
    280.00        3      1.00
     79.99        4      3.99
    145.99        2      1.99
    399.99        3       .99
    349.99        3      1.99
    169.00        3      1.00
```

POWER: Raising a Value to a Power

POWER raises a base value to a power.

Syntax: How to Raise a Value to a Power

POWER(*base, power*)

where:

base
> Numeric

> Is the value to raise to a power. The output value has the same data type as the base value. If the base value is integer, negative power values will result in truncation.

power
> Numeric

> Is the power to which to raise the base value.

Example: **Raising a Base Value to a Power**

In the following request, POWER returns the value COGS_US/20.00 raised to the power stored in DAYSDELAYED:

```
DEFINE FILE WF_RETAIL_LITE
BASE=COGS_US/20.00;
POWER1= POWER(COGS_US/20.00,DAYSDELAYED);
END
TABLE FILE WF_RETAIL_LITE
PRINT BASE IN 15 DAYSDELAYED POWER1
BY PRODUCT_CATEGORY
WHERE PRODUCT_CATEGORY EQ 'Computers'
WHERE DAYSDELAYED NE 0
ON TABLE SET PAGE NOPAGE
END
```

Partial output follows:

```
Product                           Days
Category              BASE      Delayed         POWER1
--------              ----      -------         ------
Computers            12.15            3       1,793.61
                     16.70            2         278.89
                      8.35            1           8.35
                      8.10            2          65.61
                      4.05            1           4.05
                      4.05            2          16.40
                      4.05            4         269.04
                      8.35            1           8.35
                     16.70            1          16.70
                      8.35            3         582.18
                      8.35            1           8.35
                      4.05            1           4.05
                      4.05            1           4.05
                      8.35            4       4,861.23
                      8.35           -1            .12
                      8.35            1           8.35
                      8.35            3         582.18
```

Simplified Character Functions

New simplified character functions CONCAT, REGEX, REPLACE, and SPLIT functions have been added.

LAST_NONBLANK: Retrieving the Last Field Value That is Neither Blank nor Missing

LAST_NONBLANK retrieves the last field value that is neither blank nor missing. If all previous values are either blank or missing, LAST_NONBLANK returns a missing value.

Syntax: **How to Return the Last Value That is Neither Blank nor Missing**

```
LAST_NONBLANK(field)
```

where:

field

    Is the field name whose last non-blank value is to be retrieved. If the current value is not blank or missing, the current value is returned.

Note: LAST_NONBLANK cannot be used in a compound expression, for example, as part of an IF condition.

Example: **Retrieving the Last Non-Blank Value**

The following request shows the SALARY field, the LAST_NONBLANK value from a DEFINE, and the LAST_NONBLANK value from a COMPUTE.

```
DEFINE FILE EMPLOYEE
MYSAL/I5 MISSING ON=IF DEPARTMENT EQ 'MIS' THEN SALARY ELSE MISSING;
LAST_NONBLANK1/I5 MISSING ON= LAST_NONBLANK(MYSAL);
END
TABLE FILE EMPLOYEE
PRINT LAST_NAME MYSAL  LAST_NONBLANK1
COMPUTE LAST_NONBLANK2/I5 MISSING ON=LAST_NONBLANK(MYSAL);
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
END
```

The output is shown in the following image.

LAST_NAME	MYSAL	LAST_NONBLANK1	LAST_NONBLANK2
STEVENS	.	.	.
STEVENS	.	.	.
SMITH	13200	13200	13200
JONES	18480	18480	18480
JONES	17750	17750	17750
SMITH	.	17750	17750
SMITH	.	17750	17750
BANNING	.	17750	17750
IRVING	.	17750	17750
IRVING	.	17750	17750
ROMANS	.	17750	17750
MCCOY	18480	18480	18480
BLACKWOOD	21780	21780	21780
MCKNIGHT	.	21780	21780
MCKNIGHT	.	21780	21780
GREENSPAN	9000	9000	9000
GREENSPAN	8650	8650	8650
CROSS	27062	27062	27062
CROSS	25775	25775	25775

REGEX: Matching a String to a Regular Expression

The REGEX function matches a string to a regular expression and returns true (1) if it matches and false (0) if it does not match.

A regular expression is a sequence of special characters and literal characters that you can combine to form a search pattern.

Many references for regular expressions exist on the web.

For a basic summary, see the section *Summary of Regular Expressions* in Chapter 2, *Security*, of the *Server Administration* manual.

Syntax: ## How to Match a String to a Regular Expression

```
REGEX(string, regular_expression)
```

where:

string

Alphanumeric

Is the character string to match.

regular_expression

Alphanumeric

Is a regular expression enclosed in single quotation marks (') constructed using literals and metacharacters. The following metacharacters are supported

❑ . represents any single character

❑ * represents zero or more occurrences

❑ + represents one or more occurrences

❑ ? represents zero or one occurrence

❑ ^ represents beginning of line

❑ $ represents end of line

❑ [] represents any one character in the set listed within the brackets

❑ [^] represents any one character not in the set listed within the brackets

❑ | represents the Or operator

❑ \ is the Escape Special Character

❑ () contains a character sequence

For example, the regular expression '^Ste(v|ph)en$' matches values starting with *Ste* followed by either *ph* or *v*, and ending with *en*.

Note: The output value is numeric.

Example: **Matching a String Against a Regular Expression**

The following request matches the FIRSTNAME field against the regular expression '^Sara(h?)$', which matches Sara or Sarah:

```
TABLE FILE WF_RETAIL_LITE
PRINT FIRSTNAME AND COMPUTE
REG1/I1=REGEX(FIRSTNAME,'^Sara(h?)$') ;
BY LASTNAME/A10
WHERE LASTNAME EQ 'Allen'
END
```

The output is

```
          First
LASTNAME  Name                 REG1
--------  -----                ----
Allen     Penny                   0
          Rosemary                0
          Amber                   0
          Julie                   0
          Sarah                   1
          Leo                     0
          Margret                 0
          Donna                   0
          Damian                  0
          Alexander               0
          Diego                   0
          Amber                   0
          Susan                   0
          Amber                   0
          Sara                    1
          Sara                    1
```

CONCAT: Concatenating Strings After Removing Trailing Blanks From the First

CONCAT removes trailing blanks from a string and then concatenates another string to it. The output is returned as variable length alphanumeric.

Syntax: How to Concatenate Strings After Removing Trailing Blanks From the First

CONCAT(*string1, string2*)

where:

string2
   Alphanumeric

   Is a string whose trailing blanks will be removed.

string1
   Alphanumeric

   Is a string whose leading and trailing blanks will be preserved.

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Example: **Concatenating Strings After Removing Blanks From the First**

The following request concatenates city names with state names. Note that the city and state names are converted to fixed length alphanumeric fields before concatenation.

```
DEFINE FILE WF_RETAIL_LITE
CITY/A50 = CITY_NAME;
STATE/A50 = STATE_PROV_NAME;
CONCAT_CS/A100 = CONCAT(CITY,STATE);
END

TABLE FILE WF_RETAIL_LITE
SUM CITY AS City STATE AS State CONCAT_CS AS Concatenation
BY STATE_PROV_NAME NOPRINT
WHERE COUNTRY_NAME EQ 'United States'
WHERE STATE LE 'Louisiana'
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image.

City	State	Concatenation
Montgomery	Alabama	MontgomeryAlabama
Anchorage	Alaska	AnchorageAlaska
Phoenix	Arizona	PhoenixArizona
Little Rock	Arkansas	Little RockArkansas
Saratoga	California	SaratogaCalifornia
Colorado Springs	Colorado	Colorado SpringsColorado
Old Lyme	Connecticut	Old LymeConnecticut
Lewes	Delaware	LewesDelaware
Washington	District of Columbia	WashingtonDistrict of Columbia
Miami	Florida	MiamiFlorida
Atlanta	Georgia	AtlantaGeorgia
Honolulu	Hawaii	HonoluluHawaii
Boise	Idaho	BoiseIdaho
Chicago	Illinois	ChicagoIllinois
Indianapolis	Indiana	IndianapolisIndiana
Des Moines	Iowa	Des MoinesIowa
Wichita	Kansas	WichitaKansas
Lexington	Kentucky	LexingtonKentucky
New Orleans	Louisiana	New OrleansLouisiana

REPLACE: Replacing a String

REPLACE replaces all instances of a search string in an input string with the given replacement string. The output is always variable length alphanumeric with a length determined by the input parameters.

Syntax: **How to Replace all Instances of a String**

```
REPLACE(input_string , search_string , replacement)
```

where:

input_string

    Alphanumeric or text (An, AnV, TX)

    Is the input string.

search_string

    Alphanumeric or text (An, AnV, TX)

    Is the string to search for within the input string.

replacement

    Alphanumeric or text (An, AnV, TX)

    Is the replacement string to be substituted for the search string. It can be a null string ('').

Example: **Replacing a String**

REPLACE replaces the string 'South' in the Country Name with the string 'S.'

```
SET TRACEUSER = ON
SET TRACEON = STMTRACE//CLIENT
SET TRACESTAMP=OFF
DEFINE FILE WF_RETAIL_LITE
NEWNAME/A20 = REPLACE(COUNTRY_NAME, 'SOUTH', 'S.');
END
TABLE FILE WF_RETAIL_LITE
SUM COUNTRY_NAME
BY NEWNAME AS 'New,Name'
WHERE COUNTRY_NAME LIKE 'S%'
ON TABLE SET PAGE NOLEAD
END
```

The generated SQL passes the REPLACE function to the DBMS REPLACE function.

```
SELECT
REPLACE(T3."COUNTRY_NAME",'SOUTH','S.'),
MAX(T3."COUNTRY_NAME")
FROM
wrd_wf_retail_geography T3
WHERE
(T3."COUNTRY_NAME" LIKE 'S%')
GROUP BY
REPLACE(T3."COUNTRY_NAME",'SOUTH','S.')
ORDER BY
REPLACE(T3."COUNTRY_NAME",'SOUTH','S.');
```

The output is shown in the following image.

New Name	Customer Country
S. Africa	South Africa
S. Korea	South Korea
Singapore	Singapore
Spain	Spain
Sweden	Sweden
Switzerland	Switzerland

Example: Replacing All Instances of a String

In the following request, the virtual field DAYNAME1 is the string DAY1 with all instances of the string 'DAY' replaced with the string 'day'. The virtual field DAYNAME2 has all instances of the string 'DAY' removed.

```
DEFINE FILE WF_RETAIL
DAY1/A30 = 'SUNDAY MONDAY TUESDAY';
DAYNAME1/A30 = REPLACE(DAY1, 'DAY', 'day' );
DAYNAME2/A30 = REPLACE(DAY1, 'DAY', '' );
END
TABLE FILE WF_RETAIL
PRINT DAY1 OVER
DAYNAME1 OVER
DAYNAME2
WHERE EMPLOYEE_NUMBER EQ 'AH118'
ON TABLE SET PAGE NOPAGE
END
```

The output is:

```
DAY1      SUNDAY MONDAY TUESDAY
DAYNAME1  SUNday MONday TUESday
DAYNAME2  SUN MON TUES
```

SPLIT: Extracting an Element From a String

The SPLIT function returns a specific type of element from a string. The output is returned as variable length alphanumeric.

Syntax: **How to Extract an Element From a String**

```
SPLIT(element, string)
```

where:

element

> Can be one of the following keywords:

> ❏ **EMAIL_DOMAIN.** Is the domain name portion of an email address in the string.

> ❏ **EMAIL_USERID.** Is the user ID portion of an email address in the string.

> ❏ **URL_PROTOCOL.** Is the URL protocol in the string.

> ❏ **URL_HOST.** Is the host name of the URL in the string.

> ❏ **URL_PORT.** Is the port number of the URL in the string.

> ❏ **URL_PATH.** Is the URL path in the string.

> ❏ **NAME_FIRST.** Is the first token (group of characters) in the string. Tokens are delimited by blanks.

> ❏ **NAME_LAST.** Is the last token (group of characters) in the string. Tokens are delimited by blanks.

string
> Alphanumeric

> Is the string from which the element will be extracted.

Example: **Extracting an Element From a String**

The following request defines strings and extracts elements from them.

```
DEFINE FILE WF_RETAIL_LITE
STRING1/A50 WITH COUNTRY_NAME= 'http://www.informationbuilders.com';
STRING2/A20 = 'user1@ibi.com';
STRING3/A20 = 'Louisa May Alcott';
Protocol/A20 = SPLIT(URL_PROTOCOL, STRING1);
Path/A50 = SPLIT(URL_PATH, STRING1);
Domain/A20 = SPLIT(EMAIL_DOMAIN, STRING2);
User/A20 =  SPLIT(EMAIL_USERID, STRING2);
First/A10 = SPLIT(NAME_FIRST, STRING3);
Last/A10 = SPLIT(NAME_LAST, STRING3);
END
TABLE FILE WF_RETAIL_LITE
SUM Protocol Path User Domain First Last
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image.

Protocol	Path	User	Domain	First	Last
http	http://www.informationbuilders.com	user1	ibi.com	Louisa	Alcott

CHECKMD5: Computing an MD5 Hash Check Value

CHECKMD5 takes an alphanumeric input value and returns a 128-bit value in a fixed length alphanumeric string, using the MD5 hash function. A hash function is any function that can be used to map data of arbitrary size to data of fixed size. The values returned by a hash function are called hash values. They can be used for assuring the integrity of transmitted data.

Syntax: How to Compute an MD5 Hash Check Value

```
CHECKMD5(buffer)
```

where:

buffer

Is a data buffer whose hash value is to be calculated. It can be a set of data of different types presented as a single field, or a group field in one of the following data type formats: An, AnV, or TXn.

Example: Calculating an MD5 Hash Check Value

The following request calculates an MD5 hash check value and converts it to an alphanumeric hexadecimal value for display.

```
DEFINE FILE WF_RETAIL_LITE
MD5/A32 = HEXTYPE(CHECKMD5(PRODUCT_CATEGORY));
END
TABLE FILE WF_RETAIL_LITE
SUM MD5
BY PRODUCT_CATEGORY
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT,FONT=COURIER,$
 ENDSTYLE
END
```

The output is shown in the following image. The monospaced font shows that although the input values have varying length, the output has a fixed length.

Product Category	MD5
Accessories	98EDB85B00D9527AD5ACEBE451B3FAE6
Camcorder	612A923BDD05C2231F81991B8D12A3A1
Computers	45888A4DA062F16A099A7F7C6CC15EE0
Media Player	D34BEA29F24AF9FDE2E10B3E1D857CF9
Stereo Systems	3AA9FFE9806E269A7EB066A84092F0A3
Televisions	A3B5BC99DD2B42627EF64A4FCAAAB0B2
Video Production	60913E95848330A2C4A5D921E7C8BB14

CHECKSUM: Computing a Hash Sum

CHECKSUM computes a hash sum, called the checksum, of its input parameter, as a whole number in format I11. This can be used for equality search of the fields. A checksum is a hash sum used to ensure the integrity of a file after it has been transmitted from one storage device to another.

Syntax: How to Compute a CHECKSUM Hash Value

```
CHECKSUM(buffer)
```

where:

buffer

Is a data buffer whose hash index is to be calculated. It can be a set of data of different types presented as a single field, in one of the following data type formats: An, AnV, or TXn.

Example: **Calculating a CHECKSUM Hash Value**

The following request computes a checksum hash value.

```
DEFINE FILE WF_RETAIL_LITE
CHKSUM/I11 = (CHECKSUM(PRODUCT_CATEGORY));
END
TABLE FILE WF_RETAIL_LITE
PRINT CHKSUM
BY PRODUCT_CATEGORY
WHERE PRODUCT_CATEGORY NE LAST PRODUCT_CATEGORY
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image.

Product Category	CHKSUM
Accessories	-830549649
Camcorder	-912058982
Computers	-469201037
Media Player	-1760917009
Stereo Systems	-1853215244
Televisions	810407163
Video Production	275494446

Simplified Conversion Functions

New simplified conversion functions CHAR, CTRL_CHAR, EDIT2, HEXTYPE, TO_INTEGER, and TO_NUMBER have been added.

CHAR: Returning a Character Based on a Numeric Code

The CHAR function accepts a decimal integer and returns the character identified by that number converted to ASCII or EBCDIC, depending on the operating environment. The output is returned as variable length alphanumeric. If the number is above the range of valid characters, a null is returned.

Syntax: **How to Return a Character Based on a Numeric Code**

```
CHAR(number_code)
```

where:

number_code

Integer

Is a field, number, or numeric expression whose whole absolute value will be used as a number code to retrieve an output character.

For example, a TAB character is returned by CHAR(9) in ASCII environments, or by CHAR(5) in EBCDIC environments.

Example: **Using the CHAR Function to Insert Control Characters Into a String**

The following request defines a field with carriage return (CHAR(13)) and line feed (CHAR(10)) characters inserted between the words HELLO and GOODBYE (in an ASCII environment). To show that these characters were inserted, the output is generated in PDF format and the StyleSheet attribute LINEBREAK='CRLF' is used to have these characters respected and print the field value on two lines.

```
DEFINE FILE WF_RETAIL_LITE
MYFIELD/A20 WITH COUNTRY_NAME='HELLO' | CHAR(13) | CHAR(10) | 'GOODBYE';
END
TABLE FILE WF_RETAIL_LITE
SUM MYFIELD
ON TABLE PCHOLD FORMAT PDF
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT,LINEBREAK='CRLF',$
ENDSTYLE
END
```

The output is shown in the following image.

CTRLCHAR: Returning a Non-Printable Control Character

The CTRLCHAR function returns a nonprintable control character specific to the running operating environment, based on a supported list of keywords. The output is returned as variable length alphanumeric.

Syntax: **How to Return a Non-Printable Control Character**

CTRLCHAR(*ctrl_char*)

where:

ctrl_char

Is one of the following keywords.

- ❑ **NUL** returns a null character.

- ❑ **SOH** returns a start of heading character.

- ❑ **STX** returns a start of text character.

- ❑ **ETX** returns an end of text character.

- ❑ **EOT** returns an end of transmission character.

- ❑ **ENQ** returns an enquiry character.

- ❑ **ACK** returns an acknowledge character.

- ❑ **BEL** returns a bell or beep character.

- ❑ **BS** returns a backspace character.

- ❑ **TAB** or **HT** returns a horizontal tab character.

- ❑ **LF** returns a line feed character.

- ❑ **VT** returns a vertical tab character.

- ❑ **FF** returns a form feed (top of page) character.

- ❑ **CR** returns a carriage control character.

- ❑ **SO** returns a shift out character.

- ❑ **SI** returns a shift in character.

- ❑ **DLE** returns a data link escape character.

- ❑ **DC1** or **XON** returns a device control 1 character.

- ❑ **DC2** returns a device control 2 character.

- ❑ **DC3** or **XOFF** returns a device control 3 character.

- ❑ **DC4** returns a device control 4 character.

- ❑ **NAK** returns a negative acknowledge character.

- ❑ **SYN** returns a synchronous idle character.

❏ **ETB** returns an end of transmission block character.

❏ **CAN** returns a cancel character.

❏ **EM** returns an end of medium character.

❏ **SUB** returns a substitute character.

❏ **ESC** returns an escape, prefix, or altmode character.

❏ **FS** returns a file separator character.

❏ **GS** returns a group separator character.

❏ **RS** returns a record separator character.

❏ **US** returns a unit separator character.

❏ **DEL** returns a delete, rubout, or interrupt character.

Example: **Using the CTRLCHAR Function to Insert Control Characters Into a String**

The following request defines a field with carriage return (CTRLCHAR(CR)) and line feed (CTRLCHAR(LF)) characters inserted between the words HELLO and GOODBYE. To show that these characters were inserted, the output is generated in PDF format and the StyleSheet attribute LINEBREAK='CRLF' is used to have these characters respected and print the field value on two lines.

```
DEFINE FILE WF_RETAIL_LITE
MYFIELD/A20 WITH COUNTRY_NAME='HELLO' | CTRLCHAR(CR) | CTRLCHAR(LF) |
'GOODBYE';
END
TABLE FILE WF_RETAIL_LITE
SUM MYFIELD
ON TABLE PCHOLD FORMAT PDF
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT,LINEBREAK='CRLF',$
ENDSTYLE
END
```

The output is shown in the following image.

MYFIELD
───────

HELLO
GOODBYE

EDIT2: Converting a Numeric, Date, or Date-Time Value to a Character String

The EDIT2 function converts a numeric, date, or date-time value to a character string based on a specified format. The format must be valid for the data supplied. The output is returned as variable length alphanumeric.

Syntax: **How to Convert a Numeric, Date, or Date_Time Value to a Character String**

```
EDIT2(in_value, 'format')
```

where:

in_value

Numeric, date, or date-time

Is any numeric value or a date in either standard date or date-time format. If the date is given in standard date format, all of its time components are assumed to be zero.

'format'

Is a numeric, date, or date-time format enclosed in single quotation marks (').

Example: **Converting a Date to a Character String**

The following request defines a date field as YYMD format and converts it to a character string (CharDate) in YYMtrD format.

```
DEFINE FILE WF_RETAIL_LITE
DATE1/YYMD = TIME_DATE_DAY_COMPONENT;
CharDate/A20 = EDIT2(DATE1,'YYMtrD');
END
TABLE FILE WF_RETAIL_LITE
SUM COGS_US
BY CharDate
WHERE TIME_MTHNAME  EQ 'FEB'
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image.

CharDate	Cost of Goods
2012, February 1	$10,511.00
2012, February 2	$8,393.00
2012, February 3	$8,194.00
2012, February 4	$13,928.00
2012, February 5	$10,756.00
2012, February 6	$6,704.00
2012, February 7	$8,195.00
2012, February 8	$13,625.00
2012, February 9	$9,455.00
2012, February 10	$13,433.00
2012, February 11	$6,320.00
2012, February 12	$8,060.00
2012, February 13	$7,036.00
2012, February 14	$8,799.00
2012, February 15	$9,983.00
2012, February 16	$12,824.00
2012, February 17	$7,368.00
2012, February 18	$9,613.00
2012, February 19	$12,316.00
2012, February 20	$10,335.00
2012, February 21	$9,081.00
2012, February 22	$8,208.00
2012, February 23	$6,755.00
2012, February 24	$10,849.00
2012, February 25	$9,603.00
2012, February 26	$11,080.00
2012, February 27	$10,684.00
2012, February 28	$8,346.00

HEXTYPE: Returning the Hexadecimal View of an Input Value

The HEXTYPE function returns the hexadecimal view of an input value of any data type. The result is returned as variable length alphanumeric. The alphanumeric field to which the hexidecimal value is returned must be large enough to hold two characters for each input character. The value returned depends on the running operating environment.

Syntax: **How to Returning the Hexadecimal View of an Input Value**

```
HEXTYPE(in_value)
```

where:

in_value
> Is an alphanumeric or integer field, constant, or expression.

Example: **Returning a Hexadecimal View**

The following request returns a hexadecimal view of the country names and the sum of the days delayed.

```
DEFINE FILE WF_RETAIL_LITE
Days/I8 = DAYSDELAYED;
Country/A20 = COUNTRY_NAME;
HexCountry/A30 = HEXTYPE(Country);
END
TABLE FILE WF_RETAIL_LITE
SUM COUNTRY_NAME NOPRINT  Country HexCountry Days
COMPUTE HexDays/A40 = HEXTYPE(Days);
BY COUNTRY_NAME NOPRINT
WHERE COUNTRY_NAME LT 'P'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Country	HexCountry	Days	HexDays
Argentina	417267656E74696E61202020202020	84	00000054
Australia	4175737472616C6961202020202020	27	0000001B
Austria	41757374726961202020202020202020	798	0000031E
Belgium	42656C6769756D2020202020202020	14	0000000E
Brazil	4272617A696C2020202020202020202020	204	000000CC
Canada	43616E616461202020202020202020	584	00000248
Chile	4368696C65202020202020202020202020	45	0000002D
China	4368696E6120202020202020202020202020	1	00000001
Colombia	436F6C6F6D62696120202020202020	114	00000072
Denmark	44656E6D61726B2020202020202020	0	00000000
Egypt	4567797074202020202020202020202020	3	00000003
Finland	46696E6C616E642020202020202020	3	00000003
France	4672616E6365202020202020202020	49	00000031
Germany	4765726D616E792020202020202020	498	000001F2
Greece	477265656365202020202020202020	9	00000009
Hungary	48756E67617279202020202020202020	7	00000007
India	496E646961202020202020202020202020	23	00000017
Ireland	4972656C616E642020202020202020	7	00000007
Israel	49737261656C202020202020202020	2	00000002
Italy	4974616C79202020202020202020202020	7	00000007
Japan	4A6170616E2020202020202020202020	12	0000000C
Luxembourg	4C7578656D626F757267202020202020	0	00000000
Malaysia	4D616C6179736961202020202020	20	00000014
Mexico	4D657869636F2020202020202020202020	170	000000AA
Netherlands	4E65746865726C616E6473202020202020	8	00000008
Norway	4E6F727761792020202020202020202020	0	00000000

PHONETIC: Returning a Phonetic Key for a String

PHONETIC calculates a phonetic key for a string, or a null value on failure. Phonetic keys are useful for grouping alphanumeric values, such as names, that may have spelling variations. This is done by generating an index number that will be the same for the variations of the same name based on pronunciation. One of two phonetic algorithms can be used for indexing, Metaphone and Soundex. Metaphone is the default algorithm, except on z/OS where the default is Soundex.

You can set the algorithm to use with the following command.

```
SET PHONETIC_ALGORITHM = {METAPHONE|SOUNDEX}
```

Most phonetic algorithms were developed for use with the English language. Therefore, applying the rules to words in other languages may not give a meaningful result.

Metaphone is suitable for use with most English words, not just names. Metaphone algorithms are the basis for many popular spell checkers.

Note: Metaphone is not optimized in generated SQL. Therefore, if you need to optimize the request for an SQL DBMS, the SOUNDEX setting should be used.

Soundex is a legacy phonetic algorithm for indexing names by sound, as pronounced in English.

Reference: **Return a Phonetic Key**

```
PHONETIC(string)
```

where:

string

Alphanumeric

Is a string for which to create the key. A null value will be returned on failure.

Example: **Generating a Phonetic Key**

The following request changes the spelling of the last name for MARY SMITH to SMYTHE and generates a phonetic key for each last name.

```
DEFINE FILE EMPLOYEE
LAST_NAME2/A16 = IF LAST_NAME EQ 'SMITH' AND FIRST_NAME EQ 'MARY' THEN
'SMYTHE' ELSE LAST_NAME;
PKEY/A10 = PHONETIC(LAST_NAME2);
END
TABLE FILE EMPLOYEE
PRINT FIRST_NAME LAST_NAME2
BY PKEY
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image. Note that the two spellings for SMITH are assigned the same index number.

PKEY	FIRST NAME	LAST NAME2
B423	ROSEMARIE	BLACKWOOD
B552	JOHN	BANNING
C620	BARBARA	CROSS
G652	MARY	GREENSPAN
I615	JOAN	IRVING
J520	DIANE	JONES
M200	JOHN	MCCOY
M252	ROGER	MCKNIGHT
R552	ANTHONY	ROMANS
S315	ALFRED	STEVENS
S530	MARY	SMYTHE
	RICHARD	SMITH

TO_INTEGER: Converting a Character String to an Integer Value

TO_INTEGER converts a character string that contains a valid number consisting of digits and an optional decimal point to an integer value. If the value contains a decimal point, the value after the decimal point is truncated. If the value does not represent a valid number, zero (0) is returned.

Reference: **Convert a Character String to an Integer**

```
TO_INTEGER(string)
```

where:

string

Is a character string enclosed in single quotation marks or a character field that represents a number containing digits and an optional decimal point.

Example: **Converting a Character String to an Integer Value**

The following request converts character strings to integers. Digits following the decimal point are truncated.

```
DEFINE FILE WF_RETAIL_LITE
INT1/I8 = TO_INTEGER('56.78');
INT2/I8 = TO_INTEGER('.5678');
INT3/I8 = TO_INTEGER('5678');
END
TABLE FILE WF_RETAIL_LITE
PRINT INT1 INT2 INT3
BY BUSINESS_REGION AS Region
WHERE READLIMIT EQ 1
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image.

Region	INT1	INT2	INT3
EMEA	56	0	5678

TO_NUMBER: Converting a Character String to a Numeric Value

TO_NUMBER converts a character string that contains a valid number consisting of digits and an optional decimal point to the numeric format most appropriate to the context. If the value does not represent a valid number, zero (0) is returned.

Reference: **Convert a Character String to a Number**

```
TO_NUMBER(string)
```

where:

string

Is a character string enclosed in single quotation marks or a character field that represents a number containing digits and an optional decimal point. This string will be converted to a double-precision floating point number.

Example: **Converting a Character String to a Number**

The following request converts character strings to double-precision floating point numbers.

```
DEFINE FILE WF_RETAIL_LITE
NUM1/D12.1 = TO_NUMBER('56.78');
NUM2/D12.2 = TO_NUMBER('0.5678');
END
TABLE FILE WF_RETAIL_LITE
PRINT NUM1 NUM2
BY BUSINESS_REGION AS Region
WHERE READLIMIT EQ 1
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image.

Region	NUM1	NUM2
EMEA	56.8	.57

Simplified Date Functions

The new simplified date functions DT_CURRENT_DATE, DT_CURRENT_DATETIME, and DT_CURRENT_TIME have been added.

DT_CURRENT_DATE: Returning the Current Date

The DT_CURRENT_DATE function returns the current date-time provided by the running operating environment in date-time format. The time portion of the datetime is set to zero.

Syntax: **How to Return the Current Date**

```
DT_CURRENT_DATE()
```

Example: **Returning the Current Date**

The following request returns the current date.

```
DEFINE FILE WF_RETAIL_LITE
CURRDATE/YYMD WITH COUNTRY_NAME = DT_CURRENT_DATE();
END
TABLE FILE WF_RETAIL_LITE
SUM CURRDATE
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

DT_CURRENT_DATETIME: Returning the Current Date and Time

DT_CURRENT_DATETIME returns the current date and time provided by the running operating environment in date-time format, with a specified time precision.

Syntax: **How to Return the Current Date and Time**

```
DT_CURRENT_DATETIME(component)
```

where:

component

Is one of the following time precisions.

❏ SECOND.

❏ MILLISECOND.

❏ MICROSECOND

Note: The field to which the value is returned must have a format that supports the time precision requested.

Example: **Returning the Current Date and Time**

The following request returns the current date and time, with the time specified in microseconds.

```
DEFINE FILE WF_RETAIL_LITE
CURRDATE/HYYMDm WITH COUNTRY_NAME = DT_CURRENT_DATETIME(MICROSECOND);
END
TABLE FILE WF_RETAIL_LITE
SUM CURRDATE
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

CURRDATE
2016/09/08 17:10:31.605718

DT_CURRENT_TIME: Returning the Current Time

The DT_CURRENT_TIME function returns the current time provided by the running operating environment in date-time format, with a specified time precision. The date portion of the returned date-time value is set to zero.

Syntax: **How to Return the Current Time**

```
DT_CURRENT_TIME(component)
```

where:

component
    Is one of the following time precisions.

    ❏ SECOND.

    ❏ MILLISECOND.

    ❏ MICROSECOND

Note: The field to which the value is returned must have a format that supports the time precision requested.

Example: **Returning the Current Time**

The following request returns the current time, with the time precision set to milliseconds.

```
DEFINE FILE WF_RETAIL_LITE
CURRTIME/HHISs WITH COUNTRY_NAME = DT_CURRENT_TIME(MILLISECOND);
END
TABLE FILE WF_RETAIL_LITE
SUM CURRTIME
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

CURRTIME
17:23:13.098

Simplified System Functions

Simplified system functions ENCRYPT, GETENV, and PUTENV have been added.

ENCRYPT: Encrypting a Password

The ENCRYPT function encrypts an alphanumeric input value using the encryption algorithm configured in the server. The result is returned as variable length alphanumeric.

Syntax: **How to Encrypt a Password**

```
ENCRYPT(password)
```

where:

password
     Fixed length alphanumeric

     Is the value to be encrypted.

Example: **Encrypting a Password**

The following request encrypts the value *guestpassword* using the encryption algorithm configured in the server.

```
-SET &P1 = ENCRYPT('guestpassword');
-TYPE &P1
```

The returned encrypted value is {AES}963AFA754E1763ABE697E8C5E764115E.

GETENV: Retrieving the Value of an Environment Variable

The GETENV function takes the name of an environment variable and returns its value as a variable length alphanumeric value.

Syntax: How to Retrieve the Value of an Environment Variable

```
GETENV(var_name)
```

where:

var_name
    fixed length alphanumeric

    Is the name of the environment variable whose value is being retrieved.

Example: Retrieving the Value of an Environment Variable

The following request retrieves the value of the server variable EDAEXTSEC.

```
-SET &E1 = GETENV('EDAEXTSEC');
-TYPE &E1
```

The value returned is ON if the server was started with security on or OFF if the server was started with security off.

PUTENV: Assigning a Value to an Environment Variable

The PUTENV function assigns a value to an environment variable. The function returns an integer return code whose value is 1 (one) if the assignment is not successful or 0 (zero) if it is successful.

Syntax: How to Assign a Value to an Environment Variable

```
PUTENV(var_name, var_value)
```

where:

var_name
    Fixed length alphanumeric

    Is the name of the environment variable to be set.

var_value
    Alphanumeric

    Is the value you want to assign to the variable.

Example: **Assigning a Value to the UNIX PS1 Variable**

The following request assigns the value *FOCUS/Shell:* to the UNIX PS1 variable.

```
-SET &P1 = PUTENV('PS1','FOCUS/Shell:');
```

This causes UNIX to display the following prompt when the user issues the UNIX shell command SH:

```
FOCUS/Shell:
```

The following request creates a variable named xxxx and sets it to the value *this is a test*. It then retrieves the value using GETENV.

```
-SET &XXXX=PUTENV(xxxx,'this is a test');
-SET &YYYY=GETENV(xxxx);
-TYPE  Return Code: &XXXX,  Variable value: &YYYY
```

The output is:

```
Return Code: 0,  Variable value: this is a test
```

Simplified Geography Functions

The simplified geography functions perform location-based calculations and retrieve geocoded points for various types of location data. They are used by the WebFOCUS location intelligence products that produce maps and charts. Some of the geography functions use GIS services and require valid credentials for accessing Esri ArcGIS proprietary data.

Sample Geography Files

Some of the examples for the geography functions use geography sample files. One file, esri-citibke.csv has station names, latitudes, and longitudes and trip start times and end times. The other file, esri-geo10036.ftm has geometry data. To run the examples that use these files, create an application named *esri*, and place the following files into the application folder.

esri-citibike.mas

```
FILENAME=ESRI-CITIBIKE, SUFFIX=DFIX    ,
 DATASET=esri/esri-citibike.csv, $
  SEGMENT=CITIBIKE_TRIPDATA, SEGTYPE=S0, $
    FIELDNAME=TRIPDURATION, ALIAS=tripduration, USAGE=I7, ACTUAL=A5V,
      TITLE='tripduration', $
    FIELDNAME=STARTTIME, ALIAS=starttime, USAGE=HMDYYS, ACTUAL=A18,
      TITLE='starttime', $
    FIELDNAME=STOPTIME, ALIAS=stoptime, USAGE=HMDYYS, ACTUAL=A18,
      TITLE='stoptime', $
    FIELDNAME=START_STATION_ID, ALIAS='start station id', USAGE=I6,
ACTUAL=A4V,
      TITLE='start station id', $
    FIELDNAME=START_STATION_NAME, ALIAS='start station name', USAGE=A79V,
ACTUAL=A79BV,
      TITLE='start station name', $
    FIELDNAME=START_STATION_LATITUDE, ALIAS='start station latitude',
USAGE=P20.15, ACTUAL=A18V,
      TITLE='start station latitude',
      GEOGRAPHIC_ROLE=LATITUDE,  $
    FIELDNAME=START_STATION_LONGITUDE, ALIAS='start station longitude',
USAGE=P20.14, ACTUAL=A18V,
      TITLE='start station longitude',
      GEOGRAPHIC_ROLE=LONGITUDE,  $
    FIELDNAME=END_STATION_ID, ALIAS='end station id', USAGE=I6,
     ACTUAL=A4V, TITLE='end station id', $
```

```
        FIELDNAME=END_STATION_NAME, ALIAS='end station name', USAGE=A79V,
    ACTUAL=A79BV,
        TITLE='end station name', $
    FIELDNAME=END_STATION_LATITUDE, ALIAS='end station latitude',
    USAGE=P20.15, ACTUAL=A18V,
        TITLE='end station latitude',
        GEOGRAPHIC_ROLE=LATITUDE,  $
    FIELDNAME=END_STATION_LONGITUDE, ALIAS='end station longitude',
    USAGE=P20.14, ACTUAL=A18V,
        TITLE='end station longitude',
        GEOGRAPHIC_ROLE=LONGITUDE,  $
    FIELDNAME=BIKEID, ALIAS=bikeid, USAGE=I7, ACTUAL=A5,
        TITLE='bikeid', $
    FIELDNAME=USERTYPE, ALIAS=usertype, USAGE=A10V, ACTUAL=A10BV,
        TITLE='usertype', $
    FIELDNAME=BIRTH_YEAR, ALIAS='birth year', USAGE=I6, ACTUAL=A4,
        TITLE='birth year', $
    FIELDNAME=GENDER, ALIAS=gender, USAGE=I3, ACTUAL=A1,
        TITLE='gender', $
 SEGMENT=ESRIGEO, SEGTYPE=KU, SEGSUF=FIX, PARENT=CITIBIKE_TRIPDATA,
    DATASET=esri/esri-geo10036.ftm (LRECL 80 RECFM V, CRFILE=ESRI-GEO10036,
    $
```

esri-citibike.acx

```
SEGNAME=CITIBIKE_TRIPDATA,
  DELIMITER=',',
  ENCLOSURE=",
  HEADER=NO,
  CDN=OFF, $
```

esri-citibike.csv

Note: Each complete record must be on a single line. Therefore, you must remove any line breaks that may have been inserted due to the page width in this document.

```
1094,11/1/2015 0:00,11/1/2015 0:18,537,Lexington Ave & E 24 St,
40.74025878,-73.98409214,531,Forsyth St & Broome St,
40.71893904,-73.99266288,23959,Subscriber,1980,1

520,11/1/2015 0:00,11/1/2015 0:08,536,1 Ave & E 30 St,
40.74144387,-73.97536082,498,Broadway & W 32 St,
40.74854862,-73.98808416,22251,Subscriber,1988,1

753,11/1/2015 0:00,11/1/2015 0:12,229,Great Jones St,
40.72743423,-73.99379025,328,Watts St & Greenwich St,
40.72405549,-74.00965965,15869,Subscriber,1981,1

353,11/1/2015 0:00,11/1/2015 0:06,285,Broadway & E 14 St,
40.73454567,-73.99074142,151,Cleveland Pl & Spring St,
40.72210379,-73.99724901,21645,Subscriber,1987,1
```

```
1285,11/1/2015 0:00,11/1/2015 0:21,268,Howard St & Centre St,
40.71910537,-73.99973337,476,E 31 St & 3 Ave,40.74394314,-73.97966069,14788,Customer,,0

477,11/1/2015 0:00,11/1/2015 0:08,379,W 31 St & 7 Ave,40.749156,-73.9916,546,E 30 St &
Park Ave S,40.74444921,-73.98303529,21128,Subscriber,1962,2

362,11/1/2015 0:00,11/1/2015 0:06,407,Henry St & Poplar St,
40.700469,-73.991454,310,State St & Smith St,40.68926942,-73.98912867,21016,Subscriber,
1978,1

2316,11/1/2015 0:00,11/1/2015 0:39,147,Greenwich St & Warren St,
40.71542197,-74.01121978,441,E 52 St & 2 Ave,40.756014,-73.967416,24117,Subscriber,
1988,2

627,11/1/2015 0:00,11/1/2015 0:11,521,8 Ave & W 31 St,
40.75096735,-73.99444208,285,Broadway & E 14 St,
40.73454567,-73.99074142,17048,Subscriber,1986,2

1484,11/1/2015 0:01,11/1/2015 0:26,281,Grand Army Plaza & Central Park S,
40.7643971,-73.97371465,367,E 53 St & Lexington Ave,
40.75828065,-73.97069431,16779,Customer,,0

284,11/1/2015 0:01,11/1/2015 0:06,247,Perry St & Bleecker St,
40.73535398,-74.00483091,453,W 22 St & 8 Ave,40.74475148,-73.99915362,17272,Subscriber,
1976,1

886,11/1/2015 0:01,11/1/2015 0:16,492,W 33 St & 7 Ave,40.75019995,-73.99093085,377,6
Ave & Canal St,40.72243797,-74.00566443,23019,Subscriber,1982,1

1379,11/1/2015 0:01,11/1/2015 0:24,512,W 29 St & 9 Ave,40.7500727,-73.99839279,445,E
10 St & Avenue A,40.72740794,-73.98142006,23843,Subscriber,1962,2

179,11/1/2015 0:01,11/1/2015 0:04,319,Fulton St & Broadway,
40.711066,-74.009447,264,Maiden Ln & Pearl St,
40.70706456,-74.00731853,22538,Subscriber,1981,1

309,11/1/2015 0:01,11/1/2015 0:07,160,E 37 St & Lexington Ave,
40.748238,-73.978311,362,Broadway & W 37 St,40.75172632,-73.98753523,22042,Subscriber,
1988,1

616,11/1/2015 0:02,11/1/2015 0:12,479,9 Ave & W 45 St,40.76019252,-73.9912551,440,E 45
St & 3 Ave,40.75255434,-73.97282625,22699,Subscriber,1982,1

852,11/1/2015 0:02,11/1/2015 0:16,346,Bank St & Hudson St,
40.73652889,-74.00618026,375,Mercer St & Bleecker St,
40.72679454,-73.99695094,21011,Subscriber,1991,1

1854,11/1/2015 0:02,11/1/2015 0:33,409,DeKalb Ave & Skillman St,
40.6906495,-73.95643107,3103,N 11 St & Wythe Ave,
40.72153267,-73.95782357,22011,Subscriber,1992,1
```

```
1161,11/1/2015 0:02,11/1/2015 0:21,521,8 Ave & W 31 St,40.75096735,-73.99444208,461,E
20 St & 2 Ave,40.73587678,-73.98205027,19856,Subscriber,1957,1

917,11/1/2015 0:02,11/1/2015 0:17,532,S 5 Pl & S 4 St,40.710451,-73.960876,393,E 5 St
& Avenue C,40.72299208,-73.97995466,18598,Subscriber,1991,1
```

esri-geo10036.mas

```
FILENAME=ESRI-GEO10036, SUFFIX=FIX      ,
 DATASET=esri/esri-geo10036.ftm (LRECL 80 RECFM V, IOTYPE=STREAM, $
   SEGMENT=ESRIGEO, SEGTYPE=S0, $
     FIELDNAME=GEOMETRY, ALIAS=GEOMETRY, USAGE=TX80L, ACTUAL=TX80,
       MISSING=ON, $
```

esri-geo10036.ftm

```
{"rings":[[[-73.9803889998524,40.7541490002762],
[-73.9808779999197,40.7534830001
404],[-73.9814419998484,40.7537140000011],
[-73.9824040001445,40.7541199998382],[
-73.982461000075,40.7541434001978],[-73.9825620002361,40.7541850001377],
[-73.983
2877000673,40.7544888999428],[-73.9833499997027,40.7545150000673],
[-73.983644399
969,40.7546397998869],[-73.9836849998628,40.7546570003204],
[-73.9841276003085,40
.7548161002829],[-73.984399700086,40.7544544999752],
[-73.9846140004357,40.754165
0001147],[-73.984871999743,40.7542749997914],
[-73.9866590003126,40.7550369998577
],[-73.9874449996869,40.7553720000178],[-73.9902640001834,40.756570999552],
[-73.
9914340001789,40.7570449998269],[-73.9918260002697,40.7572149995726],
[-73.992429
0001982,40.7574769999636],[-73.9927679996434,40.7576240004473],
[-73.993069000034
3,40.7578009996165],[-73.9931059999419,40.7577600004237],
[-73.9932120003335,40.7
576230004012],[-73.9933250001486,40.7576770001934],
[-73.9935390001247,40.7577669
```

998472],[-73.993725999755,40.7578459998931],
[-73.9939599997542,40.757937999639],
[-73.9940989998689,40.7579839999617],[-73.9941529996611,40.7579959996157],
[-73.9
942220001452,40.7580159996387],[-73.9943040003293,40.7580300002843],
[-73.9943650
004444,40.7580330004227],[-73.99446499966,40.7580369997078],
[-73.9945560002591,4
0.7580300002843],[-73.9946130001898,40.7580209998693],
[-73.9945689999594,40.7580
809999383],[-73.9945449997519,40.7581149997075],
[-73.9944196999092,40.7582882001
404],[-73.9943810002829,40.7583400001909],
[-73.9953849998179,40.7587409997973],[
-73.9959560000693,40.7589690004191],[-73.9960649996999,40.7590149998424],
[-73.99
68730000888,40.7593419996336],[-73.996975000296,40.7593809996335],
[-73.997314999
7874,40.7595379996789],[-73.9977009996014,40.7597030000935],
[-73.998039999946,40
.7598479995856],[-73.998334000014,40.7599709998618],
[-73.9987769997587,40.760157
0003453],[-73.9990089996656,40.7602540003219],
[-74.0015059997021,40.761292999672

2],[-74.0016340002089,40.7613299995799],
[-74.0015350001401,40.7614539999022],[-7
4.0014580001865,40.7615479997405],[-74.0013640003483,40.7616560002242],
[-74.0013
050003255,40.7617199995784],[-74.0011890003721,40.7618369995779],
[-74.0010579997
269,40.7619609999003],[-74.0009659999808,40.7620389999],
[-74.0008649998198,40.76
21230001764],[-74.0008390004195,40.7621430001993],
[-74.0006839995669,40.76226100
0245],[-74.000531999752,40.7623750001062],
[-74.0003759997525,40.7624849997829],[
-74.0002840000066,40.7625510001286],[-73.9998659996161,40.762850999574],
[-73.999
8279996624,40.7628779999198],[-73.9995749996864,40.7630590001727],
[-73.999312000
1487,40.7632720001028],[-73.9991639996189,40.7633989996642],
[-73.998941000127,40
.7636250001936],[-73.9987589998279,40.7638580001466],
[-73.9986331999622,40.76402
77004181],[-73.9986084002574,40.7640632002565],
[-73.9984819996445,40.76423400039
89],[-73.9983469997142,40.7644199999831],
[-73.998171999738,40.7646669996823],[-7
3.9980319995771,40.7648580003964],[-73.9979881998955,40.7649204996813],
[-73.9979
368000432,40.7649942000224],[-73.9978947999051,40.7650573998791],
[-73.9977017001

```
733,40.7653310995507],[-73.9975810003629,40.765481000348],
[-73.9975069996483,40.
7654519999099],[-73.9956019999323,40.7646519998899],
[-73.9955379996789,40.764625
0004434],[-73.9954779996099,40.7646030003282],
[-73.9949389999348,40.764369000329
1],[-73.9936289997785,40.7638200001929],
[-73.9934620001711,40.7637539998473],[-7
3.9931520002646,40.7636270002859],[-73.992701000151,40.7634409998023],
[-73.99244
19000736,40.7633312995998],[-73.9898629996777,40.7622390001298],
[-73.98861200044
34,40.761714000201],[-73.988021000169,40.761460000179],
[-73.987028000242,40.7610
439998808],[-73.9867690998141,40.7609346998765],
[-73.9848240002274,40.7601130001
149],[-73.9841635003452,40.7598425002312],
[-73.9813259998949,40.7586439998208],[
-73.9805479999902,40.7583159999834],[-73.9793569999256,40.757814000216],
[-73.978
1150002071,40.7572939996184],[-73.9785670003668,40.7566709996669],
[-73.979014000
2958,40.7560309998308],[-73.9794719998329,40.7554120000638],
[-73.9799399998311,4
0.7547649999048],[-73.9802380000836,40.7543610001601],
[-73.9803889998524,40.7541
490002762]]]}
%$
```

GIS_DISTANCE: Calculating the Distance Between Geometry Points

The GIS_DISTANCE function uses a GIS service to calculate the distance between two geometry points.

Syntax: **How to Calculate the Distance Between Geometry Points**

GIS_DISTANCE(*geo_point1,geo_point2*)

where:

geo_point1,geo_point2

Fixed length alphanumeric, large enough to hold the JSON describing the point (for example, A200).

Are the geometry points for which you want to calculate the distance.

Note: You can generate a geometry point using the GIS_POINT function.

Example: **Calculating the Distance Between Two Geometry Points**

The following uses a citibike .csv file that contains station names, latitudes, and longitudes and trip start times and end times. It uses the GIS_POINT function to define geometry points for start stations and end stations. It then uses GIS_DISTANCE to calculate the distance between them.

```
DEFINE FILE esri/esri-citibike
STARTPOINT/A200 = GIS_POINT('4326', START_STATION_LONGITUDE,
START_STATION_LATITUDE);
ENDPOINT/A200 = GIS_POINT('4326', END_STATION_LONGITUDE,
END_STATION_LATITUDE);
Distance/P10.2 = GIS_DISTANCE(ENDPOINT, STARTPOINT);
END
TABLE FILE esri/esri-citibike
PRINT END_STATION_NAME AS End Distance
BY START_STATION_NAME AS Start
ON TABLE SET PAGE NOLEAD
END
```

The output is shown in the following image.

Start	End	Distance
1 Ave & E 30 St	Broadway & W 32 St	.83
8 Ave & W 31 St	Broadway & E 14 St	1.15
	E 20 St & 2 Ave	1.23
9 Ave & W 45 St	E 45 St & 3 Ave	1.10
Bank St & Hudson St	Mercer St & Bleecker St	.83
Broadway & E 14 St	Cleveland Pl & Spring St	.92
DeKalb Ave & Skillman St	N 11 St & Wythe Ave	2.13
E 37 St & Lexington Ave	Broadway & W 37 St	.54
Fulton St & Broadway	Maiden Ln & Pearl St	.30
Grand Army Plaza & Central Park S	E 53 St & Lexington Ave	.45
Great Jones St	Watts St & Greenwich St	.87
Greenwich St & Warren St	E 52 St & 2 Ave	3.62
Henry St & Poplar St	State St & Smith St	.78
Howard St & Centre St	E 31 St & 3 Ave	2.01
Lexington Ave & E 24 St	Forsyth St & Broome St	1.54
Perry St & Bleecker St	W 22 St & 8 Ave	.71
S 5 Pl & S 4 St	E 5 St & Avenue C	1.32
W 29 St & 9 Ave	E 10 St & Avenue A	1.80
W 31 St & 7 Ave	E 30 St & Park Ave S	.55
W 33 St & 7 Ave	6 Ave & Canal St	2.07

GIS_DRIVE_ROUTE: Calculating the Driving Directions Between Geometry Points

The GIS_DRIVE_ROUTE function uses a GIS service to calculate the driving route between two geometry points.

Syntax: **How to Calculate the Drive Route Between Geometry Points**

```
GIS_DRIVE_ROUTE(geo_start_point,geo_end_point)
```

where:

geo_start_point,geo_point2

> Fixed length alphanumeric, large enough to hold the JSON describing the point (for example, A200).

> Is the starting point for which you want to calculate the drive route.

> **Note:** You can generate a geometry point using the GIS_POINT function.

geo_end_point,geo_point2

> Fixed length alphanumeric, large enough to hold the JSON describing the point (for example, A200).

> Is the ending point for which you want to calculate the drive route.

> **Note:** You can generate a geometry point using the GIS_POINT function.

The format of the field to which the drive route will be returned is TX.

Example: **Calculating the Drive Route Between Two Geometry Points**

The following uses a citibike .csv file that contains station names, latitudes, and longitudes and trip start times and end times. It uses the GIS_POINT function to define geometry points for start stations and end stations. It then uses GIS_DRIVE_ROUTE to calculate the route to get from the end point to the start point.

```
DEFINE FILE esri/esri-citibike
STARTPOINT/A200 = GIS_POINT('4326', START_STATION_LONGITUDE,
START_STATION_LATITUDE);
ENDPOINT/A200 = GIS_POINT('4326', END_STATION_LONGITUDE,
END_STATION_LATITUDE);
Route/TX140 (GEOGRAPHIC_ROLE=GEOMETRY_LINE) =
        GIS_DRIVE_ROUTE(ENDPOINT, STARTPOINT);
END
TABLE FILE esri/esri-citibike
PRINT START_STATION_NAME AS Start END_STATION_NAME AS End Route
WHERE START_STATION_ID EQ 147
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT, GRID=OFF,SIZE-11,$
ENDSTYLE
END
```

The output is shown in the following image.

Start	End	Route
Greenwich St & Warren St	E 52 St & 2 Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths":[[[-73.967401732999974,40.756047761000048],[-73.965229999999963,40.755130000000065],[-73.964739999999949,40.755790000000047],[-73.9 62869999999953,40.758340000000032],[-73.961959999999976,40.759610000000066],[-73.961609999999951,40.760090000000048],[-73.961499999999944,40 .760240000000067],[-73.959829999999954,40.759510000000034],[-73.959569999999985,40.759400000000028],[-73.959259999999972,40.759280000000047] ,[-73.959179999999947,40.759390000000053],[-73.958949999999959,40.759720000000073],[-73.958869999999933,40.759830000000079],[-73.95878999999 9965,40.759940000000029],[-73.958589999999958,40.760210000000029],[-73.958339999999964,40.760530000000074],[-73.958189999999945,40.760730000 000081],[-73.957859999999982,40.761150000000043],[-73.957319999999982,40.760950000000037],[-73.957139999999981,40.760880000000043],[-73.9569 29999999943,40.760660000000003],[-73.957879999999989,40.759760000000028],[-73.957919999999945,40.759710000000041],[-73.958119999999951,40.759 400000000028],[-73.958489999999983,40.758960000000059],[-73.958609999999965,40.758770000000027],[-73.958639999999946,40.758720000000039],[-7 3.958689999999933,40.758650000000046],[-73.958739999999977,40.758580000000052],[-73.958969999999965,40.758280000000007],[-73.959369999999979, 40.757710000000031],[-73.959849999999996,40.757350000000031],[-73.960149999999942,40.75699000000003],[-73.960489999999936,40.756500000000074] ,[-73.961799999999982,40.755220000000065],[-73.961939999999997,40.755090000000052],[-73.963129999999978,40.753890000000069],[-73.963889999999 935,40.753060000000062],[-73.964119999999998,40.752800000000036],[-73.964639999999974,40.752230000000054],[-73.965099999999995,40.751780000000 053],[-73.966719999999953,40.749800000000005],[-73.968079999999986,40.748140000000035],[-73.968179999999961,40.748020000000054],[-73.96825999 9999987,40.747930000000053],[-73.968379999999968,40.747780000000034],[-73.968639999999937,40.744400000000004],[-73.970579999999984,40.7454100 00000049],[-73.971699999999942,40.743880000000047],[-73.972109999999986,40.743210000000033],[-73.972149999999942,40.743130000000065],[-73.97 2659999999962,40.741790000000037],[-73.972819999999956,40.741010000000074],[-73.973059999999975,40.739860000000078],[-73.973479999999938,40. 738830000000064],[-73.974089999999933,40.737920000000031],[-73.974449999999972,40.737460000000056],[-73.974729999999965,40.737050000000067], [-73.975049999999953,40.736270000000047],[-73.974979999999996,40.735410000000059],[-73.974409999999978,40.733260000000003],[-73.97425999999995 8,40.732670000000041],[-73.974179999999933,40.732340000000008],[-73.973819999999998,40.731240000000071],[-73.972349999999949,40.729860000000 031],[-73.972029999999961,40.729450000000043],[-73.971819999999998,40.728950000000054],[-73.971769999999935,40.728270000000066],[-73.97182999 9999954,40.727830000000004],[-73.971959999999967,40.72685000000007],[-73.972009999999955,40.726610000000051],[-73.973299999999938,40.72428000 0000078],[-73.974449999999933,40.722320000000025],[-73.974659999999972,40.721390000000069],[-73.974729999999965,40.720750000000006],[-73.974 959999999953,40.718960000000038],[-73.974979999999996,40.718760000000032],[-73.975229999999954,40.717580000000055],[-73.976309999999955,40.71 5240000000051],[-73.976549999999975,40.714770000000044],[-73.976699999999937,40.714480000000037],[-73.976859999999988,40.714160000000049],[- 73.977689999999939,40.712550000000078],[-73.978309999999965,40.711790000000065],[-73.978529999999969,40.711630000000007],[-73.97868999999999 2,40.711520000000064],[-73.979819999999961,40.711020000000076],[-73.981799999999964,40.710820000000069],[-73.982529999999982,40.710560000000 044],[-73.991719999999987,40.709740000000068],[-73.992799999999988,40.709590000000048],[-73.994009999999946,40.709420000000008],[-73.99457999 9999985,40.709340000000054],[-73.995429999999942,40.709230000000048],[-73.995919999999956,40.709160000000054],[-73.996199999999988,40.709120 000000041],[-73.996899999999982,40.709020000000066],[-73.997399999999971,40.708940000000041],[-73.998499999999979,40.708630000000028],[-73.9 99509999999987,40.708120000000065],[-74.002469999999986,40.706520000000069],[-74.004169999999968,40.705930000000048],[-74.004169999999988,40.7 05470000000048],[-74.007859999999937,40.703110000000038],[-74.009209999999939,40.702280000000003],[-74.009979999999985,40.701950000000068],[- 74.010919999999942,40.701730000000055],[-74.011149999999986,40.701680000000067],[-74.011989999999969,40.701480000000006],[-74.012239999999963 ,40.701420000000041],[-74.012679999999989,40.701320000000067],[-74.013289999999984,40.701210000006],[-74.014119999999934,40.701220000000003 5],[-74.014759999999967,40.701400000000035],[-74.015359999999947,40.701750000000061],[-74.015429999999941,40.701800000000048],[-74.015479999 999968,40.701850000000036],[-74.015729999999992,40.702140000000043],[-74.015999999999963,40.702620000000024],[-74.016049999999995,40.70277000 0000044],[-74.016299999999944,40.703400000000045],[-74.016639999999938,40.704650000000072],[-74.016609999999957,40.704950000000053],[-74.016 569999999945,40.705120000000079],[-74.016009999999993,40.706470000000042],[-74.015719999999986,40.707210000000032],[-74.015689999999995,40.70 7280000000026],[-74.015619999999956,40.707460000000008],[-74.015589999999975,40.707530000000077],[-74.015399999999943,40.707970000000046],[- 74.014719999999954,40.709780000000008],[-74.014599999999973,40.710360000000037],[-74.014489999999967,40.710890000000063],[-74.014469999999 6,40.711010000000044],[-74.014229999999941,40.712080000000069],[-74.013749999999959,40.713680000000068],[-74.013429999999971,40.714420000007 5],[-74.013369999999952,40.714590000000044],[-74.013229999999965,40.715210000000007],[-74.013079999999945,40.715750000000071],[-74.0129239999 99983,40.716390000000047],[-74.011109999999974,40.715590000000077],[-74.011159794999969,40.715405758000031]]]}}

Example: Charting a Driving Route Between Two Geometry Points

The following request uses GIS_DRIVE_ROUTE to generate a driving route between a station start point and end point and charts the route on an Esri map.

```
DEFINE FILE esri-citibike
STARTPOINT/A200 = GIS_POINT('4326', START_STATION_LONGITUDE,
START_STATION_LATITUDE);
ENDPOINT/A200 = GIS_POINT('4326', END_STATION_LONGITUDE,
END_STATION_LATITUDE);
Route/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_LINE) =
        GIS_DRIVE_ROUTE(ENDPOINT, STARTPOINT);
END
```

```
GRAPH FILE ESRI-CITIBIKE
 PRINT
    START_STATION_NAME
    END_STATION_NAME
WHERE START_STATION_ID EQ 147
 ON TABLE PCHOLD FORMAT JSCHART
 ON TABLE SET LOOKGRAPH CHOROPLETH
 ON TABLE SET EMBEDHEADING ON
 ON TABLE SET AUTOFIT ON
 ON TABLE SET STYLE *
  TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
  TYPE=DATA, COLUMN=N1, /*START_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N2, /*END_STATION_NAME*/

  *GRAPH_JS_FINAL
"legend": {"visible": true},
"extensions" : { "com.esri.map" :
  { "scalebar" :
{
    "scalebarUnit": "dual",
    "attachTo" : "bottom-left"
  },
  "baseMapInfo": {
      "drawBasemapControl" : false,
      "showArcGISBasemaps" : false,
          "customBaseMaps" : [
          {"ibiBaseLayer" : "dark-gray"}
        ]
    },
  "overlayLayers":
  [{
  "ibiDataLayer": {"map-geometry" :  {"map_by_field" : "Route"}}, "title" :
"Chart"}]
    },
"introAnimation": "{\"enabled\":false}"
}

  *END
 ENDSTYLE
 HEADING
  "Chart Drive Route"
END
```

The output is shown in the following image.
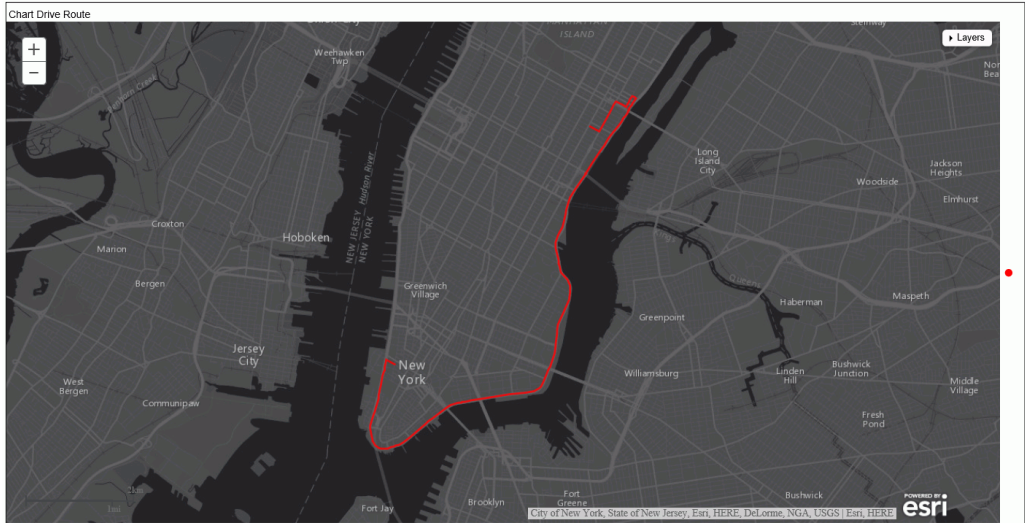
GIS_POINT: Building a Geometry Point

Given a WKID (Well-Known ID) spatial reference, longitude, and latitude, the GIS_POINT function builds a JSON point defining a Geometry object with the provided WKID, longitude, and latitude. The function is optimized for those SQL engines that can build a JSON geometry object.

The field to which the point is returned should have fixed length alphanumeric format, large enough to hold the JSON describing the point (for example, A200).

Syntax: **How to Build a Geometry Point**

```
GIS_POINT(wkid, longitude, latitude)
```

where:

wkid

Fixed length alphanumeric

Is a spatial reference code (WKID). WKID is an abbreviation for Well Known ID, which identifies a projected or geographic coordinate system.

longitude

D20.8

Is the longitude for the point.

latitude
>   D20.8

>   Is the latitude for the point.

Example: **Building a Geometry Point**

The following request uses the spatial reference code 4326 (decimal degrees) and state capital longitudes and latitudes to build a geometry point.

```
DEFINE FILE WF_RETAIL_LITE
GPOINT/A200 = GIS_POINT('4326', STATE_PROV_CAPITAL_LONGITUDE,
STATE_PROV_CAPITAL_LATITUDE);
END
TABLE FILE WF_RETAIL_LITE
SUM FST.STATE_PROV_CAPITAL_LONGITUDE AS Longitude
FST.STATE_PROV_CAPITAL_LATITUDE AS Latitude
FST.GPOINT AS Point
BY STATE_PROV_CAPITAL_NAME AS Capital
WHERE COUNTRY_NAME EQ 'United States'
WHERE STATE_PROV_CAPITAL_NAME LT 'C'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Capital	Longitude	Latitude	Point
Albany	-73.76000000	42.66000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.76000000, "y":42.66000000}}
Annapolis	-76.49000000	38.95000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-76.49000000, "y":38.95000000}}
Atlanta	-84.27000000	33.94000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-84.27000000, "y":33.94000000}}
Augusta	-69.77000000	44.32000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-69.77000000, "y":44.32000000}}
Austin	-97.75000000	30.40000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-97.75000000, "y":30.40000000}}
Baton Rouge	-91.17000000	30.38000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-91.17000000, "y":30.38000000}}
Bismarck	-100.77000000	46.82000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-100.77000000, "y":46.82000000}}
Boise	-116.16000000	43.60000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-116.16000000, "y":43.60000000}}
Boston	-71.10000000	42.35000000	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-71.10000000, "y":42.35000000}}

Example: **Charting Geometry Points**

The following request generates geometry points using GIS_POINT charts them on an Esri map.

```
DEFINE FILE WF_RETAIL
GPOINT/A200 = GIS_POINT('4326', STATE_PROV_CAPITAL_LONGITUDE,
STATE_PROV_CAPITAL_LATITUDE);
END
```

```
            GRAPH FILE WF_RETAIL
            PRINT
            STATE_PROV_NAME
            WHERE STATE_PROV_CAPITAL_LONGITUDE NE MISSING
            ON TABLE PCHOLD FORMAT JSCHART
            ON TABLE SET LOOKGRAPH BUBBLEMAP
            ON TABLE SET EMBEDHEADING ON
            ON TABLE SET AUTOFIT ON
            ON TABLE SET STYLE *
             TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
             TYPE=DATA, COLUMN=N1,
              BUCKET=tooltip, $

             *GRAPH_JS_FINAL
"bubbleMarker": {"maxSize": "10%"},
"legend": {"visible": true},
"extensions" : { "com.esri.map" :
   { "scalebar" :
{
    "scalebarUnit": "dual",
    "attachTo" : "bottom-left"
   },
   "baseMapInfo": {
       "drawBasemapControl" : false,
       "showArcGISBasemaps" : false,
           "customBaseMaps" : [
             {"ibiBaseLayer" : "gray"}
           ]
    },
   "overlayLayers":
   [{
   "ibiDataLayer": {"map-geometry" :  {"map_by_field" : "GPOINT"}},
"title" : "Report"}]
   },
"introAnimation": "{\"enabled\":false}"
}

             *END
            ENDSTYLE
            HEADING
             "Chart Geometry Points"
            END
```

The output is shown in the following image.
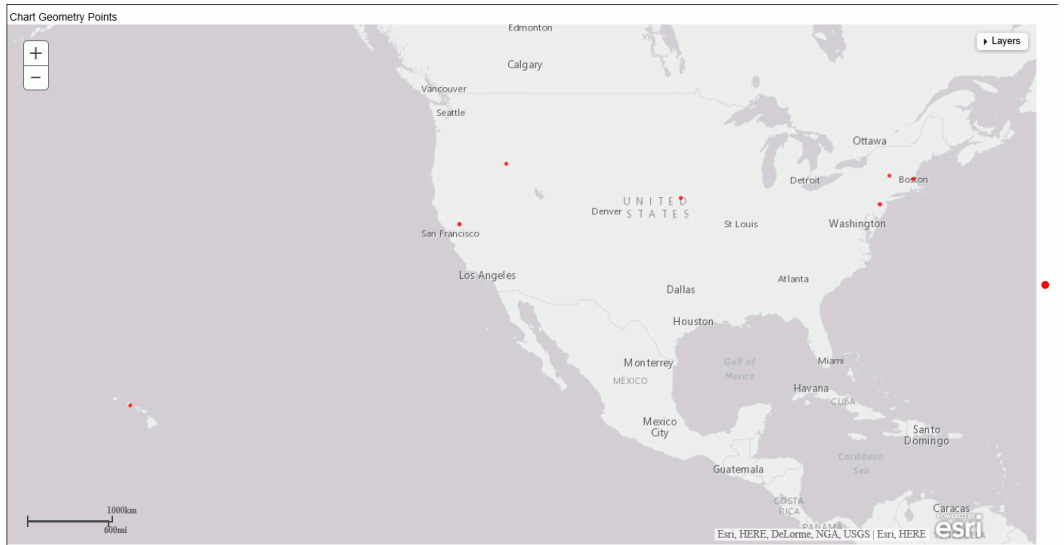
GIS_GEOCODE_ADDR: Geocoding a Complete Address

GIS_GEOCODE_ADDR uses a GIS geocoding service to obtain the geometry point for a complete address.

Syntax: **How to Geocode a Complete Address**

```
GIS_GEOCODE_ADDR(address[, country])
```

where:

address
    Fixed length alphanumeric

    Is the complete address to be geocoded.

country
    Fixed length alphanumeric

    Is a country name, which is optional if the country is the United States.

Example: **Geocoding a Complete Address**

The following request creates a complete address by concatenating the street address, city, state, and zip code. It then uses GIS_GEOCODE_ADDR to create a GIS point for the address.

```
DEFINE FILE WF_RETAIL_LITE
GADDRESS/A200 =ADDRESS_LINE_1 || ' ' | CITY_NAME || ' ' | STATE_PROV_NAME
|| ' ' | POSTAL_CODE;
GEOCODE1/A200 = GIS_GEOCODE_ADDR(GADDRESS);
END
TABLE FILE WF_RETAIL_LITE
PRINT ADDRESS_LINE_1 AS Address GEOCODE1
BY POSTAL_CODE AS Zip
WHERE CITY_NAME EQ 'New York'
WHERE POSTAL_CODE FROM '10013' TO '10020'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Zip	Address	GEOCODE1
10013	125 Worth St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-74.00269, "y":40.71543}}
10016	139 E 35Th St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97911, "y":40.74705}}
10017	2 United Nations Plz	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97115, "y":40.75111}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	219 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97333, "y":40.75030}}
	330 Madison Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97906, "y":40.75316}}
10018	119 W 40Th St Fl 10	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98599, "y":40.75398}}
	11 West 40Th Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98235, "y":40.75245}}
10019	31 West 52Nd Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97776, "y":40.76044}}
	1301 Ave Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97945, "y":40.76125}}
	1345 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97843, "y":40.76264}}
	745 7Th Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98340, "y":40.76077}}
10020	1221 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98129, "y":40.75874}}
	1271 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98018, "y":40.76025}}

GIS_GEOCODE_ADDR_CITY: Geocoding an Address Line, City, and State

GIS_GEOCODE_ADDR_CITY uses a GIS geocoding service to obtain the geometry point for an address line, city, state, and optional country. The returned value is a fixed length alphanumeric format, large enough to hold the JSON describing the geographic location (for example, A200).

Syntax: **How to Geocode an Address Line, City, and State**

```
GIS_GEOCODE_ADDR_CITY( street_addr, city , state [, country])
```

where:

street_addr

   Fixed length alphanumeric

   Is the street address to be geocoded.

city

   Fixed length alphanumeric

   Is the city name associated with the street address.

state

   Fixed length alphanumeric

   Is the state name associated with the street address.

country

   fixed length alphanumeric

   Is a country name, which is optional if the country is the United States.

Example: **Geocoding a Street Address, City, and State**

The following request geocodes a street address using GIS_GEOCODE_ADDR_CITY.

```
DEFINE FILE WF_RETAIL_LITE
GEOCODE1/A200 = GIS_GEOCODE_ADDR_CITY(ADDRESS_LINE_1, CITY_NAME ,
STATE_PROV_NAME);
END
TABLE FILE WF_RETAIL_LITE
PRINT ADDRESS_LINE_1 AS Address GEOCODE1
BY POSTAL_CODE AS Zip
WHERE CITY_NAME EQ 'New York'
WHERE POSTAL_CODE FROM '10013' TO '10020'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Zip	Address	GEOCODE1
10013	125 Worth St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-74.00269, "y":40.71543}}
10016	139 E 35Th St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.94483, "y":40.65194}}
10017	2 United Nations Plz	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97115, "y":40.75111}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	219 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97333, "y":40.75030}}
	330 Madison Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97906, "y":40.75316}}
10018	119 W 40Th St Fl 10	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98599, "y":40.75398}}
	11 West 40Th Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98235, "y":40.75245}}
10019	31 West 52Nd Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97776, "y":40.76044}}
	1301 Ave Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97945, "y":40.76125}}
	1345 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97843, "y":40.76264}}
	745 7Th Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98340, "y":40.76077}}
10020	1221 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98129, "y":40.75874}}
	1271 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98018, "y":40.76025}}

GIS_GEOCODE_ADDR_POSTAL: Geocoding an Address Line and Postal Code

GIS_GEOCODE_ADDR_POSTAL uses a GIS geocoding service to obtain the geometry point for an address line, postal code and optional country. The returned value is a fixed length alphanumeric format, large enough to hold the JSON describing the geographic location (for example, A200).

Syntax: **How to Geocode an Address Line and Postal Code**

```
GIS_GEOCODE_ADDR_POSTAL( street_addr, postal_code [, country])
```

where:

street_addr
> fixed length alphanumeric

> Is the street address to be geocoded.

postal_code
> fixed length alphanumeric

> Is the postal code associated with the street address.

country
> fixed length alphanumeric

> Is a country name, which is optional if the country is the United States.

Example: **Geocoding a Street Address and Postal Code**

The following request geocodes a street address using GIS_GEOCODE_ADDR_POSTAL.

```
DEFINE FILE WF_RETAIL_LITE
GEOCODE1/A200 = GIS_GEOCODE_ADDR_POSTAL(ADDRESS_LINE_1, POSTAL_CODE);
END
TABLE FILE WF_RETAIL_LITE
PRINT ADDRESS_LINE_1 AS Address GEOCODE1
BY POSTAL_CODE AS Zip
WHERE CITY_NAME EQ 'New York'
WHERE POSTAL_CODE FROM '10013' TO '10020'
ON TABLE SET PAGE NOPAGE
END
```

The output is shown in the following image.

Zip	Address	GEOCODE1
10013	125 Worth St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-74.00269, "y":40.71543}}
10016	139 E 35Th St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97911, "y":40.74705}}
10017	2 United Nations Plz	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97115, "y":40.75111}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	405 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.96956, "y":40.74867}}
	219 E 42Nd St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97333, "y":40.75030}}
	330 Madison Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97906, "y":40.75316}}
10018	119 W 40Th St Fl 10	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98599, "y":40.75398}}
	11 West 40Th Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98235, "y":40.75245}}
10019	31 West 52Nd Street	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97776, "y":40.76044}}
	1301 Ave Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97945, "y":40.76125}}
	1345 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.97806, "y":40.76309}}
	745 7Th Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98340, "y":40.76077}}
10020	1221 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98129, "y":40.75874}}
	1271 Avenue Of The Americas	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-73.98018, "y":40.76025}}

GIS_GEOMETRY: Building a JSON Geometry Object

The GIS_GEOMETRY function builds a JSON Geometry object given a geometry type, WKID, and a geometry.

Syntax: **How to Build a JSON Geometry Object**

GIS_GEOMETRY(*geotype, wkid, geometry*)

where:

geotype

   Alphanumeric

   Is a geometry type, for example, 'esriGeometryPolygon' ,esriGeometryPolyline, 'esriGeometryMultipoint', 'EsriGeometryPoint', 'EsriGeometryExtent'..

wkid

Alphanumeric

Is a valid spatial reference ID. WKID is an abbreviation for Well Known ID, which identifies a projected or geographic coordinate system.

geometry

TX

A geometry in JSON.

The output is returned as TX.

Example: **Building a JSON Geometry Object**

The following request builds a polygon geometry of the area encompassing zip code 10036 in Manhattan. The input geometry object is stored in a text (.ftm) file that is cross-referenced in the esri-citibike Master File. The field containing the geometry object is GEOMETRY.

```
DEFINE FILE esri/esri-citibike
WKID/A10  = '4326';
 MASTER_GEOMETRY/TX256 (GEOGRAPHIC_ROLE=GEOMETRY_AREA) =
    GIS_GEOMETRY( 'esriGeometryPolygon', WKID , GEOMETRY );
END
TABLE FILE esri/esri-citibike
 PRINT
    START_STATION_NAME AS Station
    START_STATION_LATITUDE AS Latitude
    START_STATION_LONGITUDE AS Longitude
    MASTER_GEOMETRY AS 'JSON Geometry Object'
 WHERE START_STATION_ID EQ 479
ON TABLE SET PAGE NOLEAD
 ON TABLE SET STYLE *
type=report, grid=off, size=10,$
 ENDSTYLE
END
```

The output is shown in the following image.

Station   Latitude   Longitude   JSON Geometry Object
9 Ave & W   40.760192520000000   -73.99125510000000   { "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolygon","geometry":
45 St

{"rings":[[[-73.9803889998524,40.7541490002762],[-73.9808779999197,40.7534830001404],[-73.9814419998484,40.7537140000011],[-
73.9824040001445,40.7541199998382],[-73.982461000075,40.7541434001978],[-73.9825620002361,40.7541850001377],[-73.9832877000673,40.75
44888999428],[-73.9833499997027,40.7545150000673],[-73.983644399969,40.7546397998869],[-73.9836849998628,40.7546570003204],[-
73.9841276003085,40.7548161002829],[-73.9843997000086,40.7544544999752],[-73.9846140004357,40.7541650001147],[-73.9848711999743,40.75
42749997914],[-73.9866590003126,40.7550369998577],[-73.9874449996869,40.7553720000178],[-73.9902640001834,40.756570999552],[-
73.9914340001789,40.7570449998269],[-73.9918260002697,40.7572149995726],[-73.9924290001982,40.7574769999636],[-73.9927679996434,40.
7576240004473],[-73.9930690000343,40.7578009996165],[-73.9931059999419,40.7577600004237],[-73.9932120003335,40.7576230004012],[-
73.9933250001486,40.7576770001934],[-73.9935390001247,40.7577669998472],[-73.993725999755,40.7578459998931],[-73.9939599997542,4
0.757937996639],[-73.9940989998689,40.7579839999617],[-73.9941529996611,40.7579959996157],[-73.9942220001452,40.7580159996387],[-
73.9943040003293,40.7580300002843],[-73.9943650004444,40.7580330004227],[-73.99446499966,40.7580369997078],[-73.9945560002591,4
0.7580300002843],[-73.9946130001898,40.7580209998693],[-73.9945689999594,40.7580809999383],[-73.9945449997519,40.7581149997075],[-
73.9944196999092,40.7582882001404],[-73.9943810002829,40.7583400001909],[-73.9953849998179,40.7587409997973],[-73.995956000069
3,40.7589690004191],[-73.9960649996999,40.7590149998824],[-73.9968730000888,40.7593419996336],[-73.996975000296,40.7593809996335],[-
73.9973149997874,40.7595379996789],[-73.9977009996014,40.7597030000935],[-73.9980399999946,40.7598479995856],[-73.99833400001
4,40.7599709998618],[-73.9987769997587,40.7601570003453],[-73.9990089996656,40.7602540003219],[-74.0015059997021,40.7612929996722],[-
74.0016340002089,40.7613299995799],[-74.0015350001401,40.7614539999022],[-74.0014580001865,40.7615479997405],[-74.001364000
3483,40.7616560002242],[-74.0013050003255,40.7617199995784],[-74.0011890003721,40.7618369995779],[-74.0010579997269,40.7619609999003],[-
74.0009659999808,40.7620389999],[-74.0008649998198,40.7621230001764],[-74.0008390004195,40.7621430001993],[-74.00068379
5669,40.762261000245],[-74.0005319999752,40.7623750001062],[-74.0003759997525,40.7624849997829],[-74.0002840000066,40.7625510001286],[-
73.9998659996161,40.762850999574],[-73.9998279996624,40.7628779991998],[-73.9995749996864,40.7630590001727],[-73.999312000
1487,40.7632720001028],[-73.9991639996189,40.7633989996642],[-73.9989410001027,40.7636250001936],[-73.9987589998279,40.7638580001466],[-
73.9986331999622,40.7640277004181],[-73.9986084002574,40.7640632002565],[-73.9984819996445,40.7642340003989],[-73.9983469
997142,40.7644199999831],[-73.998171999738,40.7646669996823],[-73.9980319995771,40.7648580003964],[-73.9979881998955,40.7649204996813],[-
73.9979368000432,40.7649942000224],[-73.9978947999051,40.7650573998791],[-73.9977017001733,40.7653310995507],[-73.99758
10003629,40.765481000348],[-73.9975069996483,40.7654519999099],[-73.9956019999323,40.7646519998899],[-73.9955379996789,40.7646250004434],[-
73.9954779996099,40.7646030003282],[-73.9949389999348,40.7643690003291],[-73.9936289997785,40.7638200001929],[-73.993
4620001711,40.7637539998473],[-73.9931520002646,40.7636270002859],[-73.992701000151,40.7634409998023],[-73.9924419000736,40.7633312995998],[-
73.9898629996777,40.7622390001298],[-73.9886120004434,40.761714000201],[-73.98802100016,40.76146000179],[-73.9870
28000242,40.7610439998808],[-73.9867600998141,40.7609346998765],[-73.9848240002274,40.7601130001149],[-73.9841635003452,40.7598425002312],[-
73.9813259998949,40.7586439998208],[-73.9805479999902,40.7583159999834],[-73.9793569999256,40.7581400002016],[-73.978
1150002071,40.7572939996184],[-73.9785670003668,40.7566709996669],[-73.9790140002958,40.7560309998308],[-73.9794719998329,40.7554120000638],[-
73.9799399998311,40.7547649999048],[-73.9802380000836,40.7543610001601],[-73.9803889998524,40.7541490002762]]]}}

Example: **Charting a Geometry Object**

The following request uses GIS_GEOMETRY to build a geometry object and chart it on an Esri map.

```
DEFINE FILE esri-citibike
WKID/A10  = '4326';
 MASTER_GEOMETRY/TX256 (GEOGRAPHIC_ROLE=GEOMETRY_AREA) =
     GIS_GEOMETRY( 'esriGeometryPolygon', WKID , GEOMETRY );
END

 GRAPH FILE ESRI-CITIBIKE
 PRINT
   START_STATION_NAME
   END_STATION_NAME
   ON TABLE PCHOLD FORMAT JSCHART
ON TABLE SET LOOKGRAPH CHOROPLETH
ON TABLE SET EMBEDHEADING ON
ON TABLE SET AUTOFIT ON
ON TABLE SET STYLE *
 TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
 TYPE=DATA, COLUMN=N1, /*START_STATION_NAME*/
   BUCKET=tooltip, $
 TYPE=DATA, COLUMN=N2, /*END_STATION_NAME*/
```

```
   *GRAPH_JS_FINAL

"legend": {"visible": true},
"extensions" : { "com.esri.map" :
  { "scalebar" :
{
    "scalebarUnit": "dual",
    "attachTo" : "bottom-left"
  },
  "baseMapInfo": {
      "drawBasemapControl" : false,
      "showArcGISBasemaps" : false,
          "customBaseMaps" : [
          {"ibiBaseLayer" : "dark-gray"}
        ]
    },
  "overlayLayers":
  [{
  "ibiDataLayer": {"map-geometry" :  {"map_by_field" : "MASTER_GEOMETRY"}},
"title" : "Chart"}]
  },
"introAnimation": "{\"enabled\":false}"
}

  *END
 ENDSTYLE
 HEADING
  "Chart Geometry Object"
END
```

The output is shown in the following image.

GIS_IN_POLYGON: Determining if a Point is in a Complex Polygon

Given a point and a polygon definition, the GIS_IN_POLYGON function returns the value 1 (TRUE) if the point is in the polygon or 0 (FALSE) if the point is not in the polygon. The value is returned in integer format.

Syntax: **How to Determine if a Point is in a Complex Polygon**

```
GIS_IN_POLYGON(point, polygon_definition)
```

where:

point

    Alphanumeric or text

    Is the geometry point.

polygon_definition

    Text

    Is the geometry area (polygon) definition.

Example: **Determining if a Point is in a Polygon**

The following example determines if a station is inside zip code 10036. GIS_IN_POLYGON returns 1 for a point inside the polygon definition and 0 for a point outside. The polygon definition being passed is the same one used in the example for the GIS_GEOMETRY function described previously and defines the polygon for zip code 10036 in Manhattan in New York City. The value 1 is translated to Yes and 0 to No for display on the output.

```
DEFINE FILE esri/esri-citibike
WKID/A10  = '4326';
MASTER_GEOMETRY/TX256 (GEOGRAPHIC_ROLE=GEOMETRY_AREA) =
  GIS_GEOMETRY( 'esriGeometryPolygon', WKID , GEOMETRY );
START_STATION_POINT/A200=GIS_POINT(WKID, START_STATION_LONGITUDE,
START_STATION_LATITUDE);
STATION_IN_POLYGON/I4=GIS_IN_POLYGON(START_STATION_POINT, MASTER_GEOMETRY);
IN_POLYGON/A5 = IF STATION_IN_POLYGON EQ 1 THEN 'Yes' ELSE 'No';
END
TABLE FILE esri/esri-citibike
 PRINT
     START_STATION_NAME AS Station
    IN_POLYGON AS 'Station in zip, code 10036?'
BY START_STATION_ID AS 'Station ID'
ON TABLE SET PAGE NOLEAD
 ON TABLE SET STYLE *
type=report, grid=off, size=10,$
type=data, column=in_polygon, style=bold, color=red, when = in_polygon eq
'Yes',$
 ENDSTYLE
END
```

The output is shown in the following image.

Station ID	Station	Station in zip code 10036?
147	Greenwich St & Warren St	No
160	E 37 St & Lexington Ave	No
229	Great Jones St	No
247	Perry St & Bleecker St	No
268	Howard St & Centre St	No
281	Grand Army Plaza & Central Park S	No
285	Broadway & E 14 St	No
319	Fulton St & Broadway	No
346	Bank St & Hudson St	No
379	W 31 St & 7 Ave	No
407	Henry St & Poplar St	No
409	DeKalb Ave & Skillman St	No
479	9 Ave & W 45 St	**Yes**
492	W 33 St & 7 Ave	No
512	W 29 St & 9 Ave	No
521	8 Ave & W 31 St	No
	8 Ave & W 31 St	No
532	S 5 Pl & S 4 St	No
536	1 Ave & E 30 St	No
537	Lexington Ave & E 24 St	No

GIS_LINE: Building a JSON Line

Given two geometry points or lines, GIS_LINE builds a JSON line. The output is returned in text format.

Syntax: How to Build a JSON Line

```
GIS_LINE(geometry1, geometry2)
```

where:

geometry1

Alphanumeric or text

Is the first point or line for defining the beginning of the new line.

geometry2

Alphanumeric or text

Is the second point or line for the concatenation of the new line.

Example: **Building a JSON Line**

The following request prints start stations and end stations and builds a JSON line between them.

```
DEFINE FILE ESRI/ESRI-CITIBIKE
STARTPOINT/A200 = GIS_POINT('4326', START_STATION_LONGITUDE,
START_STATION_LATITUDE);
ENDPOINT/A200 = GIS_POINT('4326', END_STATION_LONGITUDE,
END_STATION_LATITUDE);
CONNECTION_LINE/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_LINE) =
   GIS_LINE(STARTPOINT, ENDPOINT);
END
TABLE FILE ESRI/ESRI-CITIBIKE
PRINT END_STATION_NAME AS End CONNECTION_LINE AS 'Connecting Line'
BY START_STATION_NAME AS Start
WHERE START_STATION_NAME LE 'D'
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT, GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image.

Start	End	Connecting Line
1 Ave & E 30 St	Broadway & W 32 St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-73.97536082000000,40.741443870000000],[-73.98808416000000,40.748548620000000]]]}}
8 Ave & W 31 St	Broadway & E 14 St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-73.99444208000000,40.750967350000000],[-73.99074142000000,40.734545670000000]]]}}
	E 20 St & 2 Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-73.99444208000000,40.750967350000000],[-73.98205027000000,40.735876780000000]]]}}
9 Ave & W 45 St	E 45 St & 3 Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-73.99125510000000,40.760192520000000],[-73.97282625000000,40.752554340000000]]]}}
Bank St & Hudson St	Mercer St & Bleecker St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-74.00618026000000,40.736528890000000],[-73.99695094000000,40.726794540000000]]]}}
Broadway & E 14 St	Cleveland Pl & Spring St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolyline","geometry": {"paths": [[[-73.99074142000000,40.734545670000000],[-73.99724901000000,40.722103790000000]]]}}

Example: **Charting Geometry Lines**

The following request generates geometry lines and charts them on an Esri map.

```
DEFINE FILE ESRI-CITIBIKE
CONNECTION_LINE/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_LINE)
=GIS_LINE(START_STATION_POINT, END_STATION_POINT);
DISTANCE/P33.11 TITLE 'Distance'=GIS_DISTANCE(START_STATION_POINT,
END_STATION_POINT);
END
```

```
GRAPH FILE ESRI-CITIBIKE
 PRINT
   START_STATION_NAME
   END_STATION_NAME
   DISTANCE
 ON TABLE PCHOLD FORMAT JSCHART
 ON TABLE SET LOOKGRAPH BUBBLEMAP
 ON TABLE SET EMBEDHEADING ON
 ON TABLE SET AUTOFIT ON
 ON TABLE SET STYLE *
  TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
  TYPE=DATA, COLUMN=N1, /*START_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N2, /*END_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N3, /*DISTANCE*/
   BUCKET=tooltip, $

  *GRAPH_JS_FINAL
"legend": {"visible": true},
"extensions" : { "com.esri.map" :
  { "scalebar" :
{
    "scalebarUnit": "dual",
    "attachTo" : "bottom-left"
  },
  "baseMapInfo": {
      "drawBasemapControl" : false,
      "showArcGISBasemaps" : false,
          "customBaseMaps" : [
          {"ibiBaseLayer" : "dark-gray"}
       ]
    },
  "overlayLayers":
  [{
  "ibiDataLayer": {"map-geometry" :  {"map_by_field" : "CONNECTION_LINE"}},
"title" : "Chart"}]
  },
"introAnimation": "{\"enabled\":false}"
}

  *END
 ENDSTYLE
 HEADING
  "Chart Geometry Lines"
END
```

The output is shown in the following image.
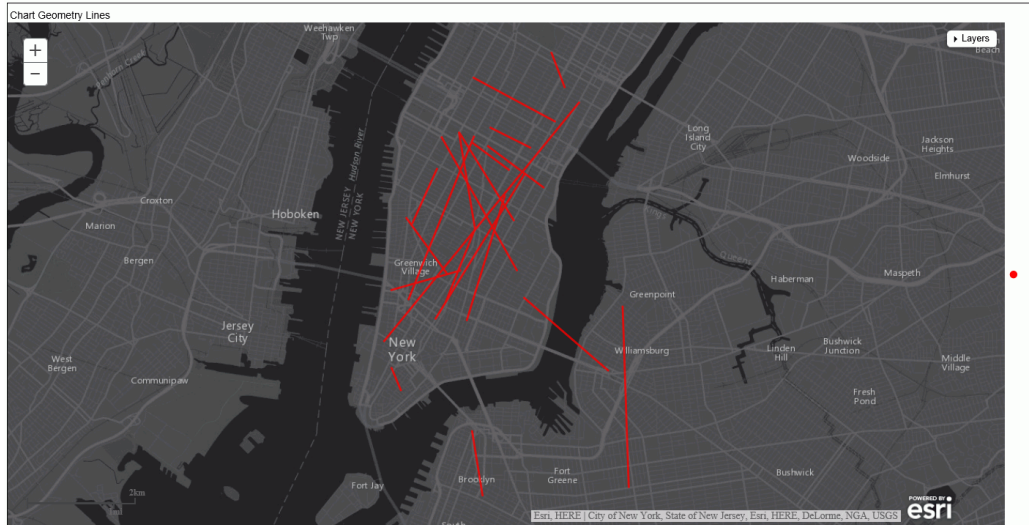
GIS_SERVICE_AREA: Calculating a Geometry Area Around a Given Point

The GIS_SERVICE_AREA function uses a GIS service to calculate the geometry area with access boundaries within the given time or distance from the provided geometry point. The output is returned in text format.

Syntax: **How to Calculate a Geometry Area Around a Point**

GIS_SERVICE_AREA(*geo_point, distance, travel_mode*)

where:

geo_point
    Alphanumeric

    Is the starting geometry point.

distance
    Alphanumeric

    Is the travel limitation in either time or distance units.

travel_mode

Alphanumeric

Is a valid travel mode as defined in gis_serv_area.mas in the Catalog directory under the server installation directory. The accepted travel modes are:

❏ **'Miles'**. This is the default value.

❏ **'TravelTime'**.

❏ **'TruckTravelTime'**.

❏ **'WalkTime'**.

❏ **'Kilometers'**.

Example: **Calculating a Service Area Around a Geometry Point**

The following request calculates the geometry area that is a five-minute walk around a station.

```
DEFINE FILE esri/esri-citibike
WKID/A10='4326';
START_STATION_POINT/A200=GIS_POINT(WKID, START_STATION_LONGITUDE,
START_STATION_LATITUDE);
DISTANCE/A10='5';
TRAVEL_MODE/A10='WalkTime';
STATION_SERVICE_AREA/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_AREA)=
 GIS_SERVICE_AREA(START_STATION_POINT, DISTANCE, TRAVEL_MODE);
END
TABLE FILE esri/esri-citibike
 PRINT
    START_STATION_ID AS 'Station ID'
    START_STATION_NAME AS 'Station Name'
    STATION_SERVICE_AREA AS '5-Minute Walk Service Area Around Station'
 WHERE START_STATION_ID EQ 479 OR 512;
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT, GRID=OFF, SIZE=12,$
ENDSTYLE
END
```

The output is shown in the following image.

Station ID	Station Name	5-Minute Walk Service Area Around Station
512	W 29 St & 9 Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolygon","geometry": {"rings":[[[-73.995542525999952,40.749246597000081],[-73.995094298999959,40.748346329000071],[-73.995542525999952,40.74767494200006],[-73.996665954999969,40.747449875000029],[-73.99778938299994,40.748571396000045],[-73.998462676999964,40.748571396000045],[-73.998462676999964,40.747449875000029],[-73.999135970999987,40.746999741000025],[-73.999586104999935,40.747224808000055],[-74.000932692999982,40.746103287000039],[-74.00160789499995,40.746549606000031],[-74.002056121999942,40.748121262000041],[-74.000484466999978,40.749471664000055],[-74.000259398999958,40.749471664000055],[-74.000034331999984,40.749917984000035],[-74.002729415999966,40.750818253000034],[-74.00317954999997,40.751489639000056],[-74.002729415999966,40.752614975000029],[-74.001831054999968,40.752614975000029],[-74.000932692999982,40.75328636200004],[-74.000034331999984,40.752840042000059],[-73.999811171999966,40.75171470600003],[-73.99778938299994,40.751043320000065],[-73.99756431599996,40.75036811800004],[-73.995542525999952,40.749246597000081]]]}}
479	9 Ave & W 45 St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolygon","geometry": {"rings":[[[-73.990602492999983,40.760248184000034],[-73.988132476999965,40.759351730000049],[-73.98768234299996,40.758451462000039],[-73.988580703999958,40.757555008000054],[-73.98992919899996,40.757780075000028],[-73.990827559999957,40.756658554000069],[-73.992399215999967,40.75732994100008],[-73.992849349999972,40.756433487000038],[-73.993745803999957,40.756208420000064],[-73.994644164999954,40.757104874000049],[-73.994421004999936,40.758230209000033],[-73.995094298999959,40.760026932000073],[-73.994195937999962,40.760923386000059],[-73.99262428299994,40.760248184000034],[-73.991950988999974,40.760923386000059],[-73.991725921999944,40.760923386000059],[-73.99150085399998,40.760923386000059],[-73.99150085399998,40.761148453000033],[-73.990602492999983,40.760698318000038],[-73.990602492999983,40.760248184000034]]]}}

Example: ## Charting a Geometry Service Area Around a Point

The following request generates service areas that are 5-minute walking distances from start station geometry points and charts them on an Esri map.

```
DEFINE FILE esri-citibike
WKID/A10='4326';
START_STATION_POINT/A200=GIS_POINT(WKID, START_STATION_LONGITUDE,
START_STATION_LATITUDE);
DISTANCE/A10='5';
TRAVEL_MODE/A10='WalkTime';
STATION_SERVICE_AREA/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_AREA)=
 GIS_SERVICE_AREA(START_STATION_POINT, DISTANCE, TRAVEL_MODE);
END
```

```
GRAPH FILE ESRI-CITIBIKE
 PRINT
   START_STATION_NAME
   END_STATION_NAME
   DISTANCE
 ON TABLE PCHOLD FORMAT JSCHART
 ON TABLE SET LOOKGRAPH CHOROPLETH
 ON TABLE SET EMBEDHEADING ON
 ON TABLE SET AUTOFIT ON
 ON TABLE SET STYLE *
  TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
  TYPE=DATA, COLUMN=N1, /*START_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N2, /*END_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N3, /*DISTANCE*/
   BUCKET=tooltip, $

  *GRAPH_JS_FINAL
"legend": {"visible": true},
"extensions" : { "com.esri.map" :
  { "scalebar" :
{
   "scalebarUnit": "dual",
   "attachTo" : "bottom-left"
  },
  "baseMapInfo": {
     "drawBasemapControl" : false,
     "showArcGISBasemaps" : false,
        "customBaseMaps" : [
        {"ibiBaseLayer" : "dark-gray"}
      ]
   },
  "overlayLayers":
  [{
  "ibiDataLayer": {"map-geometry" :  {"map_by_field" :
"STATION_SERVICE_AREA"}}, "title" : "Chart"}]
   },
"introAnimation": "{\"enabled\":false}"
}

  *END
 ENDSTYLE
 HEADING
  "Chart Geometry Service Area"
END
```

The output is shown in the following image.

GIS_SERV_AREA_XY: Calculating a Service Area Around a Given Coordinate

The GIS_SERV_AREA_XY function uses a GIS service to calculate the geometry area with access boundaries within the given time or distance from the provided coordinate. The output is returned in text format.

Syntax: **How to Calculate a Geometry Area Around a Coordinate**

```
GIS_SERV_AREA_XY(longitude, latitude, distance, travel_mode[, wkid])
```

where:

longitude

Alphanumeric

Is the longitude of the starting point.

latitude

Alphanumeric

Is the latitude of the starting point.

distance

Integer

Is the travel limitation in either time or distance units.

travel_mode

Alphanumeric

Is a valid travel mode as defined in gis_serv_area.mas in the Catalog directory under the server installation directory. The accepted travel modes are:

❑ **'Miles'**. This is the default value.

❑ **'TravelTime'**.

❑ **'TruckTravelTime'**.

❑ **'WalkTime'**.

❑ **'Kilometers'**.

wkid

Alphanumeric

Is the spatial reference ID for the coordinate. WKID is an abbreviation for Well Known ID, which identifies a projected or geographic coordinate system. The default value is '4326', which represents decimal degrees.

Example: Calculating a Service Area Around a Coordinate

The following request calculates the geometry area that is a five-minute walk around a station, using the longitude and latitude that specify the station location.

```
DEFINE FILE esri/esri-citibike
DISTANCE/I4=5;
WKID/A10='4326';
TRAVEL_MODE/A10='WalkTime';
STATION_SERVICE_AREA/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_AREA)=
   GIS_SERV_AREA_XY(START_STATION_LONGITUDE, START_STATION_LATITUDE,
DISTANCE, TRAVEL_MODE, WKID);
END
TABLE FILE esri/esri-citibike
 PRINT
    START_STATION_ID AS 'Station ID'
    START_STATION_NAME AS 'Station Name'
    STATION_SERVICE_AREA
       AS '5-Minute Walk Service Area Around Station Coordinate'
 WHERE START_STATION_ID EQ 479 OR 512;
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
TYPE=REPORT, GRID=OFF, SIZE=12,$
ENDSTYLE
END
```

The output is shown in the following image.

Station ID	Station Name	5-Minute Walk Area Around Station Coordinate
512	W 29 St & 9 Ave	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolygon","geometry": {"rings":[[[-73.996217727999976,40.748571396000045],[-73.996891021999943,40.7481 21262000041],[-73.998462676999964,40.748571396000045],[-73.998237609999933,40.74 7900009000034],[-73.998687743999938,40.747224808000055],[-74.000932692999982,40. 746999741000025],[-74.001382827999976,40.748121262000041],[-74.000034331999984,4 0.749917984000035],[-74.002281188999973,40.750818253000034],[-74.002504348999935 ,40.75171470600003],[-74.002056121999942,40.752389908000055],[-74.00183105499996 8,40.752389908000055],[-74.001382827999976,40.752614975000029],[-74.001382827999 976,40.752840042000059],[-73.996665954999969,40.750143051000066],[-73.9959926609 99946,40.749246597000081],[-73.996217727999976,40.748571396000045]]]}}
479	9 Ave & W 45 St	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPolygon","geometry": {"rings":[[[-73.988357543999939,40.75867652900007],[-73.989255904999936,40.75778 0075000028],[-73.99127578699995,40.758451462000039],[-73.991725921999944,40.7575 55008000054],[-73.993297576999964,40.756658554000069],[-73.994195937999962,40.75 7555008000054],[-73.993745803999957,40.758451462000039],[-73.994195937999962,40. 759576797000079],[-73.993745803999957,40.760248184000034],[-73.992399215999967,4 0.760248184000034],[-73.99150085399998,40.760923386000059],[-73.99150085399998,4 0.761148453000033],[-73.990827559999957,40.760923386000059],[-73.990602492999983 ,40.760248184000034],[-73.988805770999988,40.759801865000043],[-73.9883575439999 39,40.75867652900007]]]}}

Example: Charting a Geometry Service Area Around a Coordinate

The following request generates service areas that are 5-minute walking distances from start station coordinates and charts them on an Esri map.

```
DEFINE FILE esri-citibike
WKID/A10='4326';
DISTANCE/A10='5';
TRAVEL_MODE/A10='WalkTime';
STATION_SERVICE_AREA/TX80 (GEOGRAPHIC_ROLE=GEOMETRY_AREA)=
   GIS_SERV_AREA_XY(START_STATION_LONGITUDE, START_STATION_LATITUDE,
DISTANCE, TRAVEL_MODE, WKID);
END
```

```
GRAPH FILE ESRI-CITIBIKE
 PRINT
   START_STATION_NAME
   END_STATION_NAME
   DISTANCE
 ON TABLE PCHOLD FORMAT JSCHART
 ON TABLE SET LOOKGRAPH CHOROPLETH
 ON TABLE SET EMBEDHEADING ON
 ON TABLE SET AUTOFIT ON
 ON TABLE SET STYLE *
  TYPE=REPORT, TITLETEXT='Map', PAGESIZE=E, CHART-LOOK=com.esri.map, $
  TYPE=DATA, COLUMN=N1, /*START_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N2, /*END_STATION_NAME*/
   BUCKET=tooltip, $
  TYPE=DATA, COLUMN=N3, /*DISTANCE*/
   BUCKET=tooltip, $

  *GRAPH_JS_FINAL
"legend": {"visible": true},
"extensions" : { "com.esri.map" :
  { "scalebar" :
{
    "scalebarUnit": "dual",
    "attachTo" : "bottom-left"
  },
  "baseMapInfo": {
      "drawBasemapControl" : false,
      "showArcGISBasemaps" : false,
          "customBaseMaps" : [
          {"ibiBaseLayer" : "dark-gray"}
        ]
    },
  "overlayLayers":
  [{
  "ibiDataLayer": {"map-geometry" :  {"map_by_field" :
"STATION_SERVICE_AREA"}}, "title" : "Chart"}]
    },
"introAnimation": "{\"enabled\":false}"
}

  *END
 ENDSTYLE
 HEADING
  "Chart Geometry Service Area"
END
```

The output is shown in the following image.

Support for the Comma Character as the Operation in an Autoprompt Dynamic Multi-Select List

As of WebFOCUS Release 8.2, the comma character is supported as an operation in an Autoprompt dynamic multi-select list with the IN and NOT IN operators. The IN and NOT IN operators optimize performance when running report requests to retrieve data from SQL data sources, as well as FOCUS selection.

In the following example, the comma separator identifies the values that must be quoted for Autoprompt processing.

```
TABLE FILE CAR
PRINT CAR
WHERE COUNTRY IN (&COUNTRIES.(,(FIND COUNTRY IN CAR)).COUNTRY LIST.)
END
```

Both alphanumeric and numeric values can be quoted. Alphanumeric values are required to be quoted for the IN list operator. Quotation marks are optional for numeric values.

When Autoprompt processes the selected values, they are sent to the Reporting Server with FOCUS quote encoding (multiple quotation marks), so that the FOCUS parser processes the value enclosed in quotation marks.

Example: Single Value Selection

In the following example, the value ITALY is enclosed in three single quotation marks. Autoprompt processing adds the -SET operator to the request code sent to the Reporting Server.

```
-SET &COUNTRIES='''ITALY''';
-SET &SEATS='''5''';
```

Example: Multiple Value Selection

In the following example, the values ENGLAND and FRANCE are selected. Each individual value is enclosed in two single quotation marks and the entire series of values is enclosed in single quotation marks. Autoprompt processing adds the -SET operator to the request code sent to the Reporting Server.

```
-SET &COUNTRIES='''ENGLAND'' , ''FRANCE''';
```

Automatic Conversion Between Date and Date-Time Formats

The following automatic direct operations are supported between date and date-time formats:

❏ **Assignment.**

Assignment of a date field or a date constant to a date-time field. The time component is set to zero (midnight). The date can be a full component date such as YYMD or a partial component date such as YYM. It cannot be a single component date such as Q, as this type of date, although displayed as a date in reports, is stored as an integer value and is used as an integer value in expressions.

Assignment of a date-time field or date-time constant to a date field. The time components are removed.

❏ **Comparison and Subtraction.**

When a date-time value is compared with or subtracted from a date value, or a date value is compared with or subtracted from a date-time value, the date is converted to date-time with the time component set to midnight. They are then compared or subtracted as date-time values.

❏ **Function parameters.**

Simplified date functions can use either date or date-time values as their date parameters. Legacy user functions do not support this new functionality. The date-time functions (H functions) use date-time parameters and the new date functions use new dates, which are stored as offsets from a base date.

Recognition and use of date or date-time constants.

❏ Constants can be expressed as strings, without the DT operator.

❏ Constants are converted to or from date or date-time values in accordance with the field format they are compared with, subtracted from, or assigned to.

❏ Unless it is expressed in a non-ambiguous translated or formatted string format with proper delimiters (not as a numeric string or number), the recognition of a constant as a date depends on the format of its field counterpart.

In this case, the size in terms of number of digits is strictly limited to at least six for a full component date or date-time value, (eight for a four-digit year), three for a partial component date, and one for a single component date.

❏ When numeric constants are used as function parameters and, therefore, do not have a field counterpart, they are recognized according to YYMD or YMD format. The only exception is a string with a single blank or the number zero which, in reports, will be presented as a blank. Date offset constants are no longer allowed. Blank separators between digits in a string are also not supported.

For information about creating and using date and date-time constants, see the *Describing Data With WebFOCUS Language* manual.

Example: **Assigning Date and Date-Time Values**

The following request generates a date-time value using the DT_CURRENT_DATETIME function. It then assigns this value to a date field and assigns that date field to a date-time field.

```
TABLE FILE WF_RETAIL_LITE
PRINT QUANTITY_SOLD NOPRINT AND COMPUTE
 DATETIME1/HYYMDm =  DT_CURRENT_DATETIME(MILLISECOND);
     AS 'Date-Time 1'
COMPUTE
 DATE1/YYMD   = DATETIME1;
     AS 'Date'
COMPUTE
DATETIME2/HYYMDm = DATE1;
     AS 'Date-Time 2'
WHERE RECORDLIMIT EQ 20
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image. The original date-time field has a non-zero time component. When assigned to the date field, the time component is removed. When that date is assigned to the second date-time field, a zero time component is added.

Date-Time 1	Date	Date-Time 2
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.855000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.856000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.856000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.856000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.856000	2017/08/25	2017/08/25 00:00:00.000000
2017/08/25 09:10:06.856000	2017/08/25	2017/08/25 00:00:00.000000

Example: **Comparing Date and Date-Time Values**

The following request creates one date-time field and one date field. When quantity sold is 1, they have the same date value and the date-time field has a zero time component. When quantity sold is 2, they have different date values, and the date-time field has a zero time component. In all other cases, the date-time field has the current date with a non-zero time component, and the date field has the current date. The EQUAL1 field compares them to see if they compare as equal.

```
TABLE FILE WF_RETAIL_LITE
PRINT QUANTITY_SOLD AS Quantity AND COMPUTE
 DATETIME1/HYYMDm = IF QUANTITY_SOLD EQ 1 THEN '2017/06/05'
        ELSE IF QUANTITY_SOLD EQ 2 THEN '2016/02/29'
        ELSE DT_CURRENT_DATETIME(MILLISECOND);
        AS 'Date-Time'
COMPUTE
  DATE1/YYMD   = IF QUANTITY_SOLD EQ 1 THEN '2017/06/05'
        ELSE IF QUANTITY_SOLD EQ 2 THEN '2015/12/30'
        ELSE DT_CURRENT_DATE();
        AS 'Date'
COMPUTE
  EQUAL1/A1 = IF DATETIME1 EQ DATE1 THEN 'Y' ELSE 'N';
        AS 'Equal?'
WHERE RECORDLIMIT EQ 12
ON TABLE SET PAGE NOLEAD
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image. When a date value is compared to a date-time value, the date is converted to a date-time value with the time component set to zero, and then the values are compared. Therefore, when QUANTITY_SOLD is 1, both the date components are equal and the time component of the date-time field is set to zero, so when the date is converted to a date-time value, they are equal. When QUANTITY_SOLD is 2, the date components are different, so they are not equal. When QUANTITY_SOLD is 3, the date components are the same, but the date-time field has a non-zero time component. Therefore, when the date field is converted to a date-time value with a zero time component and they are compared, they are not equal.

Quantity	Date-Time	Date	Equal?
1	2017/06/05 00:00:00.000000	2017/06/05	Y
1	2017/06/05 00:00:00.000000	2017/06/05	Y
1	2017/06/05 00:00:00.000000	2017/06/05	Y
2	2016/02/29 00:00:00.000000	2015/12/30	N
1	2017/06/05 00:00:00.000000	2017/06/05	Y
1	2017/06/05 00:00:00.000000	2017/06/05	Y
2	2016/02/29 00:00:00.000000	2015/12/30	N
1	2017/06/05 00:00:00.000000	2017/06/05	Y
1	2017/06/05 00:00:00.000000	2017/06/05	Y
1	2017/06/05 00:00:00.000000	2017/06/05	Y
3	2017/08/25 09:24:45.203000	2017/08/25	N
1	2017/06/05 00:00:00.000000	2017/06/05	Y

Charting With WebFOCUS

WebFOCUS charting options have been expanded to include more advanced properties, as well as a new output format that allows you to render a chart in the browser using a built-in JavaScript engine.

In this chapter:

Generating Narrative Charts

Narrative charts use a text generation server to generate a natural language summary of and insight into a chart.

Natural Language Generation (NLG) is a branch of artificial intelligence (AI) that produces language as output on the basis of data input. This helps you to get an easily understandable explanation of a chart that adds value by identifying the most relevant information and conveying it through conversational language.

To generate a narrative chart, you add narrative chart properties to a chart request. Using these properties, you can control some of the features of the narrative that is generated.

Configuring WebFOCUS to Generate Narrative Charts

In order to configure WebFOCUS to generate narrative charts, you must install the WebFOCUS Narrative Charts Server and, optionally, configure the URL to the WebFOCUS Narrative Charts Server in the WebFOCUS Administration Console.

Note: If you do not configure the URL to the WebFOCUS Narrative Charts Server in the WebFOCUS Administration Console, the Narrative charts button will not be activated in InfoAssist+. If you do configure the URL in the WebFOCUS Administration Console, you will find the *Narrative* button on the *Format* menu under *Features* when you create an HTML5 (FORMAT JSCHART) bar, line, area, or pie chart.

The WebFOCUS Narrative Charts Server is a separately licensed product that can be installed on Windows or Linux. Once you have licensed this feature, you can install the server using the instructions in the *WebFOCUS Narrative Charts Installation and Configuration* manual.

In order generate WebFOCUS narrative charts, you must either include the narrative text in your chart procedure or StyleSheet, configure the URL to the WebFOCUS Narrative Charts Server in the WebFOCUS Administration Console, or include the URL in the narrative chart properties in your chart procedure or StyleSheet. The order of precedence is:

1. **The URL configured in the WebFOCUS Administration Console.** If neither the content nor the url property is specified in your procedure or StyleSheet, the URL configured in the WebFOCUS Administration Console will be used.

2. **A URL specified in the procedure or StyleSheet.** If your procedure or the StyleSheet included in your procedure has a url property pointing to the WebFOCUS Narrative Charts Server, and the content property is omitted or set to *undefined*, the last URL found when parsing the procedure or StyleSheet will be used.

3. **Your own content.** If you supply narrative text in the content property of your procedure or StyleSheet, it will be used.

Reference: Usage Notes for Narrative Charts

Narrative charts can have a maximum of 1,024 data points. This limit is imposed by the WebFOCUS Narrative Charts Server and will be removed in a future release. If the limit is exceeded, the message returned from the WebFOCUS Narrative Charts Server is

```
Failed to retrieve narrative text
```

Procedure: How to Configure the URL to the WebFOCUS Narrative Charts Server in the WebFOCUS Administration Console

1. From the WebFOCUS Home Page, click *Administration* at the top right of the page, and click *Administration Console*.

   The WebFOCUS Administration Console opens.

2. Select *Text Generation Server* under Application Settings in the left pane, as shown in the following image.
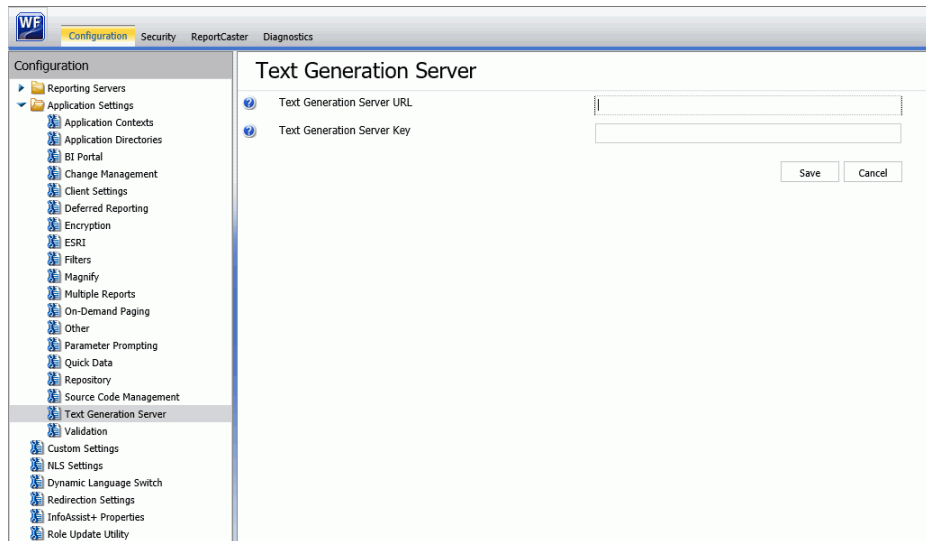
3. Enter the URL to the WebFOCUS Narrative Charts Server in the *Text Generation Server* URL text box.

   Note: The Text Generation Server Key field is not used.

4. Click *Save*.

5. Clear the cache in the WebFOCUS Administration Console by clicking *Clear Cache* at the top right of the console page.

Chart Types Supported for Narration

The following chart types are supported for narrative text generation when creating an HTML5 (FORMAT JSCHART) chart.

❏ **Bar.** Horizontal and vertical bars are supported, including stacked bars, and percent bars.

❏ **Line.** Horizontal and vertical lines are supported, including stacked lines and absolute lines.

   Note: Line charts require an ordered axis, such as date.

❏ **Area.** Horizontal and vertical area charts are supported, including stacked lines and absolute lines.

   Note: Area charts require an ordered axis, such as date.

❏ **Pie.** Both pie and ring pie charts are supported, including percent pies.

Narrative chart requests can include up to two dimensions as long as they are concatenated and if there is only one measure, or up to two measures if there is only one dimension.

Adding Narrative Chart Properties

Note: For JSON formatting, object names, property names, and string property values should be enclosed in double quotation marks.

For an introduction to JSON syntax for WebFOCUS HTML5 charts and the supported methods for specifying colors, see the *Creating HTML5 Charts With WebFOCUS Language* manual.

The following properties can be used to add a narrative to a chart, format the narrative, and control features of the generated narrative.

```
*GRAPH_JS
"narrativeText":
    {
      "enabled": boolean,
      "hideChart": boolean,
      "position": "string",
      "maxSize": "string",
      "url": "string",
      "content": "string",
      "label": {
              "font": "string",
              "color": "string",
              "align": "string"
            },
      "backgroundColor": "string",
      "border": {
              "width": number,
              "color": "string",
              "dash": "string"
            },
      "dockButton": {
              "enabled": boolean,
              "animationDelay": number,
              "size": number,
              "color": "string",
              "hoverColor": "string"
            },
```

```
"textGenerationAPI":
        {
           "inputChart":
            {
             "mainDimensionOrdered": boolean,
             "multiSeriesType": "string",
             "disableInterpolation": boolean,
             "singularExceptions": ["string", "string"...],
             "pluralExceptions": ["string", "string"...],
            },
           "outputText": {
                        "levelOfDetail": number,
                        "lang": "string",
                        "useBulletPoints": boolean
                        },
           "measures":    [
                        {
                         "defaultValue": "string",
                         "meaningOfUp": "string",
                         "unit": "string"
                        },
                        {
                         "defaultValue": "string",
                         "meaningOfUp": "string",
                         "unit": "string"
                        }
                        ]
        }
   }
*END
```

where:

"narrativeText":

   Starts the narrative chart properties section of a *GRAPH_JS block in the StyleSheet.

   "enabled": *boolean*

      Enables or disables the narrative text generation. Valid values are true, which
      generates a narrative on the chart output, and false, which does not generate a
      narrative on the chart output. The default value is false.

   "hideChart": *boolean*

      Controls whether the chart displays along with the narrative. Valid values are true,
      which displays only the narrative, not the chart, and false, which displays both the
      narrative and the chart. The default value is false.

   "position": "*string*"

      Defines the position of the narrative text in relation to the chart. Valid values are
      "top", "bottom", "left", or "right". The default value is "top".

`"maxSize"`: `"string"`

Is a string that includes a percent symbol (%) that defines the maximum percent of the chart draw area that will be dedicated to the narrative text. This value takes position into account. If position is "left" or "right", this defines the maximum width of the text box for the narrative. If position is "top" or "bottom", this value defines the maximum height of the text box for the narrative. The default value is "20%".

`"url"`: `"string"`

Identifies the URL to the text generation server. Optional if the URL is configured in the WebFOCUS Administration Console. Omit both the property name and value if you want to supply content using the *content* property.

`"content"`: `"string"`

Should be *undefined*, if the text will be generated by the WebFOCUS Charts Narrative Server. If the url property is missing or commented out and the URL is not configured in the WebFOCUS Administration Console, provide a string containing the text of the narrative you want to display. Simple HTML tags such as < br > and < ol > can be used. An amper variable can be used if the Narrative Chart properties are defined in the chart request and not in an external WebFOCUS StyleSheet The default value is *undefined*.

Note: All of the content string must be entered as a single line in the procedure. Any breaks that you want to appear on the narrative output should be entered as HTML tags.

`"label"`:

These properties define the format and alignment of the generated narrative text.

`"font"`: `"string"`

Is a string that defines the font of the narrative text. The default value is "11pt Sans-Serif".

`"color"`: `"string"`

Is a string that defines the color of the narrative text using a color name, an RGB color string, or a hex color string. The default value is "black".

`"align"`: `"string"`

Is a string that defines the alignment of the narrative text within the text box. Valid values are "left", "middle", "center", and "right". The default value is "left".

`"backgroundColor"`: `"string"`

Is a string that defines the background color of the text using a color name, an RGB color string, or a hex color string. The default value is *undefined*.

"border":

These properties define the border of the text box.

"width": *number*

Is a number that defines the width in pixels of the border around the narrative text box. The value zero (0) does not draw a border around the text box. The default value is 0.

"color": "*string*"

Is a string that defines the color of the border around the text box using a color name, an RGB color string, or a hex color string. The default color is "black".

"dash": "*string*"

Is a string that defines the dash style of the border around the text box. The default value is "" (a solid line). Use a string of numbers that defines the width of a dash in pixels followed by the width of the gap between dashes in pixels (for example, dash: "1 1" draws a dotted line).

"dockButton":

These properties define a button that can be drawn pointing to the chart that, when clicked, expands the narrative text box as much as required, up to the size of the entire chart frame. After expansion, the button becomes a collapse button that collapses the text box to its original size.

"enabled": *boolean*

Controls whether a dock button will be drawn. Valid values are true, which draws a dock button, and false, which does not draw a dock button. The default value is false.

"animationDelay": *number*

Is a number that defines the length of time (in ms) to animate the sliding transition when expanding and collapsing the text box. The default value is 300.

"size": *number*

Is a number that defines the diameter of the dock button in pixels. The default value is *undefined*.

"color": "*string*"

Is a string that defines the color of the dock button using a color name, an RGB color string, or a hex color string. The default value is "rgb(50, 50, 50)".

"hoverColor": "*string*"

Is a string that defines the color of the dock button when the mouse hovers over it. the default value is "black".

`"textGenerationAPI":`

These properties define the parameters sent to the WebFOCUS Narrative Charts Server to be used in generating the narrative text.

`"inputChart":`

These properties define aspects of the data being sent to the WebFOCUS Narrative Chart Server.

❏ `"mainDimensionOrdered": ` *boolean*

Specifies whether the dimension represents a range of values or a categorical list. To have the type of ordering automatically detected, omit this property. Valid values are:

❏ true, which indicates that the dimension values can be expressed as a range of values. This type of ordering is appropriate for time, date, or numeric dimensions. The generated text will describe the dimension values as a from-to range of values. This is the default value for bar, line, and area charts.

❏ false, which indicates that the dimension values do not represent a range. This type of ordering is appropriate for alphanumeric dimensions. The generated text will express the dimension values as a categorical list. This is the default value for pie charts.

❏ `"multiSeriesType": "` *string* `"`

Indicates if the measures are related to each other. Valid values are:

❏ "UNRELATED", which means the measures are not related to each other. This is the default value.

❏ "VALUE_VS_REFERENCE", which means that the measures are related. Value refers to the first measure, say, Actual Sales, and the second measure is the Reference (that is, the target or objective). This option requires a date axis, and the format must be YYMD.

❏ `"disableInterpolation": ` *boolean*

Determines whether missing values will be approximated or replaced with a default value. Valid values are:

❏ true, which uses a default value for missing values. The default value is specified in the defaultValue property for each measure. This is the default option.

❑ false, which computes an approximate value when a data value is missing.

❑ `"singularExceptions": ["string", "string" ...]`

Is an array of strings that identify nouns that seem plural but should be treated as singular. Examples are the nouns mathematics, physics, and ethics. The default value is not to have singular exceptions.

❑ `"pluralExceptions": ["string", "string" ...]`

Is an array of strings that identify nouns that seem singular but should be treated as plural. Examples are the nouns pliers, tongs, and tweezers. The default value is not to have plural exceptions.

`"outputText":`

These properties control some of the aspects of the returned narrative text.

❑ `"levelOfDetail": number`

Is an integer from 1 to 7 that controls how much text is generated, with 7 generating the most detailed text and 1 generating the simplest text. The default value is 7.

❑ `"lang": "string"`

Defines the language for the generated text. At this time, the supported values are "en" (English) or "fr" (French). You can be licensed to use either English or French, but not both. The default value is "en".

❑ `"useBulletPoints": boolean`

Defines whether key points in the narrative should be displayed as bullets or paragraphs. Valid values are true, which displays key points as bullets, or false, which uses paragraphs. The default value is false.

`"measures":`

Is an array that defines the properties of up to two measures.

Note: If your chart request has only one measure, do not include properties for a second measure or the chart will not draw.

❑ `"defaultValue": "string"`

Is a string that specifies default value to be used for missing data values if the disableInterpolation property is set to *true*. The default value is "0".

❑ `"meaningOfUp": "string"`

Identifies whether high values represent positive information (for example, sales or profit) or negative information (for example, expenses). Valid values are:

❏ "GOOD", which means higher values represent positive information. This is the default value.

❏ "BAD", which means higher values represent negative information.

❏ "unit": "*string*"

Defines the units to be applied to measure values. Valid values are:

❏ "$". Should be used for currency values.

❏ "%". When "%" is used, an automatic scale is applied to the data (.1 will be displayed as 10%).

❏ "". This is the default value.

Note:

❏ For all examples, the application containing the Master File must be on the APP PATH or be included in the GRAPH FILE command. For example:

```
GRAPH FILE app1/wf_retail_lite
```

❏ The text generation server purposely creates varying narratives, even for the same chart output. Therefore, the narrative output you get if you run the following examples may differ from the narrative output displayed here.

Example: **Generating a Bar Chart With Narrative Text**

The following request generates a vertical bar chart with narrative text enabled. Default values are accepted for all other properties.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY TIME_DATE_QTR_COMPONENT
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR_COMPONENT, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText": {
                "enabled": true,
    "textGenerationAPI": {
                "measures": [
                        {"unit": "$"},
                        {"unit": "$"}
                        ],
                }
            }
*END
ENDSTYLE
END
```

The output is shown in the following image.
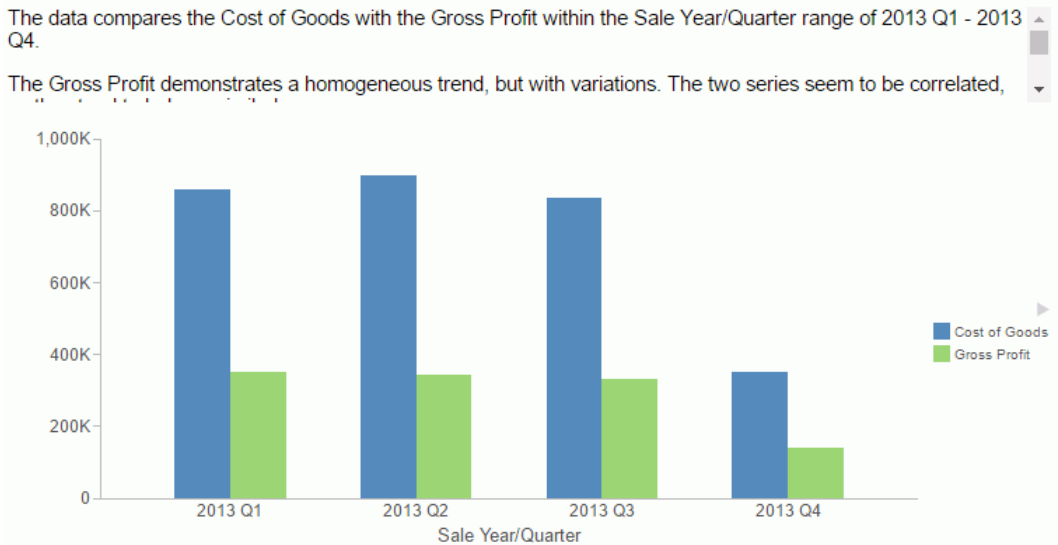
Example: Formatting the Narrative Text and Border

The following request generates a line chart and makes the text larger and center aligned, draws a blue dashed border around the text, and makes the background color corn silk.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY TIME_DATE_QTR_COMPONENT
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH LINE
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR_COMPONENT, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText": {
            "enabled": true,
            "label": {
                        "font": "14pt Sans-Serif",
                        "color": "black",
                        "align": "center"
            },
            "backgroundColor": "cornsilk",
            "border": {
                        "width": 2,
                        "color": "blue",
                        "dash": "4 4"
            },
        }
*END
ENDSTYLE
END
```

The output is shown in the following image.
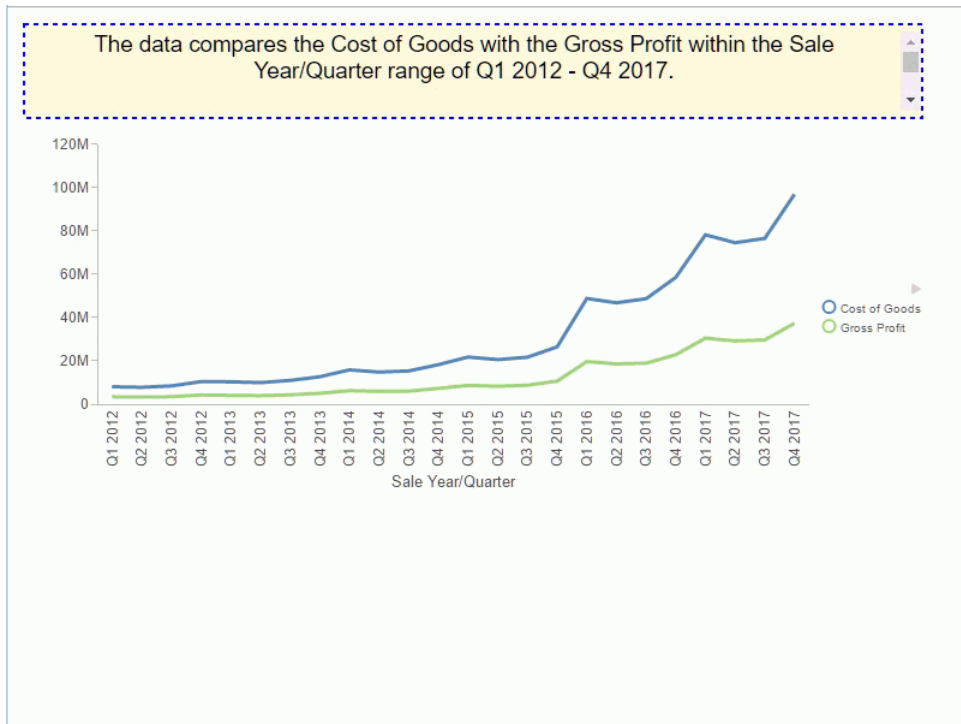
Example: **Generating a Narrative-Only Chart**

The following request hides the chart output so that only the narrative displays.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY TIME_DATE_QTR_COMPONENT
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR_COMPONENT, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText": {
            "enabled": true,
            "hideChart": true,

            "label": {
                      "font": "16pt Sans-Serif",
                      "color": "blue",
                      "align": "left"
            },

        }
*END
ENDSTYLE
END
```

Information Builders

The output is shown in the following image.

The data compares the Cost of Goods with the Gross Profit across the Sale Year/Quarter range of 2013 Q1 - 2013 Q4.

The Gross Profit demonstrates a consistent trend, but with variations. The two series seem to be correlated, as they tend to behave similarly.

Throughout the period the Cost of Goods overall declined, falling from 859,510 to 352,995. At the same time, the Gross Profit decreased continually, and the rate of variation in the data abated.

The longest period of decline in Gross Profit started in 2013 Q1, between the Sale Year/Quarters of 2013 Q1 and 2013 Q4, and was followed one Sale Year/Quarter later by the one in Cost of Goods spanning between 2013 Q2 and 2013 Q4. In addition, the lowest point in Cost of Goods and in Gross Profit occurred at the same time, in 2013 Q4.

Example: **Generating a Narrative Using an Unordered Dimension**

The following request generates a pie with a dimension (PRODUCT_CATEGORY) that should not be expressed as a range.

```
GRAPH FILE WF_RETAIL_LITE
SUM GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH PIE
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=measure, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=color, $
*GRAPH_JS
"narrativeText": {
            "enabled": true,
            "label": {
                    "font": "12pt Sans-Serif",
                    "color": "black",
                    "align": "left"
            },
            "textGenerationAPI":
                    {
                    "inputChart": {
                    "mainDimensionOrdered": false
                            },
                    }
            }
*END
ENDSTYLE
END
```

Information Builders

The output is shown in the following image. The dimension values are expressed as a list, not a range.

The data shows the Gross Profit for the following Product Categories: Stereo Systems, Media Player, Camcorder, Accessories, Video Production, Computers and Televisions.

When taken together, the seven Product Categories amount to a total value of 1,167,734. The

Product Category
- Accessories
- Camcorder
- Computers
- Media Player
- Stereo Systems
- Televisions
- Video Production
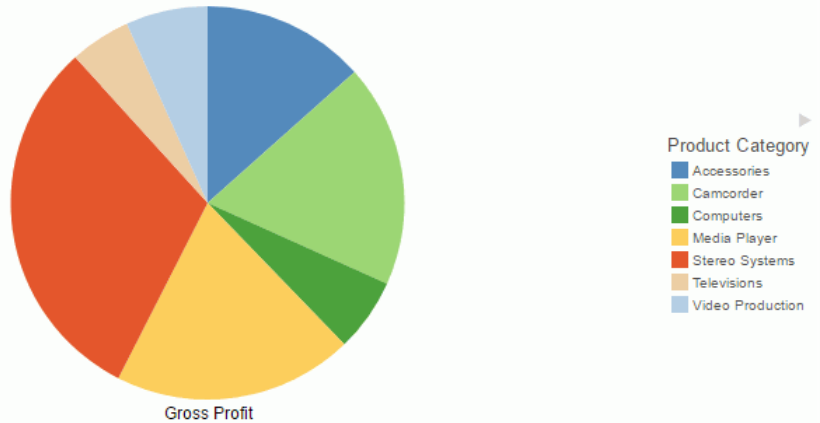
Gross Profit

Example: **Generating a Narrative With Less Detail**

The following request generates a bar chart with a less detailed narrative (levelOfDetail:1).

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText": {
            "enabled": true,
            "label": {
                "font": "14pt Sans-Serif",
                "color": "black",
                "align": "left"
            },
            "textGenerationAPI":
                {
                "outputText": {
                            "levelOfDetail": 1
                            },
                }
        }
*END
ENDSTYLE
END
```

The output is shown in the following image.

The data compares the Cost of Goods with the Gross Profit by Product Category.

Example: **Displaying a Dock Button**

The following request generates a chart with a red dock button that has a diameter of 25 pixels.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText":
        {
        "enabled": true,
        "label": {
                "font": "10pt Sans-Serif",
                "color": "black",
                "align": "left"
                },
        "backgroundColor": "white",
        "dockButton":
                {
                "enabled": true,
                "size": 10,
                "color": "red"
                },
        }
*END
ENDSTYLE
END
```

Information Builders

The initial output is shown in the following image, where the button is pointing toward the chart.
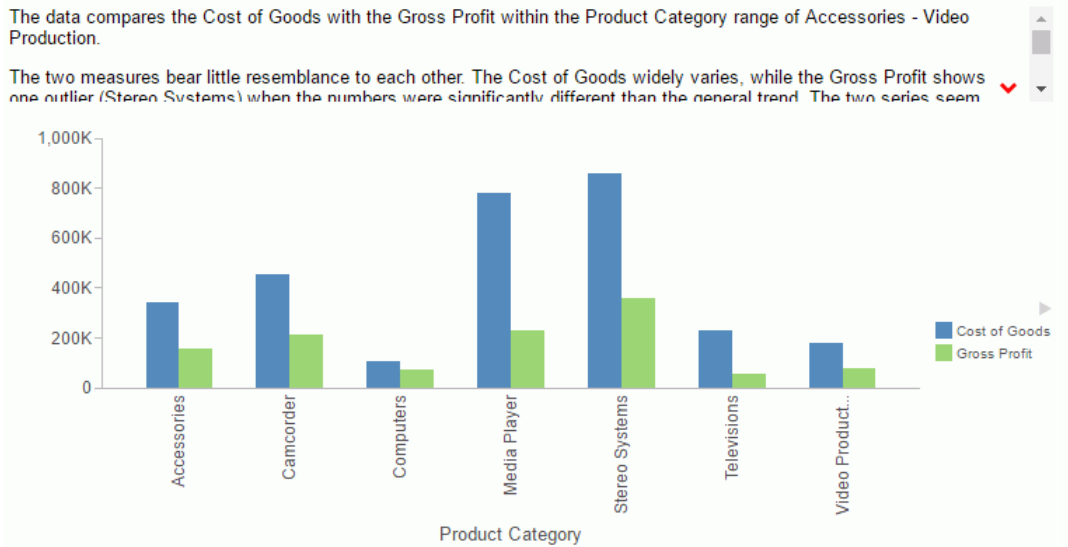
The following image shows the text box expanded after the dock button is clicked.

Example: **Generating a Narrative for Related Measures**

The following request describes revenue for the date period, using gross profit as its target values.

```
DEFINE FILE WF_RETAIL_LITE
Dates/YYMD=TIME_DATE_MONTH_COMPONENT;
END
GRAPH FILE WF_RETAIL_LITE
SUM REVENUE_US GROSS_PROFIT_US
BY Dates
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=REVENUE_US , BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=Dates, BUCKET=x-axis, $
*GRAPH_JS
  "narrativeText":
   {
    "enabled": true,
    "maxSize": "40%",
    "label": {"font": "10pt Arial"},
    "textGenerationAPI":
       {
        "inputChart": {
            "mainDimensionOrdered": true,
            "multiSeriesType":  "VALUE_VS_REFERENCE",
            "disableInterpolation": true,
                },
        "measures":
           [
           {"unit": "$"},
           {"unit": "$"}
           ],
        }
       }
*END
ENDSTYLE
END
```

The output is shown in the following image.

The data compares the Revenue with its targets within the period of January 2013 - November 2013.

Throughout the current timespan the Revenue overall declined, falling from $382K to $4.52K. Goals were always met, surpassing them by 71.64% on average. The Revenue, in relation to its set objectives, has deteriorated throughout this period.

Revenue dropped noticeably between the Dates of October and November, from $489K to $4.52K.

In the end, the Revenue fell to $4.52K, dropped by 99% compared with January. It was above its last target by 211.04%.
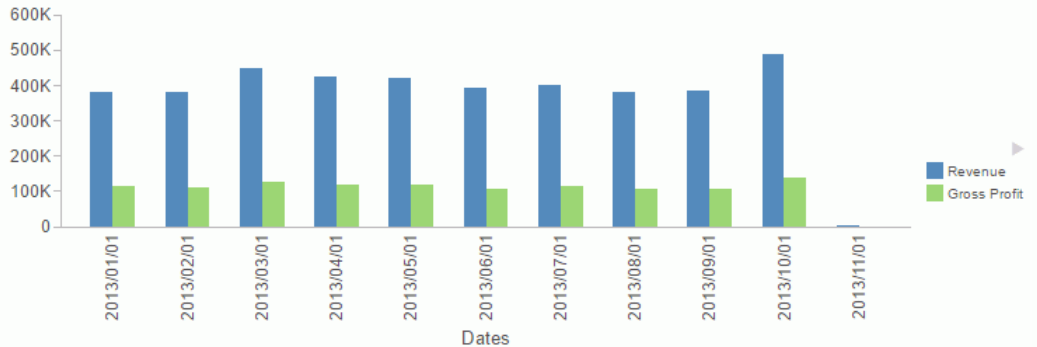
Example: **Setting the Unit for Measures in the Narrative**

The following request sets the dollar sign ($) as the unit for both measures and makes the text box larger.
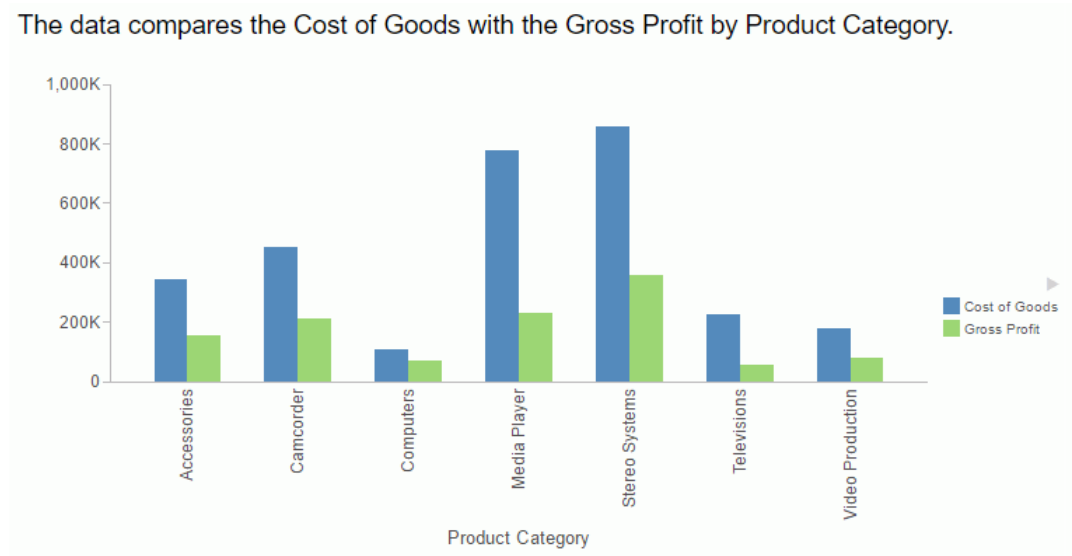
```
GRAPH FILE WF_RETAIL_LITE
SUM REVENUE_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=REVENUE_US , BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
*GRAPH_JS
  "narrativeText": {
    "enabled": true,
    "maxSize": "50%",
    "label": {"font": "12pt Arial"},
    "textGenerationAPI": {
        "inputChart": {
            "mainDimensionOrdered": false,
            "multiSeriesType":  "UNRELATED",
            "disableInterpolation": true,
                  },
        "measures": [
              {"unit": "$"},
              {"unit": "$"}
              ],
                  }
              }
*END
ENDSTYLE
END
```

The output is shown in the following image.

The data compares the Revenue with the Gross Profit for the following Product Categories: Accessories, Camcorder, Computers, Media Player, Stereo Systems, Televisions and Video Production.

When taken together, the seven Product Categories amount to a total value of $4.12M. The average value is $588K.

Stereo Systems is the most important (29.54% of the total Revenue). Media Player is the second largest (24.52% of the total Revenue). Combined, the five other Product Categories account for 45.94% of the total.
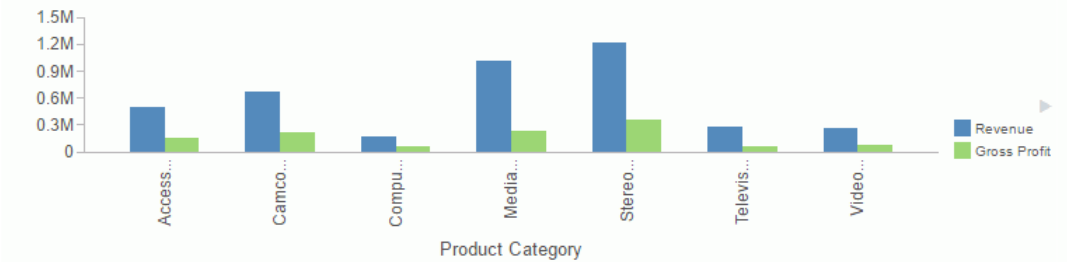
Example: **Providing Your Own Narrative**

The following request provides a narrative as text in the content property. Note that all content must be supplied as a single line in the request.
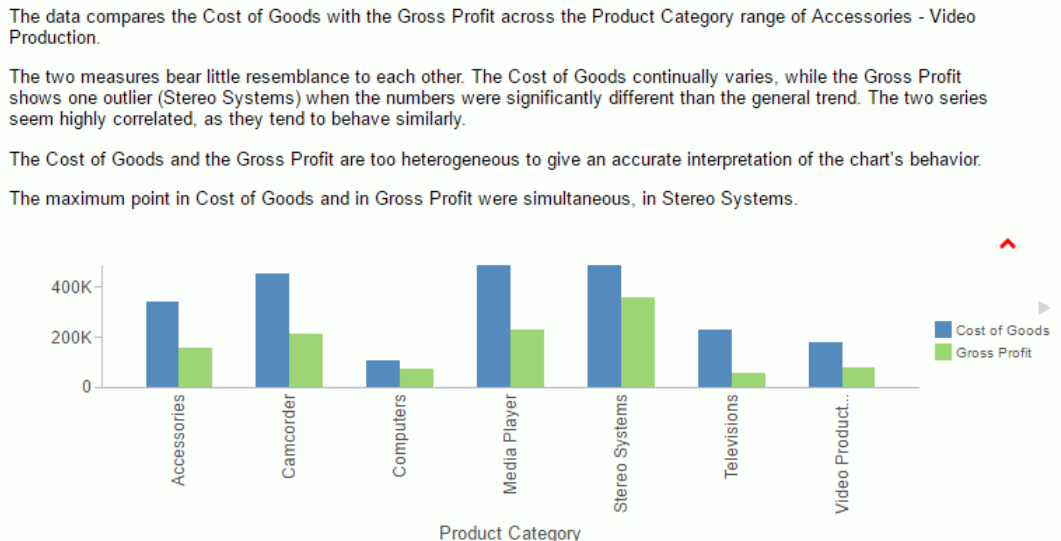
```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
*GRAPH_JS
"narrativeText":
  {
    "enabled": true,
    "content": "This chart compares revenue and profit for product categories.",
    "label": {
            "font": "12pt Sans-Serif",
            "color": "black",
            "align": "left"
         },
    "backgroundColor": "cornsilk",
    "border": {
            "width": 2,
            "color": "black",
            "dash": ""
         },
    "textGenerationAPI":
     {
            "inputChart":
            {
              " mainDimensionOrdered": false,
              "multiSeriesType": "UNRELATED",
            },

    }
  }
*END
ENDSTYLE
END
```

The output is shown in the following image.
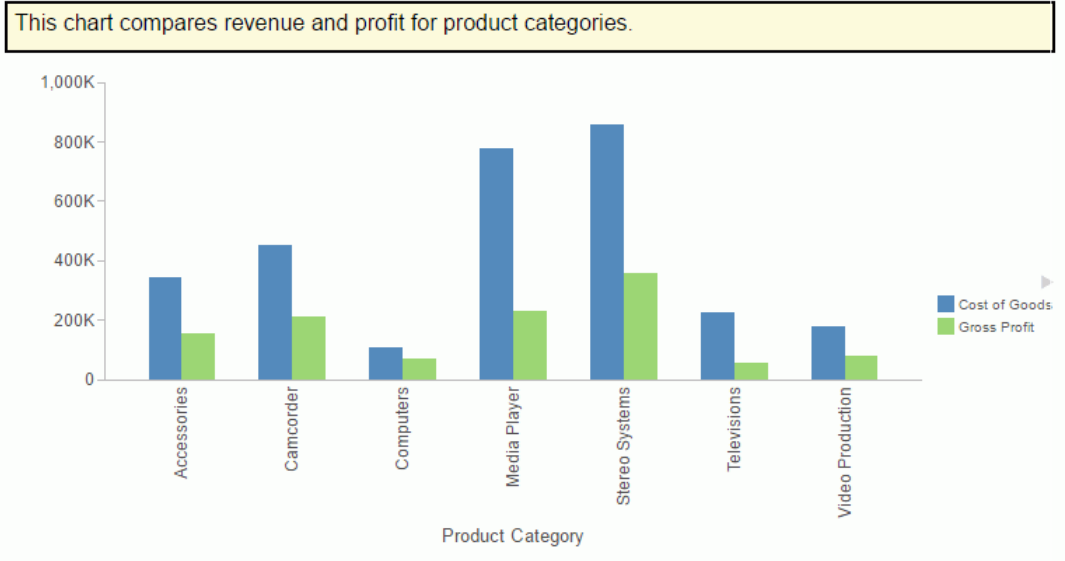
Example: **Using Concatenated Dimensions**

The following request uses two dimensions and one measure. The dimensions are required to be concatenated:

```
GRAPH FILE wfretail82/wf_retail_lite
SUM REVENUE_US
BY PRODUCT_CATEGORY
BY PRODUCT_SUBCATEG
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET AUTOFIT ON
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/ibi_themes/Warm.sty,$
TYPE=REPORT, TITLETEXT='WebFOCUS Report', ORIENTATION=LANDSCAPE, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
TYPE=DATA, COLUMN=PRODUCT_SUBCATEG, BUCKET=x-axis, $
TYPE=DATA, COLUMN=REVENUE_US, BUCKET=y-axis, $
*GRAPH_JS
"narrativeText": {
              "enabled": true,
              "textGenerationAPI":
                    {
                       "inputChart": {
                       "mainDimensionOrdered": false
                                   },
                    }
              },

"xaxis":{"labels":{"nestingConcatSymbol":":"}}
*END

ENDSTYLE
END

-RUN
```

Note: Concatenated labels are the default label option for the x-axis, and the default concatenation symbol is the colon (:). To concatenate dimensions manually, you can supply a concatenation symbol for the x-axis labels using the nestingConcatSymbol property, as shown in this example.

The output is shown in the following image.
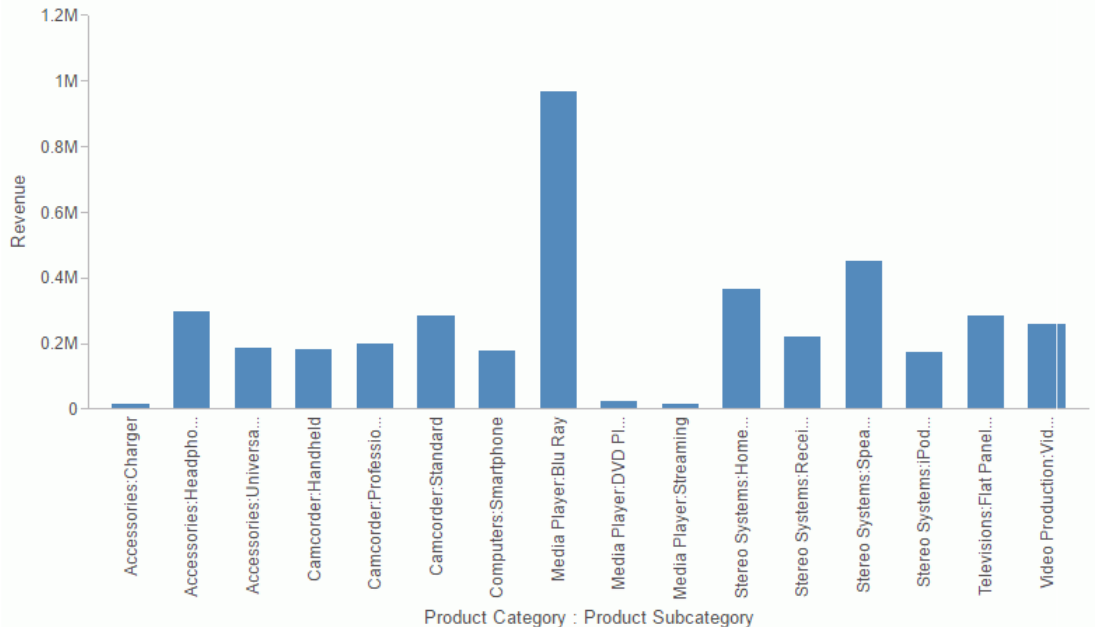
Controlling Riser Width

By default, the chart engine fits chart output to the size of the container. It generates a scroll bar when all of the risers will not fit in the container nicely. if the AUTOFIT parameter is set to RESIZE and the container is resized, the risers will also be resized.

Using the xaxis:groupFit properties, you can control riser width. You can set a minimum, maximum, or exact width for risers, or you can specify a minimum number of groups to show in the frame if a scroll bar is generated.

Syntax: **How to Control Riser Width**

```
xaxis: {
   groupFit:
     {rule: 'string',
      value: value      }
   }
```

where:

rule: *'string'*

Is one of the following rules that controls how the riser widths are determined.

❏ **'auto'.** Size risers according to the width of the chart frame. This is the default value.

❏ **'minSize'.** Risers are at least value pixels wide.

❏ **'maxSize'.** Risers are never more than value pixels wide.

❏ **'exactSize'.** Risers are always exactly value pixels wide.

❏ **'scrollCount'.** If the bars do not fit nicely, add a scroll bar but ensure that *value* number of risers are visible on the chart at the same time.

value: *value*

Is the width in pixels for 'minSize', 'maxSize', or 'exactSize', or the number of groups for 'scrollCount'. It is ignored for 'auto'. The default value is *undefined*.

Example: **Controlling Riser Width**

The following request generates a chart with risers that are sized automatically. The AUTOFIT parameter is set to RESIZE, so when the frame is resized, the riser widths are resized.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
BY BUSINESS_REGION
WHERE BUSINESS_REGION NE 'Oceania'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET AUTOFIT RESIZE
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=REPORT, CHART-SERIES-LAYOUT=side-by-side,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=x-axis, $
*END
ENDSTYLE
END
```

The initial chart display is shown in the following image.
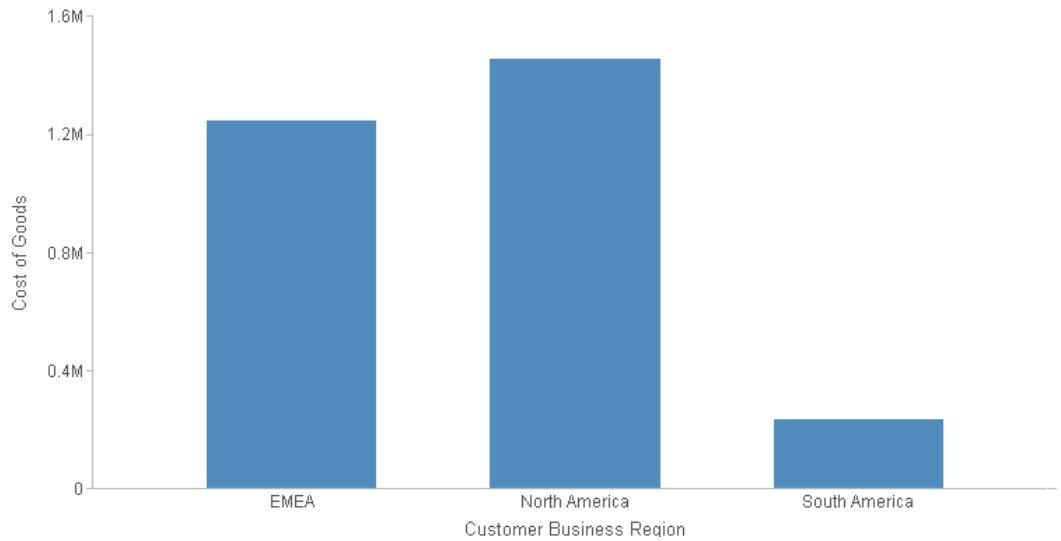
The following image shows the same chart when the frame is resized to its maximum. The riser widths become wider to fill the chart frame.
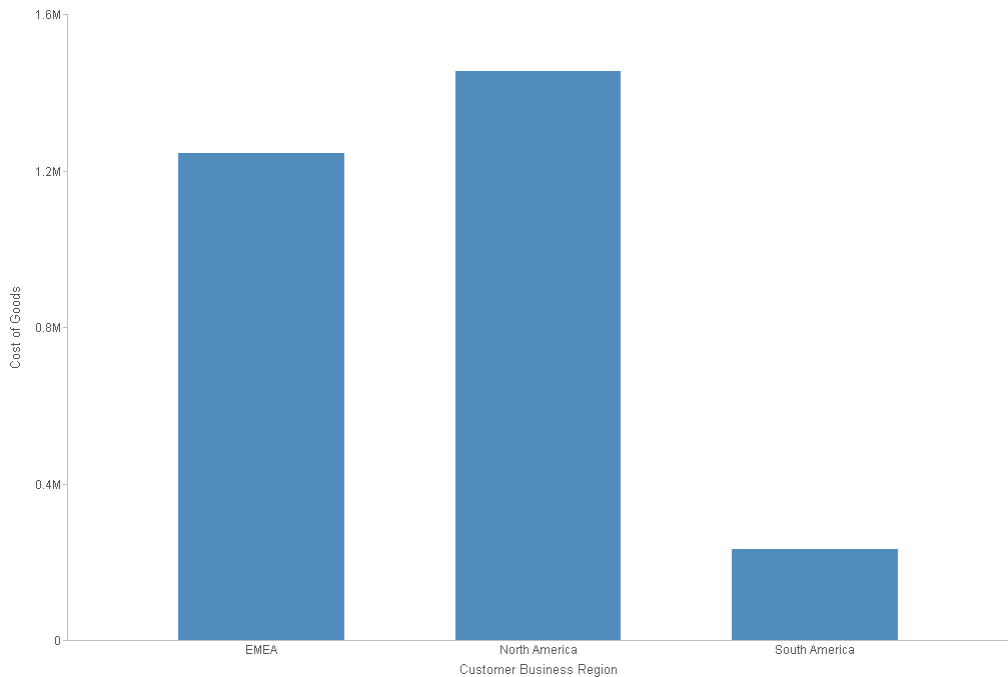
The following version of the request uses the groupFit properties to make the risers exactly 100 pixels wide.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
BY BUSINESS_REGION
WHERE BUSINESS_REGION NE 'Oceania'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET AUTOFIT RESIZE
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=REPORT, CHART-SERIES-LAYOUT=side-by-side,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=x-axis, $
*GRAPH_JS
xaxis:{
groupFit:
{rule: 'exactSize', value: 100}
}
*END
ENDSTYLE
END
```

The initial chart display is shown in the following image.
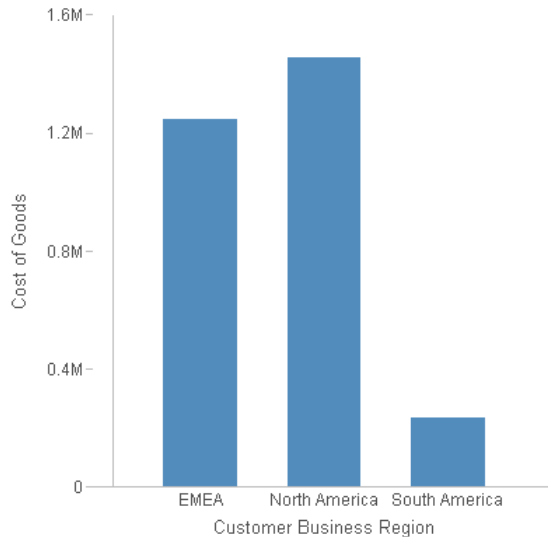
The following image shows the chart when the frame is resized to its maximum size. The risers are still the same width.
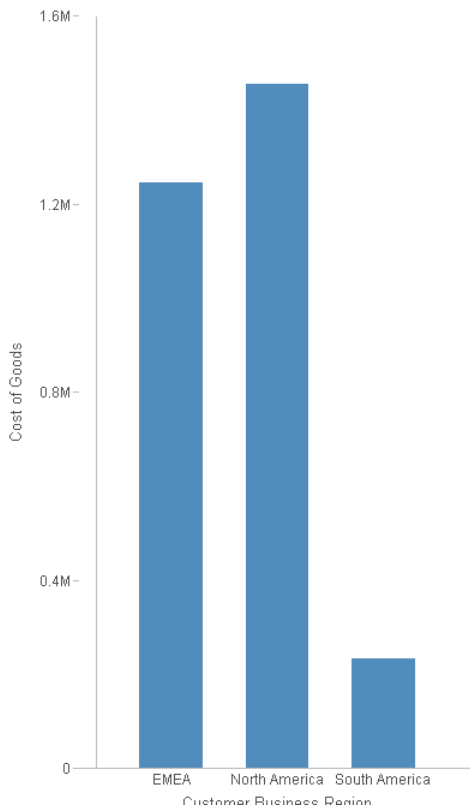
Assigning Color Modes on a Map Chart

When you add a color scale to a map chart, a new color mode called "*bin*" has been added to the existing color modes. You have a choice of the following three color modes to define the way color transitions are visualized on the chart and in the legend.

❏ **continuous.** Continuous mode is the default visualization. In continuous mode, the colors in the color scale form a blended gradient.

❏ **discrete.** Discrete mode visualizes the colorScale in discrete color bands. You define an array of color bands that provide start and stop values for each color.

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❏ **bin.** Bin mode creates discrete markers on the legend for each entry in the colorScale array. This is useful when the color bands generate an unappealing legend that is hard to read.

Syntax: **How to Format Color Mode Bins**

```
"colorScale":
  {
    "colorMode": "bin",
    "invert": boolean,
      "binMarkers":
          {
            "visible": boolean,
            "concatSymbol": "string",
            "size": number,
            "shape": "string",
            "rotation": number,
            "position": "string",
              "border":
                  {
                    "width": number,
                    "color": "string",
                    "dash": "string"
                  }
          }
  }
```

where:

`"invert":` *boolean*

Defines the order of the color bands. Valid values are:

❏ true, which lists the bands from high to low.

❏ <u>false</u>, which lists the bands from low to high. This is the default value.

`"visible":` *boolean*

Specifies whether to show the bin markers. Valid values are:

❏ <u>true</u>, which shows the bin markers. This is the default value.

❏ false, which does not show the bin markers.

`"concatSymbol":` `"`*string*`"`

Is a string that defines the symbol used in each legend label between the minimum value and maximum value for the bin. The default concatenation symbol is " ... ".

`"size":` *number*

Is the diameter of the bin marker in pixels. The default value is 8.

"shape": "*string*"

Is a string that specifies any standard marker shape. The default value is "square".

"rotation": *number*

Is a number that defines the rotation of the marker in degrees. The default value is 0 (zero).

"position": "*string*"

Specifies the position of the markers relative to the labels. Valid values are:

❏ "left", which places the markers to the left of the labels. This is the default value.

❏ "right", which places the markers to the right of the labels.

❏ "bottom", which places the markers below the labels.

❏ "top", which places the markers on top of the labels.

"border":

Defines the properties of the marker border.

"width": *number*

Is a number that defines the width of the border in pixels. The default value is 1.

"color": "*string*",

Is a string that defines the color of the marker border. The default value is "black".

"dash": "*string*"

Is a string that defines the dash style of the marker border. Specify the length of a dash in pixels followed by the length of the space between dashes in pixels. For example, dash: "1 1" generates a dotted line. The default value is " ", which generates a solid border.

Example: **Using Bin Color Mode**

The following request uses color mode bin. The bin markers are square and 20 pixels in diameter. The concatenation symbol between the start and stop values is " -". The bin markers are beneath the bin labels and have a red border one pixel wide. The color bands are inverted so that the band representing the highest percents is on top.

```
GRAPH FILE WF_RETAIL_LITE
SUM CITY_POPULATION
BY COUNTRY_NAME
WHERE COUNTRY_NAME NE 'Taiwan'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH CHOROPLETH
ON GRAPH SET AUTOFIT ON
ON GRAPH SET STYLE *
TYPE=REPORT, CHART-LOOK=com.esri.map, $
TYPE=DATA, COLUMN=COUNTRY_NAME, BUCKET=location, $
TYPE=DATA, COLUMN=CITY_POPULATION, BUCKET=color, $
*GRAPH_JS
"legend": {"visible": true},
"colorScale":
    {
    "colorMode": "bin",
    "invert": true,
    "binMarkers":
        {
          "visible": true,
          "concatSymbol": " - ",
          "size": 20,
          "shape": "square",
          "rotation": 0,
          "position": "bottom",
            "border": {
                "width": 1,
                "color": "red",
                    }
        },
    "colorBands":[
        {"start":"0%",  "stop":"10%",  "color":"#B57877"},
        {"start":"10%", "stop":"20%",  "color":"#2887A6"},
        {"start":"20%", "stop":"30%",  "color":"#7ABD66"},
        {"start":"30%", "stop":"40%",  "color":"#984EA3"},
        {"start":"40%", "stop":"100%", "color":"#4DAF4A"},
            ]
    },
```

```
"extensions": {
"com.esri.map": {
"overlayLayers":
   [
      {
         "title": "WebFOCUS Countries Request",
         "layerType": "choropleth",
         "geometrySourceType": "esri",
         "geometryLocateField": ["Country"],
         "geometryDataField": "name",
         "url": "http://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/
services/World_Countries_(Generalized)/FeatureServer/0"
      }
   ],
            }
         }
*END
ENDSTYLE
END
```

The output is shown in the following image.
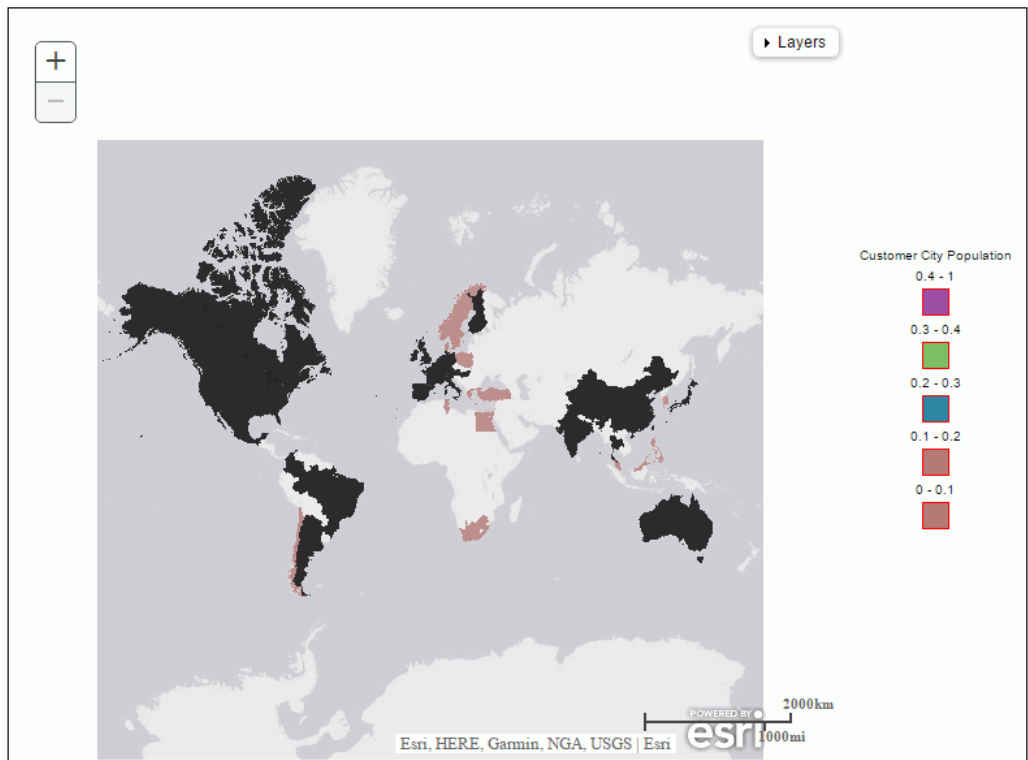
Styling Nested Label Connector Lines

When you assign multiple sort fields to the x-axis, by default, the x-axis is drawn using a nested layout, where the hierarchy of sort fields is presented on the x-axis. The hierarchical relationships between the sort fields is depicted with connector lines. You can control the color, width, and dash style of these connector lines using the xaxis:labels:nestingLineStyle properties.

Syntax: **How to Style Nested Label Connector Lines**

```
xaxis: {
    labels: {
        nestingLineStyle: {
            width: lwidth,
            color: 'lcolor',
            dash: 'ldstring'
        }
    }
}
```

where:

lwidth

Is the width of the line in pixels. The default value is 1.

'lcolor'

Is a color specification string that defines the color of the line. The default value is 'black'.

'ldstring'

Is a string that defines the dash style. The default value is '' (which generates a solid line). Use a string of numbers that defines the width of a dash in pixels followed by the width of the gap between dashes in pixels (for example, dash: '1 1' draws a dotted line).

Example: **Styling Nested Label Connector Lines**

The following request makes the nested label connector lines 2 pixels wide, blue, and dashed.

```
GRAPH FILE WF_RETAIL_LITE
SUM DAYSDELAYED
BY TIME_DATE_QTR
BY TIME_DATE_MONTH
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
TYPE=DATA, COLUMN=DAYSDELAYED, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR, BUCKET=x-axis, $
TYPE=DATA, COLUMN=TIME_DATE_MONTH, BUCKET=x-axis, $
*GRAPH_JS
xaxis: {labels: {
        nestingLineStyle: {
        width: 2,
        color: 'blue',
        dash: '3 3'
          }
        }
    }
*END
ENDSTYLE
END
```

The output is shown in the following image.

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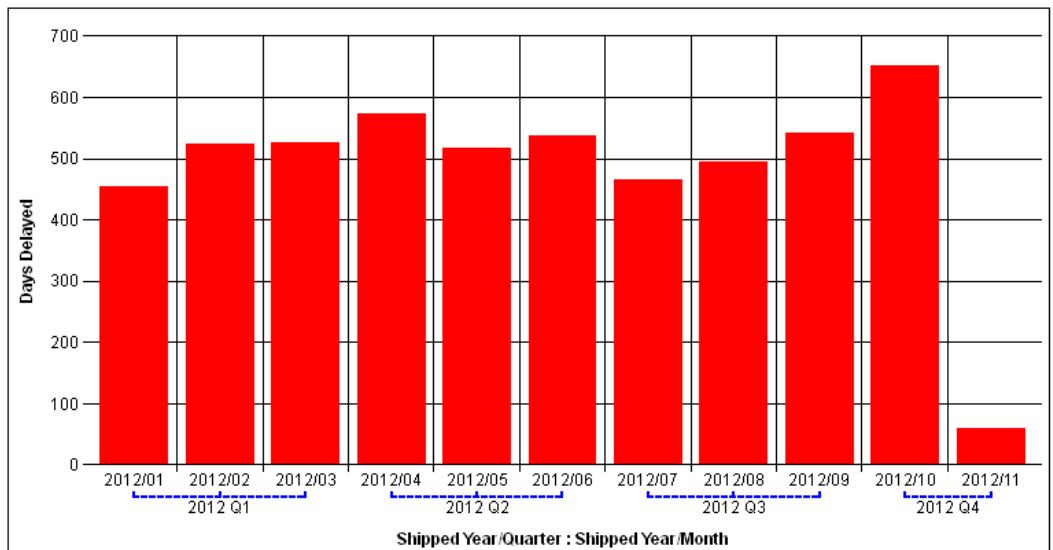
Support for Delimited Sequential Files With Esri HTML5 Charts

When you generate an Esri map chart in HTML5 format, your request needs to point to a location that describes the geography for the request location values. Starting in this release, you can point to a comma-separated value (.csv) file, or other delimited file, that contains the names of the regions you want to show on the map and their longitude and latitude values.

Syntax: ### How to Define Properties for a Delimited File

If you are using a delimited file for your geometry data, you can add a csvOptions object to the layer that will access the file for its geometry data. However, there are defaults for all of the options. Therefore, if your file conforms to the default options, you do not need to include the csvOptions object.

The default .file will not have a first row containing field names (titles). It will be comma-delimited with a \n line-end character at the end of each line. It will contain the following three values per line:

1. The name of the geometric location enclosed in single or double quotation marks. This field will be referred to as *region* in the map extensions properties.

2. The longitude that corresponds to the region, which is referred to as *lng* in the map extensions properties.

3. The latitude that corresponds to the region, which is referred to as *lat* in the map extensions properties.

If your file does not conform to these criteria, you can describe the structure of your file using the csvOptions object in your layer properties.

```
extensions: {
  "com.esri.map": {
    overlayLayers:
    [
     {
        csvOptions :
         {fieldNames: ['fld1', 'fld2', 'fld3'],
          fieldSep: 'fsep',
          lineSep: 'lsep',
          firstRowIsTitles: tboolean,
          removeSurroundingQuotes: qboolean}
      }
    ],
                    }
                  }
```

where:

```
['fld1', 'fld2','fld3']
```

Are the field names in your .csv file. The default values are ['region', 'lng', 'lat'].

'fsep'

Is the field separator character in your .csv file. The default value is a comma (','). It can be any printable character.

'lsep'

Is the line separator string in your .csv file. The default value is a line end character ('\n').

tboolean

Specifies whether the first row in your file contains titles. Valid values are:

❏ true, if your file has a first row containing titles. If it does, these names will take precedence over the field names listed in the fieldNames object. When you specify the value of geometryLocateField, use the title from the delimited file.

❏ false, if your file does not have a first row containing titles. This is the default value. If you specified a fieldNames object, use the value of the appropriate field name as the geometryLocateField value.

qboolean

Specifies whether to remove quotation marks surrounding values in your file. Valid values are:

❏ true, to remove quotation marks surrounding values. This is the default value.

❏ false, if your file does not have quotation marks surrounding values.

The following are the default values for the csvOptions object:

```
csvOptions:
    {
    fieldNames: ['region', 'lng', 'lat'],
    fieldSep: ',',
    lineSep: '\n',
    firstRowIsTitles: false,
    removeSurroundingQuotes: true
    }
```

The following layer properties must then be set to values that correspond to your csvOptions:

```
title: "layertitle",
layerType: "layertype",
geometrySourceType: "csv",
geometryLocateField: ["locationfld"],
url:"url_to_csv_file"
```

where:

"layertitle"

Is a title for the layer.

"*layertype*"

Is the type of layer. Valid values are:

❑ **choropleth.** Displays a WebFOCUS choropleth layer.

❑ **bubble.** Displays a WebFOCUS bubblemap layer.

"*locationfld*"

Is the field name for the geometry locator field. If your .csv file has titles, the value should come from the file. If not, it should be the appropriate field name from the fieldNames property of your csvOptions object. If neither of these is specified, use the default, which is 'region'.

"*url_to_csv_file*"

Is the url that points to your .csv file.

Example: **Using a .csv File to Generate a Bubblemap**

The country.csv file contains longitude and latitude values for each country.

Following are the first few lines of the country.csv file:

```
"Argentina",-64.00000000,-34.00000000
"Australia",133.00000000,-27.00000000
"Austria",13.33330000,47.33330000
"Belgium",4.00000000,50.83330000
"Brazil",-55.00000000,-10.00000000
"Canada",-95.00000000,60.00000000
"Chile",-71.00000000,-30.00000000
"China",105.00000000,35.00000000
"Colombia",-72.00000000,4.00000000
```

The following request generates a bubblemap chart that shows days delayed by country using the country.csv file as the geometry data file. This file conforms to the default structure, so no csvOptions object is included in the layer properties:

```
GRAPH FILE WF_RETAIL_LITE
SUM DAYSDELAYED
MIN.DAYSDELAYED
BY COUNTRY_NAME
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BUBBLEMAP
ON GRAPH SET STYLE *
TYPE=REPORT, CHART-LOOK=com.esri.map, $
TYPE=DATA, COLUMN=country_name, BUCKET=location, $
TYPE=DATA, COLUMN=daysdelayed, BUCKET=size, $
TYPE=DATA, COLUMN=min.daysdelayed, BUCKET=color, $
*GRAPH_JS
"extensions": {
  "com.esri.map": {
    "drawToc": "true",
    "baseLayer": {
      "title": "base title",
      "basemap": "streets"
                },
    "overlayLayers": [
      {
        "title": "csv default",
        "layerType": "bubble",
       "geometrySourceType": "csv",
       "geometryLocateField": ["region"],
        "url": "http://ecl.informationbuilders.com/jschart/country.csv"
      }
                        ],
                }
                    }
*END
ENDSTYLE
END
```

The output is shown in the following image:
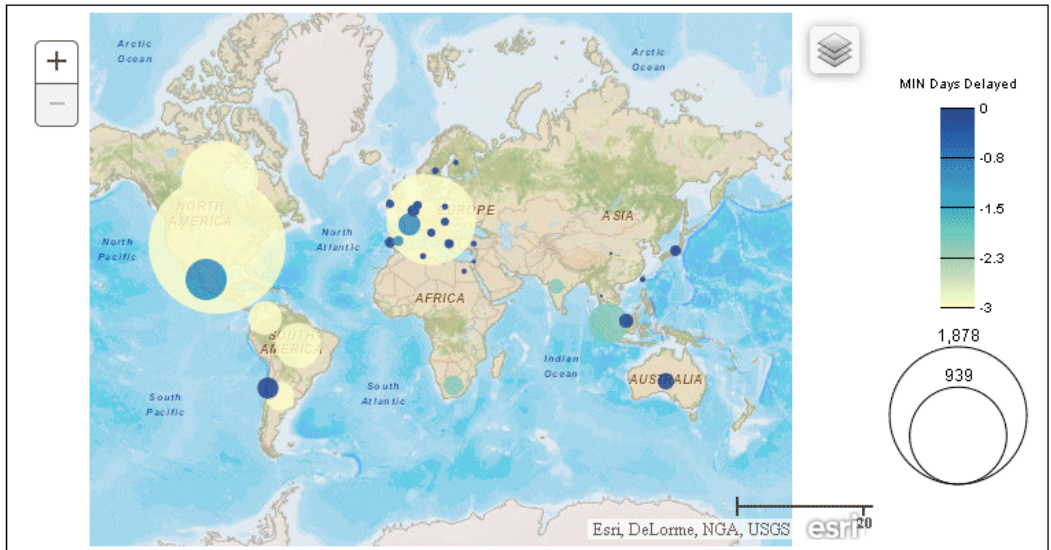
The following file (named countryp.txt) has a row with titles as the first row, the separator is a pipe character (|), and the values are enclosed in double quotation marks. The first several lines in the file are shown below:

```
"Country"|"lng"|"lat"
"Argentina"|"-64.0000000"|"-34.0000000"
"Australia"|"133.0000000"|"-27.0000000"
"Austria"|"13.3333000"|"47.3333000"
"Belgium"|"4.0000000"|"50.8333000"
"Brazil"|"-55.0000000"|"-10.0000000"
"Canada"|"-95.0000000"|"60.0000000"
```

The following version of the request uses this file. It has a csvOptions object to describe the non-default options. Since the file has titles, no fieldNames object is included. The title row in the file specifies "Country" as the geometry locator field:

```
GRAPH FILE WF_RETAIL_LITE
SUM DAYSDELAYED
MIN.DAYSDELAYED
BY COUNTRY_NAME
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BUBBLEMAP
ON GRAPH SET STYLE *
TYPE=REPORT, CHART-LOOK=com.esri.map, $
TYPE=DATA, COLUMN=country_name, BUCKET=location, $
TYPE=DATA, COLUMN=daysdelayed, BUCKET=size, $
TYPE=DATA, COLUMN=min.daysdelayed, BUCKET=color, $
*GRAPH_JS
"extensions": {
  "com.esri.map": {
    "drawToc": "true",
    "baseLayer": {
      "title": "base title",
      "basemap": "streets"
                    },
    "overlayLayers": [
      {
        "title": "csv options",

        csvOptions:
         {
            fieldSep: '|',
            firstRowIsTitles: true,
            removeSurroundingQuotes: true
         } ,
        "layerType": "bubble",
        "geometrySourceType": "csv",
        "geometryLocateField": ["Country"],
         "url": "http://ecl.informationbuilders.com/jschart/countryp.txt"
      }
                            ],
                         }
                      }
*END
ENDSTYLE
END
```

The output is shown in the following image:
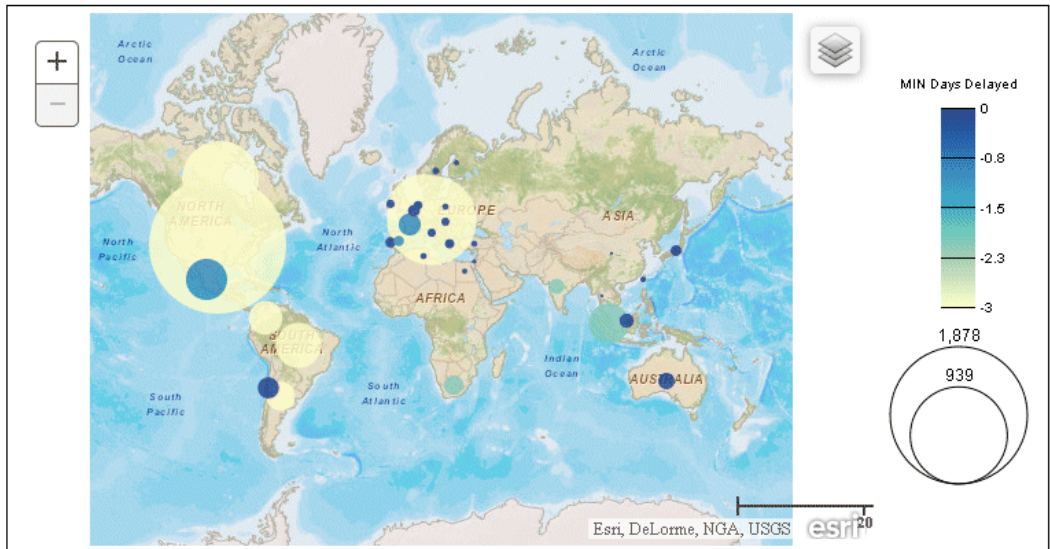
Support for Geojson Files With Esri HTML5 Charts

When you generate an ESRI map chart in HTML5 format, your request needs to point to a location that describes the geography for the request location dimension. You can point to a geojson file that contains the names of the locations you want to show on the map and their longitude and latitude values.

Syntax: How to Define Properties for a Geojson File

Add the following properties to the overlay layer that will use the geojson file.

```
overlayLayers: [
 {
 title: "layertitle",
 layerType: "choropleth",
 geometrySourceType: "geojson",
 geometryLocateField: ["fieldname"],
 geometryDataField: "name",
 url: "http://url_to_geojson_file"
 }
 ],
```

where:

layertitle

Is a title to display in the layer table of contents.

fieldname

Is the name of the location field in the geojson file.

url_to_geojson_file

Is the url that points to the location of the geojson file.

Example: **Using a Geojson File With an HTML5 Map Chart**

The sample_wfretail_regions.geojson file contains latitude and longitude values for the borders of United States regions. The following shows a partial listing of the beginning of the file.

```
{
"type": "FeatureCollection",
"features":[
{ "type": "Feature","properties": { "region": "Central" },
"geometry": { "type": "Polygon","coordinates":
[[[-84.7570,45.7847],[-84.7288,45.7880],[-84.7212,45.7666],
[-84.5570,45.7084],[-84.4780,45.6566],[-84.4295,45.6448],
[-84.4150,45.6530],[-84.4285,45.6697],[-84.3768,45.6558],
[-84.3293,45.6643],[-84.2165,45.6349],[-84.1326,45.5666],
[-84.1123,45.5077],[-84.0749,45.4888],[-83.9362,45.4925],
[-83.8103,45.4204],[-83.7414,45.4037],[-83.7157,45.4144],
[-83.5988,45.3523],[-83.5374,45.3578],[-83.4953,45.3396],
[-83.4912,45.3590],[-83.4780,45.3453],[-83.4860,45.3308],
[-83.4636,45.3307],[-83.3830,45.2718],[-83.3913,45.2527],
[-83.4164,45.2566],[-83.4125,45.2402],[-83.3624,45.1652],
[-83.3165,45.1418],[-83.3199,45.1178],[-83.3008,45.0922],
[-83.3263,45.0850],[-83.3130,45.0849],[-83.3140,45.0546],
[-83.2616,45.0253],[-83.3390,45.0412],[-83.3779,45.0776],
[-83.4364,45.0558],[-83.4564,45.0230],[-83.4332,45.0045],
[-83.4647,45.0028],[-83.4280,44.9282],[-83.3153,44.8802],
[-83.3218,44.8553],[-83.2938,44.8083],[-83.2959,44.7413],
[-83.2717,44.7132],[-83.3145,44.6087],[-83.3072,44.5435],[-83.3334,44.3372],
[-83.3749,44.3267],[-83.4498,44.2507],
[-83.4431,44.2715],[-83.4788,44.2800],[-83.5357,44.2507],
[-83.5659,44.1634],
...
}
```

The name of the field that contains the region names is *region*. The following request assigns states to the region names defined in the geojson file and uses this file as the geometry file for the map layer.

```
DEFINE FILE WF_RETAIL_LITE
STATE/A20=WF_RETAIL_LITE.WF_RETAIL_GEOGRAPHY_CUSTOMER.STATE_PROV_NAME;
REGION/A20 WITH WF_RETAIL_LITE.WF_RETAIL_GEOGRAPHY_CUSTOMER.STATE_PROV_NAME=
IF STATE EQ 'Illinois' OR 'Indiana' OR 'Iowa' OR 'Kentucky' OR 'Michigan'
OR 'Minnesota' OR 'Missouri'
   OR 'Ohio' OR 'Wisconsin' OR 'Kansas' OR 'Nebraska' THEN 'Central'
ELSE IF STATE EQ 'Alabama' OR 'Florida' OR  'Georgia' OR 'Louisiana' OR
'Mississippi'
 OR 'North Carolina' OR 'South Carolina' OR 'Virginia' THEN 'SouthEast'
ELSE IF STATE EQ 'Arkansas' OR 'Tennessee' OR 'West Virginia' OR 'Texas' OR
'Oklahoma'
   OR 'New Mexico' OR 'Hawaii' THEN 'SouthWest'
ELSE IF STATE EQ 'Connecticut' OR 'Maine' OR 'Massachusetts' OR 'New
Hampshire' OR 'Rhode Island' OR 'Vermont' THEN 'NorthEast'
ELSE IF STATE EQ 'New Jersey' OR 'New York' OR 'Pennsylvania' OR 'Delaware'
OR 'Maryland' THEN 'MidEast'
ELSE IF STATE EQ 'Colorado' OR 'Idaho' OR 'Montana' OR 'North Dakota' OR
'South Dakota'
   OR 'Wyoming' OR 'Alaska' THEN 'NorthWest'
ELSE IF STATE EQ 'Arizona' OR 'California' OR 'Nevada' OR 'Oregon' OR
'Utah' OR 'Washington' THEN 'West'
ELSE 'Unknown';
END
```

```
GRAPH FILE WF_RETAIL_LITE
SUM CITY_POPULATION
BY REGION
WHERE COUNTRY_NAME EQ 'United States'
WHERE REGION NE 'Unknown'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH CHOROPLETH
ON GRAPH SET AUTOFIT ON
ON GRAPH SET STYLE *
TYPE=REPORT, CHART-LOOK=com.esri.map, $
TYPE=DATA, COLUMN=region, BUCKET=location, $
TYPE=DATA, COLUMN=city_population, BUCKET=color, $
*GRAPH_JS
extensions: {
 "com.esri.map": {
 overlayLayers: [
 {
 title: "Geojson",
 layerType: "choropleth",
 geometrySourceType: "geojson",
 geometryLocateField: ["region"],
 geometryDataField: "name",
 url: "http://ecl.informationbuilders.com/jschart/
sample_wfretail_regions.geojson"
 },
 ],
 baseLayer: {
 basemap: "streets",
center: [-98, 40],
zoom: 4                   }
 }
}
*END
ENDSTYLE
END
```

The output is shown in the following image.
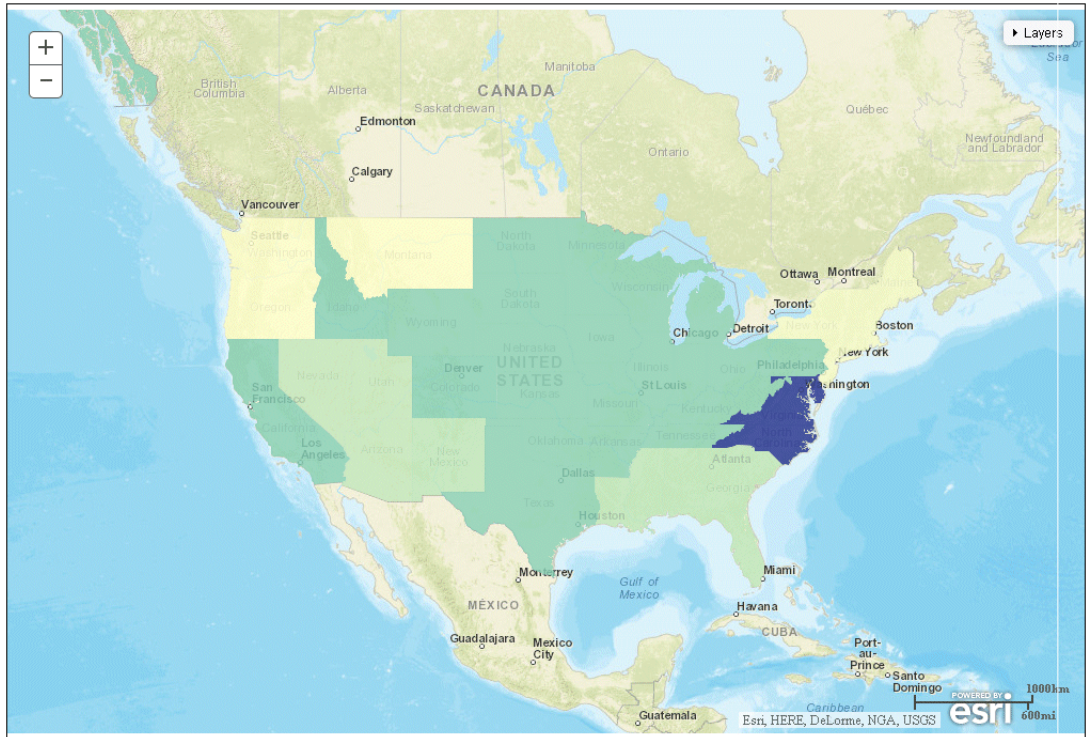
Using JSON to Register Chart Events

On an HTML5 chart, a DOM (Document Object Model) event, such as clicking an object on the chart, can be detected and used to trigger a response, such as invoking a callback function or going to a URL.

Syntax: **How to Register Chart Events Using JSON**

You can describe an array of events to the event dispatcher. Each event will trigger a corresponding response when the event occurs on the DOM nodes that match the properties listed in the event description.

```
eventDispatcher: {
 events = [
  {response1, event: 'evnt1', object: 'obj1',
   userInfo: {custom: 'userobj1'}, series: s1, group: g1,
   row: r1, col: c1,
   misc: 'miscobj1', userInfo: {custom: 'userobj1'},
   context:  contxt1, target:  'target1' },
   .
   .
   .

 ]
}
```

where:

response1,...

Required

Is the response to the event that matches the remaining parameters described by this entry in the array of events. Valid responses can be:

❏ Invoking a callback function.

```
callback: function(parm){function_code;}
```

where:

parm

Are the function parameters.

function_code

Is the code invoked by the function.

❏ Going to a url.

```
url: "link_to_url"
```

where:

link_to_url

Is the url to which you want to send the user.

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'evnt1', ...
> Required

> Is a DOM event string such as 'mouseover', 'click', or 'keyup', that triggers the response for this event in the array of events.

obj1
> Required

> Is a string matching the object ID of the chart object (such as 'riser') on which to register the event.

s1, ...
> Optional

> Is the series ID number of the riser series to match. If undefined, match all series.

g1, ...
> Optional

> Is the group ID number of the riser groups to match. If undefined, match all groups.

r1, ...
> Optional

> Is the matrix row ID to match. If undefined, match all rows.

c1, ...
> Optional

> Is the matrix column ID to match. If undefined, match all columns.

'miscobj1', ...
> Optional

> Is a miscellaneous object ID to match, for example, 'marker'. If undefined, match all misc IDs.

'userobj1', ...
> Optional

> Is an extra, custom user-defined object to be passed back into the event callback.

contxt1, ...
> Optional

> Defines 'this' in the event callback. If undefined, 'this' refers to the calling chart instance.

'target1', ...
    Optional

Is the target associated with a 'url' property, used when triggering a URL click event. The default is '_blank', which instructs the browser to create a new browser tab or window when the user clicks the link.

Example: **Registering Chart Events**

The following request registers two events. The first event logs the event parameters to the browser Web Console when the user clicks the riser for series 1 in group 1. The second event goes to the Information Builders web site when the user clicks a riser for series 2.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
BY BUSINESS_REGION
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis,$
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=color,$
TYPE=DATA, COLUMN=cogs_us, BUCKET=y-axis,$
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
*GRAPH_JS
eventDispatcher: {
    events: [
    {callback: function(a){console.log(a);}, event: 'click',
        object: 'riser', userInfo: {custom: 'Custom1'},
        series: 1, group:1},
    {url: "http://www.informationbuilders.com", target: '_blank',
        event: 'click', object: 'riser', series: 2},
        ]
}
*END
ENDSTYLE
END
```


The following image shows the chart output with the riser for series 1 and group 1 clicked.
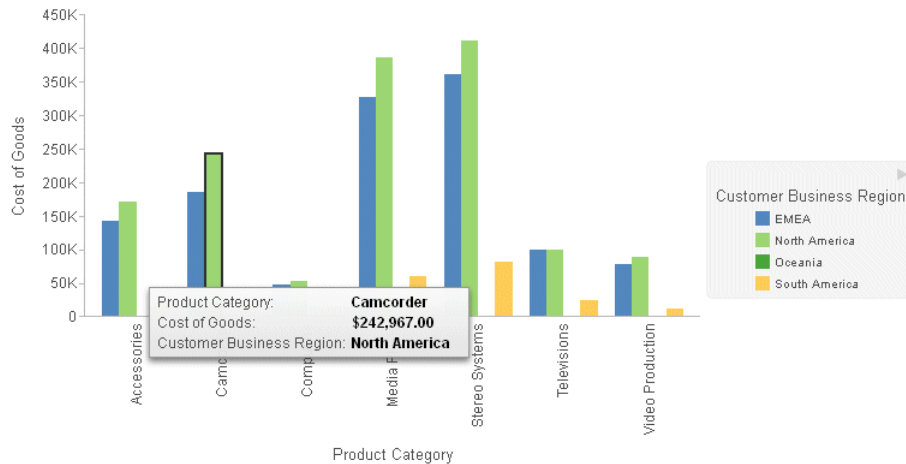
The following shows the parameters logged to the browser Web Console in response to the click event.

Controlling Nesting of X-Axis Labels

The xaxis:nestingConcatSymbol property controls the nesting of x-axis labels.

If this property is not set, or is set to null (the default value) or undefined, nested x-axis labels are generated. If this property is set to a string (for example, ':'), the x-axis labels are concatenated, with the specified string placed between the sort field values.

Example: **Controlling Nesting of X-Axis Labels**

The following request generates nested x-axis labels.

```
GRAPH FILE WF_RETAIL_LITE
SUM DAYSDELAYED
BY TIME_DATE_QTR
BY TIME_DATE_MONTH
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
TYPE=DATA, COLUMN=DAYSDELAYED, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR, BUCKET=x-axis, $
TYPE=DATA, COLUMN=TIME_DATE_MONTH, BUCKET=x-axis, $
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
*GRAPH_JS
xaxis: { labels: { nestingConcatSymbol: null} }
*END
ENDSTYLE
END
```

The output is shown in the following image.
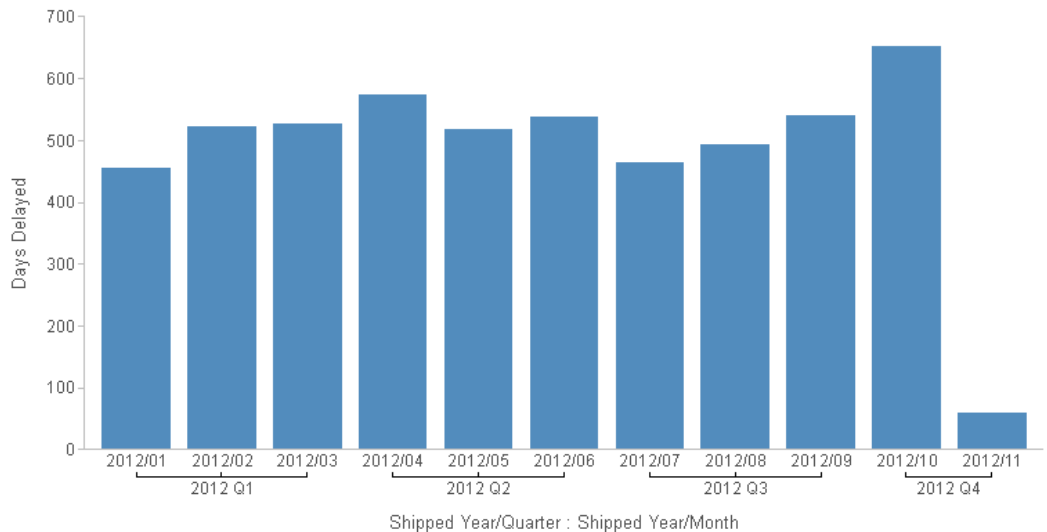
The following version of the request makes the concatenation string a slash surrounded by spaces (' / ').

```
GRAPH FILE WF_RETAIL_LITE
SUM DAYSDELAYED
BY TIME_DATE_QTR
BY TIME_DATE_MONTH
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
TYPE=DATA, COLUMN=DAYSDELAYED, BUCKET=y-axis, $
TYPE=DATA, COLUMN=TIME_DATE_QTR, BUCKET=x-axis, $
TYPE=DATA, COLUMN=TIME_DATE_MONTH, BUCKET=x-axis, $
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
*GRAPH_JS
xaxis: { labels: { nestingConcatSymbol: ' / '} }
*END
ENDSTYLE
END
```

The output is shown in the following image.
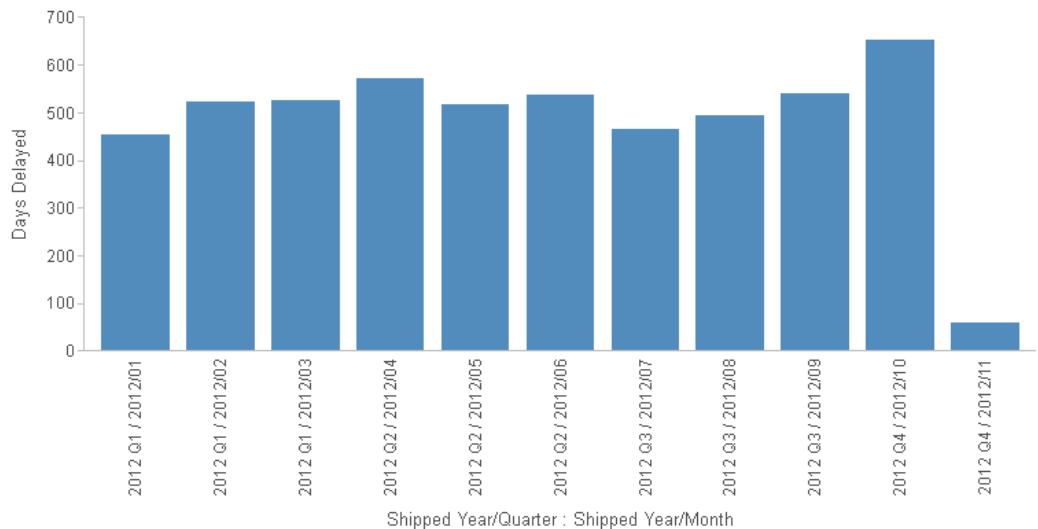
Formatting a Scrolling X-Axis as a Minichart

The xaxis:labelLayout:scroll property enables or disables x-axis scrolling. Even if scrolling is enabled, it will only be implemented when needed. You have a choice between two forms of scroll bar:

❏ A standard scroll bar.

❏ A minichart, in which the scroll bar background is a compressed version of the main chart. As you scroll the bar to focus on a portion of the minichart, that portion of the main chart scrolls into the chart frame, if necessary. This type of chart is called a *focus-context chart*.

Syntax: **How to Generate a Scrolling X-Axis**

```
xaxis: {
    scroll: {
        style: 'sbarstyle',
            groups: {
                minSize: msize,
                maxCount: mcount
                    },
        miniChartProperties: {
            height: height
            dataSelection: {
                selectionRect: {fill: 'rgba(r, g, b, a)' }
                        }
                    }
        }
    }
```

where:

`'sbarstyle'`
Specifies the type of scroll bar. Valid values are:

❏ 'simple', which generates a standard scrollbar. This is the default value.

❏ 'miniChart, which generates a scrollbar whose background is a compressed version of the main chart.

`msize`

Defines a minimum number of pixels for each group. The default value is 'auto', which leaves the decision to the chart engine.

Note: Use either maxCount or minSize. If both minSize and maxCount are undefined, all groups are fit into the frame and scrollbars are disabled.

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mcount

Specifies the maximum number of groups to show at once, unless fewer are available. The default value is *undefined*.

Note: Use either maxCount or minSize. If both minSize and maxCount are undefined, all groups are fit into the frame and scrollbars are disabled.

height

Is the height of the minichart in pixels, or a percent string that represents a percentage of the height of the main chart. The selection rectangle on the scrollable minichart is always the same height as the minichart itself. By default, the minichart height is 20% of the height of the main chart.

`'rgba(r, g, b, a)'`

Is a color definition and transparency for the selection rectangle. If you use a color definition without a transparency value, the selection rectangle will be fully opaque and block the view of the minichart group on which it is positioned.

Example: ### Generating a Minichart Scrollbar on the X-Axis

The following request generates a minichart scrollbar on the x-axis. The selection rectangle is orchid and 45% opaque:

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US MSRP_US REVENUE_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=ENID_Default.sty,$
*GRAPH_JS
xaxis: {
      scroll: {
        style: 'miniChart',
        groups: {
            maxCount: 3
                },
        miniChartProperties: {
          height:70,
          dataSelection:{
              selectionRect: {
                  fill: 'rgba(218, 112, 214, 0.45)'
                          }
                      }
                  }
              }
          }
*END
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=MSRP_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=REVENUE_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
ENDSTYLE
END
```

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The output is shown on the following image, with the selection rectangle (which spans a maximum of three groups) scrolled to the second block of groups:
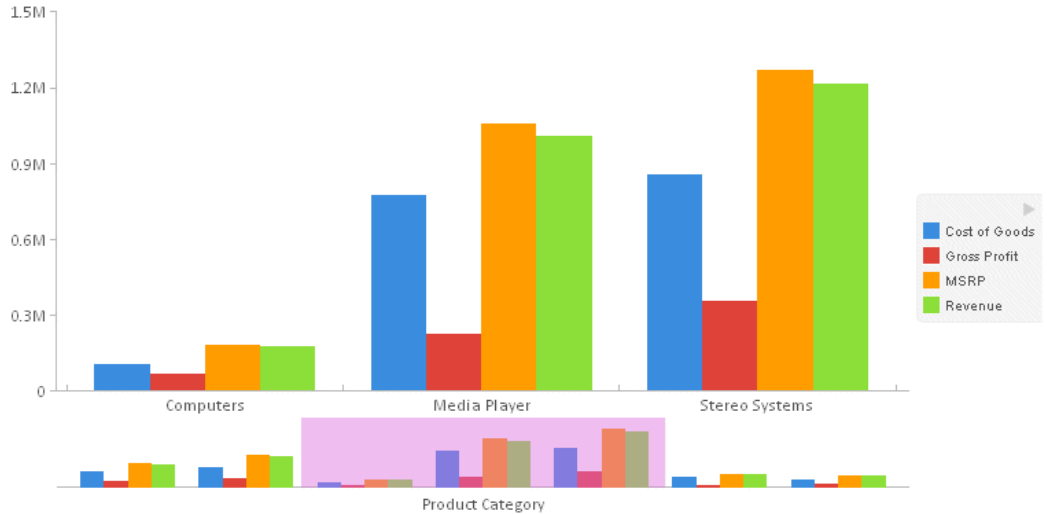
Generating a Scrolling Legend

If there are too many series to fit in the chart frame, you can enable a scrolling legend and format the properties of the scroll bar and scroll handle. The scrollbar will not appear unless it is necessary in order to display the entire legend.

Syntax: **How to Generate a Scrolling Legend**

```
legend:
  {
  scroll: {
     enabled: boolean,
     size: snumber,
     color: 'scrollcolor',
     handle: {
        color: 'handlecolor',
        hoverColor: 'hovercolor',
        border: {
           width: bnumber,
           color: 'bcolor',
           dash: 'bdash'
              }
           }
        }
     }
```

where:

boolean

Controls whether the legend will be scrollable when necessary. Valid values are:

❏ true, which enables legend scrolling.

❏ <u>false</u>, which disables legend scrolling. This is the default value.

snumber

Defines the width of the scroll bar in pixels. The default value is 15.

'scrollcolor'

Is a color or gradient definition string the defines the fill color of the scroll bar. The default color is 'rgb(240, 240, 240)'.

'handlecolor'

Is a color definition string that defines the color of the scroll bar handle. The default color is 'grey'.

'hovercolor'

Is a color definition string that defines the color of the scroll bar handle when the mouse hovers over it or clicks on it. The default color is 'rgb(88, 88, 88)'.

bnumber

Defines the width of the handle border in pixels. The default value is 0.

'bcolor'

Is a color definition string that defines the color of the handle border. The default value is 'transparent'.

'bdash'

Is a string that defines the dash style of the border. The default value is '' (a solid line). Use a string of numbers that defines the width of a dash in pixels followed by the width of the gap between dashes in pixels (for example, dash: '1 1' draws a dotted line).

Multiple dashes can be defined within the dash string (for example, '2 4 4 2'), in which case, the dash types will alternate along the border.

Example: Generating a Scrolling Legend

The following request generates a scrolling legend. The scroll bar fill color is a linear gradient that transitions from teal to cyan, the handle color is silver with a black border, and the fill color becomes orchid when the mouse hovers over or clicks it.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US MSRP_US REVENUE_US DISCOUNT_US
COGS_LOCAL GROSS_PROFIT_LOCAL MSRP_LOCAL REVENUE_LOCAL DISCOUNT_LOCAL
BY PRODUCT_CATEGORY
ON GRAPH SET VAXIS 150
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENID_Default.sty,$
*GRAPH_JS
xaxis: {labels:{rotation:0}},
legend: {
   scroll: {
       enabled: true,
       size: 15,
       color:'linear-gradient(0,0,100%,100%, 20% teal, 95% cyan)',
       handle: {
         color: 'silver',
         hoverColor: 'orchid',
         border: {
           width: 3,
           color: 'black',
           dash: ''
                 }
             }
         },
       },
*END
TYPE=DATA, COLUMN=N2, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N3, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N4, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N5, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N6, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N7, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N8, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N9, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N10, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N11, BUCKET=y-axis, $
TYPE=DATA, COLUMN=N1, BUCKET=x-axis, $
ENDSTYLE
END
```

The following image shows the scroll bar before it is clicked:
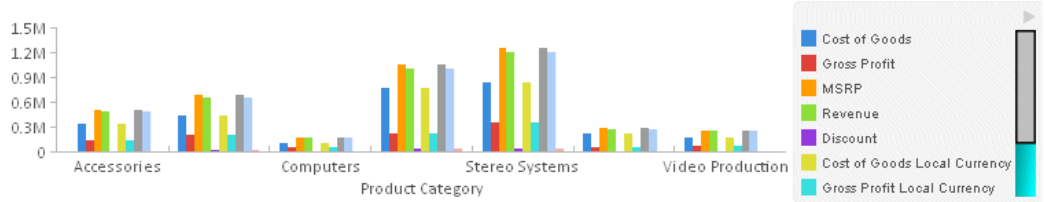
The following image shows the scroll bar handle dragged to the bottom of the legend area:
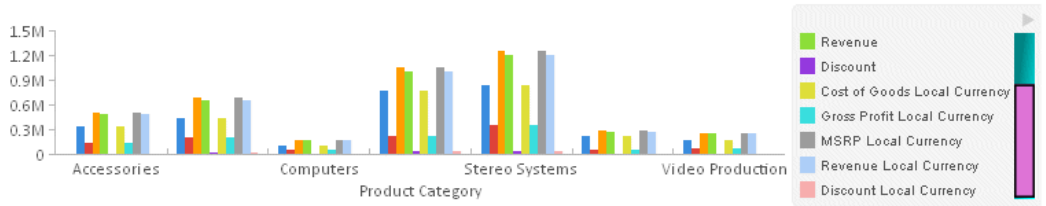
Generating a Docked Legend

A docked legend is a minimized (collapsed) legend that shows only an active expand button and can also show pictograms of the legend.

Syntax: **How to Generate a Docked Legend**

```
legend:
     {
        dock:{
          enabled: enboolean,
          animate: anboolean,
          minimized: minboolean,
          resizeFrame: reboolean,
          showMarkers: shboolean,
          expandDirection: 'direction',
          button: {
            size: bsize,
            color: 'buttoncolor',
            hoverColor: 'hovcolor',
            border: {
                  width: borwidth,
                  color: 'bordercolor',
                  dash: 'dstyle'
                  }
            }
          }
     }
```

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where:

enboolean

Controls whether a docked legend will be generated. Valid values are:

❑ true, which enables a docked legend.

❑ <u>false</u>, which disables a docked legend. This is the default value.

anboolean

Controls whether the expansion and contraction of the legend is animated using a slide action. Valid values are:

❑ <u>true</u>, which animates the expansion and contraction of the legend. This is the default value.

❑ false, which disables animation.

minboolean

Controls whether a docked legend is initially collapsed or expanded. Valid values are:

❑ true, which initially displays a collapsed docked legend.

❑ <u>false</u>, which initially displays an expanded docked legend. This is the default value.

reboolean

Controls whether the frame shrinks and expands as the legend is collapsed and expanded. Valid values are:

❑ <u>true</u>, which resizes the frame as the legend collapses or expands. This is the default value

❑ false, which does not resize the frame as the legend collapses or expands.

shboolean

Controls whether a collapsed docked legend displays the legend markers. Valid values are:

❑ <u>true</u>, which displays legend markers on a collapsed legend. This is the default value.

❑ false, which disables does not display markers on a collapsed legend.

'direction'

Specifies the direction of expansion ('left', 'right', 'top', 'bottom' for a legend whose position is *free*. For legends whose positions are not free, the value is *undefined*, and the chart engine determines the direction of expansion.

bsize

Defines the size of the button (defined as two times the distance from the center of the object to the furthest corner of the shape) in pixels, or can be 'auto' to draw the button the same size as the legend markers. The default value is 'auto'.

'buttoncolor'

Is a color specification string that defines the button color. The default value is 'grey'.

'hovcolor'

Is a color specification string that defines the button color when the mouse hovers over it or clicks it. The default value is 'black'.

borwidth

Defines the width of the button border in pixels. The default value is zero (0).

'bordercolor'

Is a color specification string that defines the color of the button border. The default value is 'transparent'.

'dstyle'

Is a string that defines the dash style of the border. The default value is '' (a solid line). Use a string of numbers that defines the width of a dash in pixels followed by the width of the gap between dashes in pixels (for example, dash: '1 1' draws a dotted line).

Multiple dashes can be defined within the dash string (for example, '2 4 4 2'), in which case, the dash types will alternate along the border.

Example: **Generating a Docked Legend**

The following request generates a legend that is initially collapsed but shows the legend markers. The expand button has a diameter of 25 pixels, is lime green with a blue border, and turns yellow when the mouse hovers over or clicks it:

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
GROSS_PROFIT_US
MSRP_US
REVENUE_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
*GRAPH_JS
xaxis: {majorGrid: {visible:false}},
yaxis: {majorGrid: {visible:false}},
legend: {
        dock:{
          enabled: true,
          animate: true,
          minimized: true,
          resizeFrame: true,
          showMarkers: true,
          expandDirection: undefined,
          button: {
              size: 25,
              color: 'limegreen',
              hoverColor: 'yellow',
              border: {
                  width: 1,
                  color: 'blue',
                  dash: ''
                  }
              }
          }
        }
*END
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=MSRP_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=REVENUE_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
ENDSTYLE
END
```

The following image shows the initial view, with the legend collapsed:
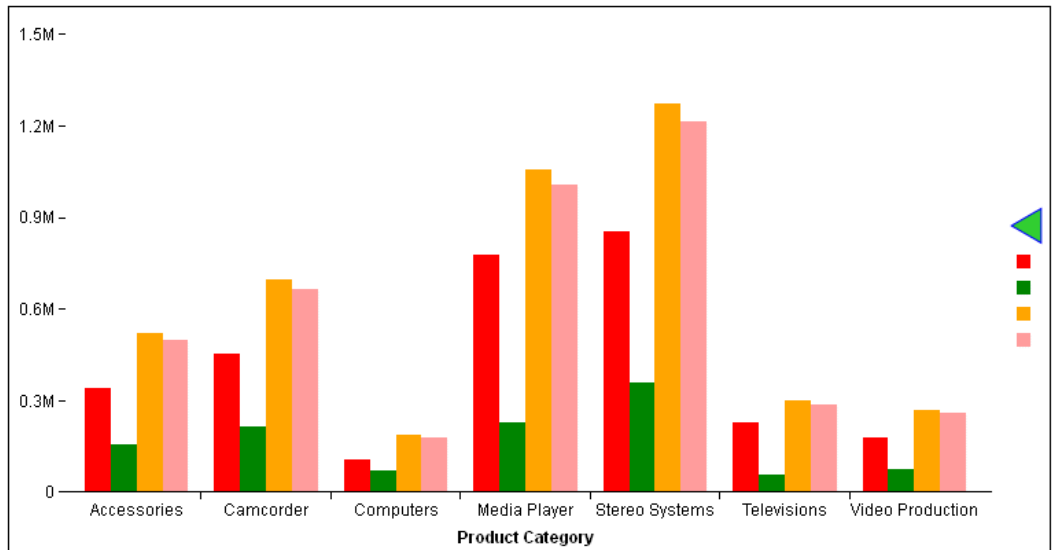
The following image shows the legend expanded, with the mouse hovering over the button (the hover color is displaying). The chart frame has resized:
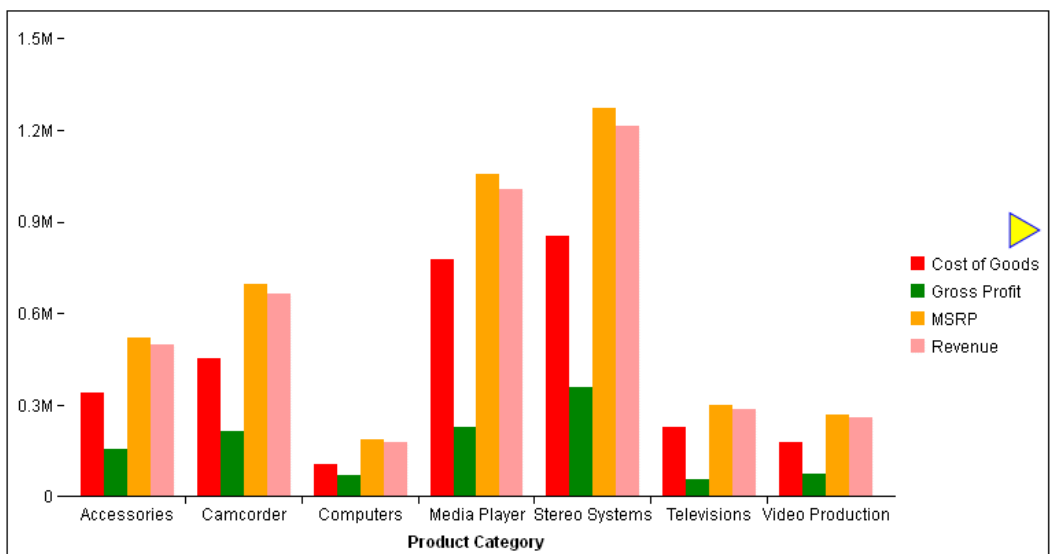
Chart Attribute Syntax

Chart attribute syntax uses WebFOCUS StyleSheet attributes to assign roles to dimensions and measures in an HTML5 request. Using this syntax, you can generate chart types that are not available without it, and display multiple charts in a matrix array. This syntax also uses a simplified list of chart types and provides the ability to add sliders, pages, and additional detail to charts.

TYPE=DATA declarations in a WebFOCUS StyleSheet assign the fields in a request to attribute categories. Some examples of attribute categories are *x-axis*, *y-axis*, *size*, and *color*. For example, to assign the PRODUCT_CATEGORY field to the x-axis category, the syntax is:

```
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
```

The attribute categories available for a request vary depending on the chart type.

For complete information about chart attribute syntax, see the *Creating HTML5 Charts With WebFOCUS Language* manual.

Example: Creating a Bar Chart Using Chart Attribute Syntax

The following request generates a bar chart. The sort field (PRODUCT_CATEGORY) is assigned to the x-axis, and both measures (COGS_US and GROSS_PROFIT_US) are assigned to the y-axis. The chart type is BAR.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
ENDSTYLE
END
```

The output is shown in the following image:
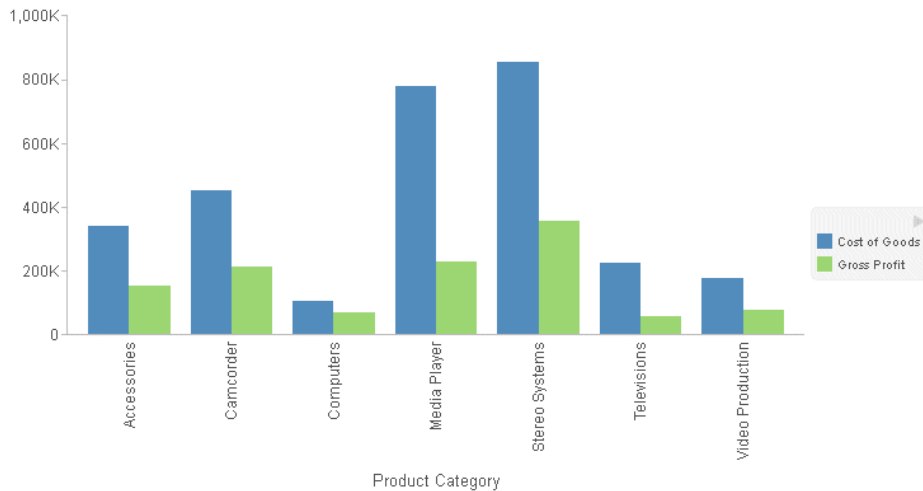
New Chart Types Available With Chart Attribute Syntax

Chart attribute syntax introduces the following new chart types:

❏ **Matrix Charts.** In addition to assigning fields in the request to specific chart components, you can create multiple charts by assigning fields to the *row* and *column* categories in order to generate a matrix of charts.

The following request generates a matrix of bar charts.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY TIME_DAYNAME
BY BUSINESS_REGION
BY PRODUCT_CATEGORY
WHERE TIME_DAYNAME EQ 'FRI' OR 'MON'
WHERE BUSINESS_REGION NE 'Oceania'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=DATA, COLUMN=TIME_DAYNAME, BUCKET=row, $
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=column, $
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
ENDSTYLE
END
```

The output is shown in the following image.
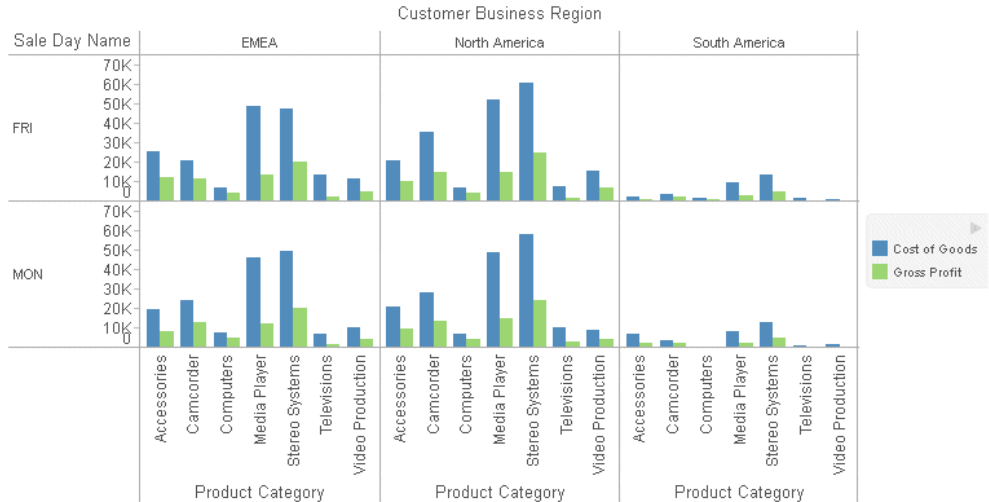
❏ **Matrix Marker Charts.** A matrix marker chart is a graphical representation of tabular data. It displays a marker in each cell of a matrix. This marker can be sized by one measure and colored by a second measure.

The following request generates a matrix marker chart.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
GROSS_PROFIT_US
BY PRODUCT_CATEGORY
BY BUSINESS_REGION
WHERE BUSINESS_REGION NE 'Oceania'
WHERE PRODUCT_CATEGORY LE 'D'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH MARKER
ON GRAPH SET STYLE *
TYPE=DATA, COLUMN=COGS_US, BUCKET=color, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=row, $
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=column, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=size, $
ENDSTYLE
END
```

The output is shown in the following image.
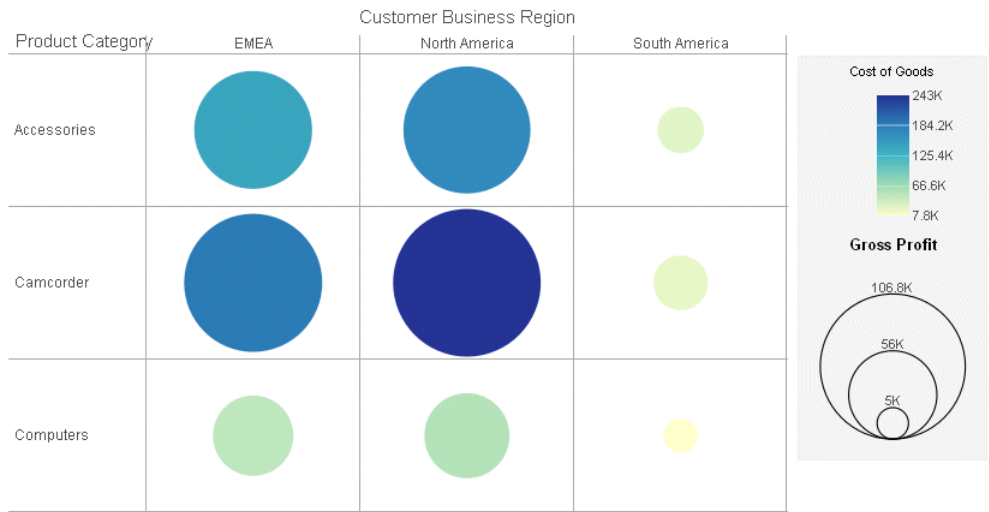
❏ **Data Grids.** A data grid is a tabular representation of data. The grid can have multiple rows, columns, and measures. Column totals can be generated using several types of aggregation calculations, such as a sum (the default) or an average. Unlike the tabular reports generated with the WebFOCUS TABLE FILE command, data grids are generated in a GRAPH FILE request using PCHOLD FORMAT JSCHART.

The following request generates a data grid with default column totals (sums).

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
BY PRODUCT_SUBCATEG
BY TIME_QTR
BY BUSINESS_REGION
WHERE (BUSINESS_REGION NE 'Oceania' OR 'EMEA') AND (TIME_QTR EQ 1 OR 2)
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH DATAGRID
ON GRAPH SET AUTOFIT ON
ON GRAPH SET STYLE *
type=data, column=product_category, bucket=row, $
type=data, column=product_subcateg,  bucket=row, $
type=data, column=time_qtr,      bucket=column, $
type=data, column=business_region,   bucket=column, $
type=data, column=cogs_us,     bucket=measure, $
type=data, column=gross_profit_us, bucket=measure, $
*GRAPH_JS
dataGridProperties: {
columnTotals:{visible:true}
}
*END
ENDSTYLE
END
```

The output is shown in the following image.

	Sale Quarter	1				2			
	Customer Business Region	North America		South America		North America		South America	
Product Category	Product Subcategory	Cost of Goods	Gross Profit	Cost of Goods	Gross Profit	Cost of Goods	Gross Profit	Cost of Goods	Gross Prof
Accessories	Charger	$1,445.00	$1,441.10	$170.00	$157.98	$945.00	$901.25	$232.00	$242.9
	Headphones	$23,243.00	$11,691.55	$2,659.00	$1,551.87	$23,680.00	$12,076.97	$5,266.00	$1,987.5
	Universal Remote Controls	$20,671.00	$7,428.05	$5,034.00	$1,577.96	$19,995.00	$8,044.73	$2,559.00	$695.8
Camcorder	Handheld	$12,172.00	$12,772.12	$3,170.00	$3,172.94	$12,692.00	$13,031.36	$1,644.00	$1,411.6
	Professional	$23,570.00	$7,811.15			$31,030.00	$1,850.75		
	Standard	$31,199.00	$13,095.73	$7,277.00	$3,065.45	$36,694.00	$13,544.14	$3,113.00	$1,187.1
Computers	Smartphone	$15,052.00	$8,932.73	$3,720.00	$2,514.65	$15,568.00	$10,256.59	$1,321.00	$679.8
Media Player	Blu Ray	$113,791.00	$34,313.74	$25,734.00	$7,551.09	$107,000.00	$29,846.63	$16,449.00	$4,340.9
	DVD Players	$7,743.00	$4,663.02	$2,184.00	$1,012.87				
	Streaming	$1,748.00	$1,187.62	$184.00	$135.96	$1,380.00	$983.70	$46.00	$33.9
Stereo Systems	Home Theater Systems	$36,291.00	$17,731.46	$7,527.00	$3,509.50	$37,369.00	$18,277.90	$4,609.00	$2,183.6
	Receivers	$20,082.00	$8,774.40	$3,992.00	$1,425.23	$23,382.00	$8,922.36	$6,542.00	$2,709.4
	Speaker Kits	$54,032.00	$17,453.00	$12,007.00	$4,001.42	$45,503.00	$14,251.98	$11,014.00	$3,570.9
	iPod Docking Station	$17,786.00	$10,859.56	$2,888.00	$1,373.32	$17,902.00	$9,982.36	$2,907.00	$1,770.5
Televisions	Flat Panel TV	$29,889.00	$8,931.25	$3,829.00	$883.92	$33,167.00	$9,311.83	$15,847.00	$4,310.9
Video Production	Video Editing	$27,278.00	$12,561.31	$3,026.00	$1,550.34	$29,025.00	$11,446.98	$4,592.00	$1,760.2
TOTAL		$435,992.00	$179,647.79	$83,401.00	$33,484.50	$435,332.00	$162,729.53	$76,141.00	$26,885.8

Adding Additional Information to a Chart

Chart attribute syntax lets you add additional fields to a request and, depending on the chart type, assign them to the color, size, slider, and detail attribute categories.

❑ **Color-by and size-by fields.** For some types of charts, chart attribute syntax enables you to add additional information to a chart by adding additional fields whose values are used to color and size risers or markers. For example, line charts can have *size* and *color* categories when using chart attribute syntax. If the markers are visible, their size is varied to represent the *size* measure value. If the markers are not visible, the line width is varied to represent the *size* measure value. The color-by field can be a measure or dimension field. The color is reflected in the markers, lines, and legend. If a color-by field is a measure, the colors are visualized as a gradient. If it is a dimension, the colors are visualized as discrete colors.

The following request generates a line chart with size-by and color-by fields.

```
DEFINE FILE WF_RETAIL_LITE
SIZE1 WITH WF_RETAIL_SALES.COGS_US =
   IF WF_RETAIL_TIME_SALES.TIME_YEARQTR LT 200902 THEN 5
   ELSE IF WF_RETAIL_TIME_SALES.TIME_YEARQTR LT 200903 THEN 50
   ELSE 200;
END
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US MSRP_US SIZE1
BY WF_RETAIL_TIME_SALES.TIME_YEARQTR
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH LINE
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=DATA, COLUMN=WF_RETAIL_TIME_SALES.TIME_YEARQTR, BUCKET=x-axis, $
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=GROSS_PROFIT_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=MSRP_US, BUCKET=color, $
TYPE=DATA, COLUMN=SIZE1, BUCKET=size, $
*GRAPH_JS
series: [
{series:0, marker: {visible:false}},
{series:1, marker: {visible:true, shape:'circle'}}
]
*END
ENDSTYLE
END
```

The output is shown in the following image.

❑ **Detail fields for bubble and scatter charts.** For bubble and scatter charts, you can add additional low-level sort fields to the request and assign these fields to the *detail* category. The effect of these additional sort fields is to add more data points to the chart.

The following request generates a scatter chart with an additional detail sort field.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
REVENUE_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH SCATTER
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=DATA, COLUMN=COGS_US, BUCKET=y-axis, $
TYPE=DATA, COLUMN=REVENUE_US, BUCKET=x-axis, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=color, $
ENDSTYLE
END
```

The output is shown in the following image.
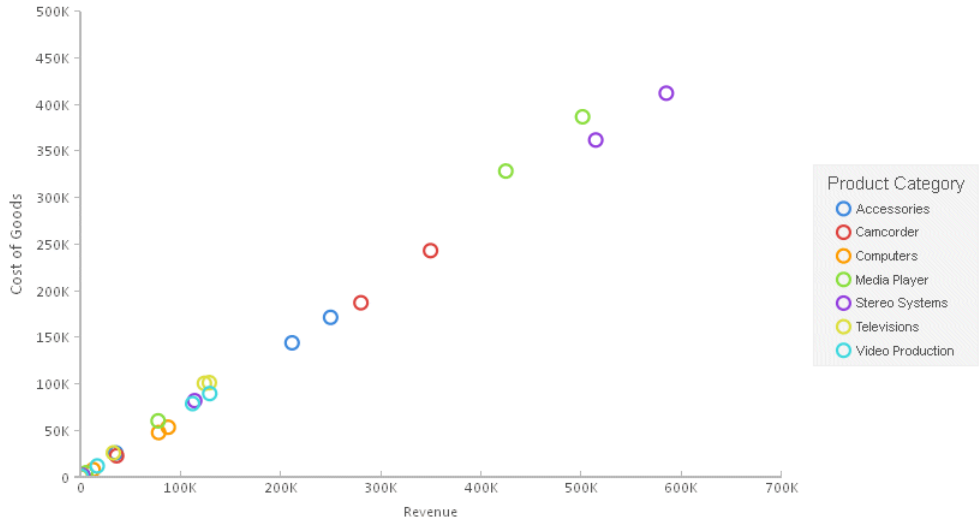
❏ **Sliders.** A slider control on a chart creates an animation effect as you move the control along the slider bar. A slider is limited to one sort field only and should preferably be something time or sequence related such as *YEAR*.

The following request generates a chart with a slider control.

```
GRAPH FILE WF_RETAIL_LITE
SUM DISCOUNT_US
BY WF_RETAIL_TIME_SALES.TIME_YEARQTR
BY BUSINESS_REGION
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
TYPE=DATA, COLUMN=DISCOUNT_US , BUCKET=y-axis, $
TYPE=DATA, COLUMN=BUSINESS_REGION, BUCKET=color, $
TYPE=DATA, COLUMN=PRODUCT_CATEGORY, BUCKET=x-axis, $
TYPE=DATA, COLUMN=WF_RETAIL_TIME_SALES.TIME_YEARQTR, BUCKET=slider, $
ENDSTYLE
END
```

The output is shown in the following image.
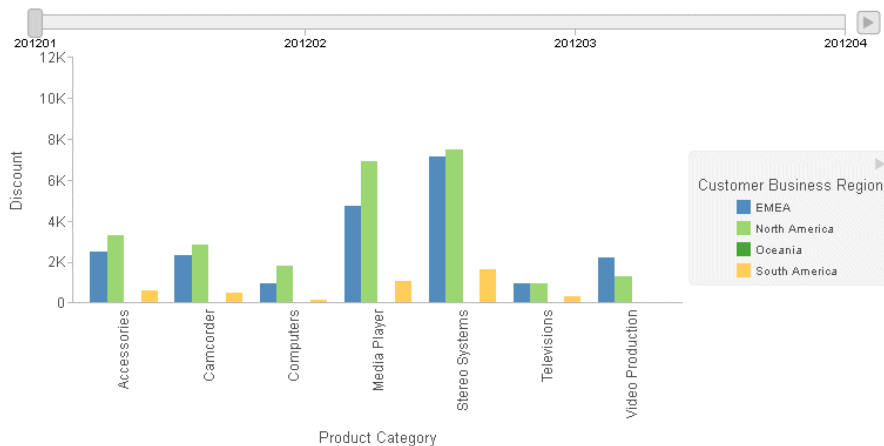
In addition, you can generate separate chart pages using the *page* attribute category and add fields to the tooltip using the *tooltip* category.

For complete information about chart attribute syntax, see the *Creating HTML5 Charts With WebFOCUS Language* manual.

Adding Basemap Information to an Esri HTML5 Chart

By adding a baseMapInfo object to an Esri chart request, you can specify an array of custom map images to use as the background for your chart. You can also place a basemap control on the chart output that displays thumbnails of all available basemaps and lets you switch between basemaps on the resulting chart output.

Syntax: **How to Add Basemap Properties to an Esri Map Chart**

```
baseMapInfo : {
 drawBasemapControl : cboolean,
 showArcGISBasemaps : sboolean,
 customBaseMaps : [
 {
 name : "basemapname",
 title : "basemaptitle",
 url : "url_to_basemap",
 thumbnailUrl : "url_to_thumbnail"
 }
 ]
}
```

where:

cboolean

    Specifies whether to draw a basemap control on the chart output. Valid values are:

    ❏ **true,** which draws a basemap control.

    ❏ **false,** which does not draw a basemap control. This is the default value.

sboolean

    Specifies whether to show the ArcGIS Online basemaps on the basemap control. Valid values are:

    ❏ **true**, which shows the ArcGIS Online basemaps on the basemap control. This is the default value.

    ❏ **false,** which does not show the ArcGIS Online basemaps on the basemap control.

"*basemapname*"

    Is a name for the basemap that you can use as the baselayer:basemap property to select this basemap for the chart.

"*basemaptitle*"

    Is a title to display under the thumbnail for this basemap on the basemap control.

"*url_to_basemap*"

    Is the URL to the endpoint for the basemap.

"*url_to_thumbnail*"

    Is the URL to the thumbnail for the basemap.

*Example:* **Adding a Custom Basemap to an Esri Map Chart**

The following request adds a basemap from Delorme and a basemap control to the chart.

```
GRAPH FILE WF_RETAIL_LITE
SUM MIN.CITY_POPULATION MAX.DAYSDELAYED
BY COUNTRY_NAME
WHERE COUNTRY_NAME NE 'Taiwan'
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BUBBLEMAP
ON GRAPH SET AUTOFIT ON
ON GRAPH SET STYLE *
TYPE=REPORT, CHART-LOOK=com.esri.map, $
TYPE=DATA, COLUMN=COUNTRY_NAME, BUCKET=location, $
TYPE=DATA, COLUMN=MIN.CITY_POPULATION, BUCKET=size, $
TYPE=DATA, COLUMN=MAX.DAYSDELAYED, BUCKET=color, $
*GRAPH_JS
bubbleMarker: {maxSize: '10%' },
extensions: {
"com.esri.map": {
overlayLayers: [
{
title: "Population",
layerType: "bubble",
geometrySourceType: "esri",
geometryLocateField: ["Country"],
geometryDataField: "name",
url:
"http://services.arcgis.com/P3ePLMYs2RVChkJx/arcgis/rest/services/
World_Countries_(Generalized)/FeatureServer/0"
}
],
```

```
baseMapInfo : {
drawBasemapControl : true,
showArcGISBasemaps : true,
customBaseMaps : [
{
name:"Delorme",
title:"Delorme",
url:"http://services.arcgisonline.com/ArcGIS/rest/services/Specialty/
DeLorme_World_Base_Map/MapServer",
thumbnailUrl:"http://www.arcgis.com/sharing/rest/content/items/
6d9fa6d159ae4a1f80b9e296ed300767/info/thumbnail/national_map.jpg"
}
                         ]
                          },

baseLayer: {
basemap: "Delorme"
}
}
}
*END
ENDSTYLE
END
```

The output, with the basemap control open, is shown in the following image.
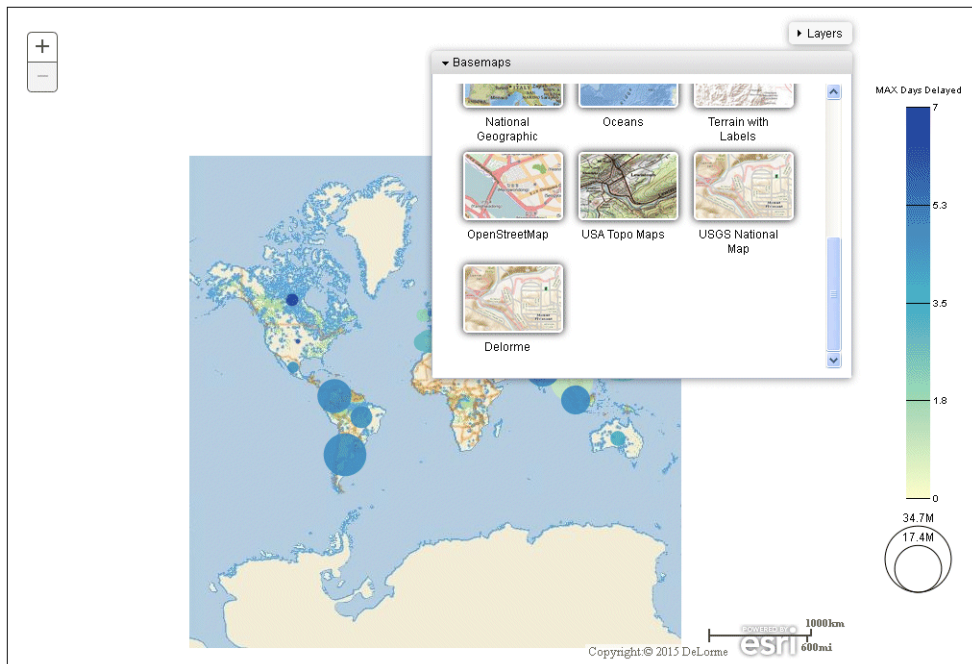
To change the chart background, click a thumbnail on the basemap control.

To close the basemap control, click anywhere in the header.

Controlling the Width of an Absolute Bar Chart Inset

In an absolute bar chart, the bar centers are at the same x-axis point (for a vertical chart) or the same y-axis point (for a horizontal chart). The bar for the first series in the request is placed at the back, with the bars for each subsequent series placed on top of the previous one. The width of each bar added to the chart is scaled so that the bar in back of it remains visible on the sides. Using the absoluteInset property, you can define the width of the smallest bar as a percentage of the width of the largest bar. The other bars will be scaled accordingly

Syntax: **How to Control the Width of an Absolute Bar Chart Inset**

```
blaProperties: {
   absoluteInset: n
             }
```

where:

n

Is a decimal number between 0 and 1 that represents the width smallest bar as a percentage of the width of the largest bar. The default value is 0.7, which represents 70%.

Note: You can disable the inset effect by setting the absolueInset value to 1. This makes all of the bars the same width so that they completely overlap each other.

Example: **Specifying an Inset for an Absolute Bar Chart**

The following request makes the width of the smallest bar 30% the width of the largest bar.

```
GRAPH FILE WF_RETAIL_LITE
SUM COGS_US
REVENUE_US
BY PRODUCT_CATEGORY
ON GRAPH PCHOLD FORMAT JSCHART
ON GRAPH SET LOOKGRAPH BAR
ON GRAPH SET STYLE *
INCLUDE=IBFS:/FILE/IBI_HTML_DIR/javaassist/intl/EN/combine_templates/
ENWarm.sty,$
type=report, chart-series-layout=absolute,$
type=data, column=product_category, bucket=x-axis, $
type=data, column=cogs_us, bucket=y-axis, $
type=data, column=revenue_us, bucket=y-axis, $
*GRAPH_JS
blaProperties: {
    absoluteInset: .3
    }
*END
ENDSTYLE
END
```

The output is shown in the following image.
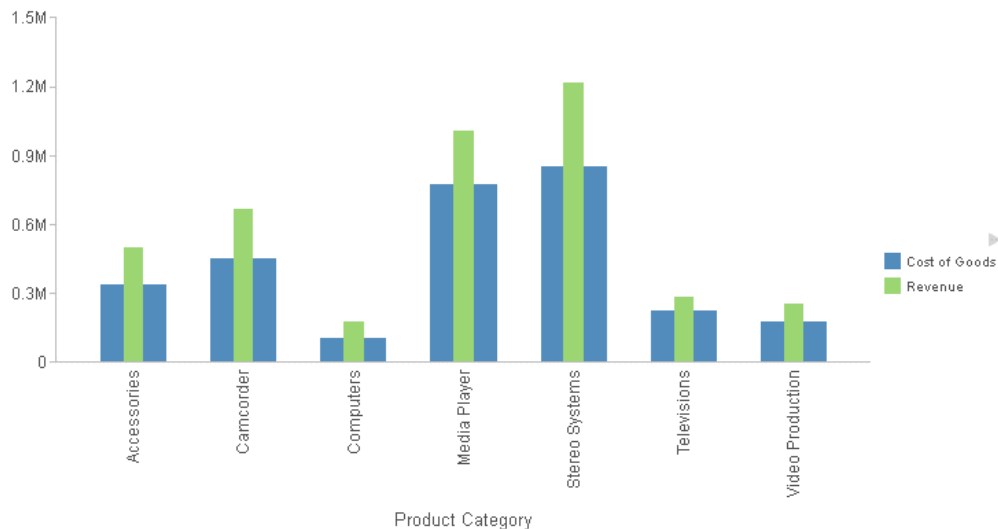
The following image shows the bar chart without the absoluteInset property.
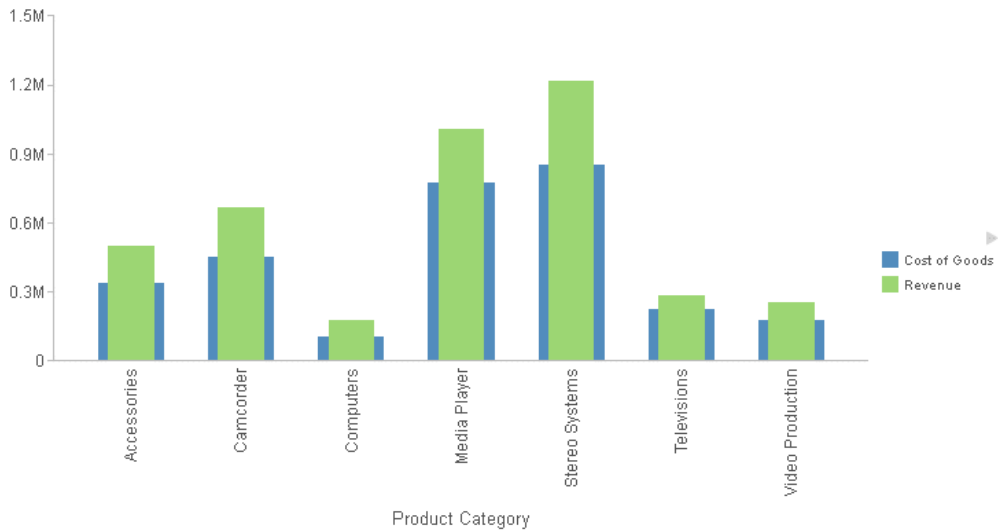
WebFOCUS Chart and Graph Enhancements

You can include API calls in WebFOCUS procedures to create dynamic, sophisticated graphs that showcase your business data.

If you save a chart generated by a WebFOCUS procedure in JSCHART format, you can produce a highly interactive HTML5 visualization rendered directly in the browser.

If you save a graph generated by a WebFOCUS procedure in Scalable Vector Graphics (SVG) or Portable Network Graphics (PNG) format, you can produce a high-quality image for display or print, with advanced features provided by the API calls.

Developing Applications

To address the varied information needs of all types and levels of users, developers must be able to quickly and easily build and implement sophisticated business intelligence and data maintenance applications. With WebFOCUS, you can create applications that deliver simplified end-user reporting capabilities in a secured, business-oriented environment that can easily be maintained and customized.

In this chapter:

❏ Business Intelligence Portal

❏ WebFOCUS Embedded Business Intelligence

Business Intelligence Portal

The Business Intelligence Portal (BI Portal) is new in WebFOCUS 8. You can use the Business Intelligence Portal to provide users with access to view and analyze information quickly in a self-service environment. It enables you to build complete, modern websites with different views, using InfoAssist+. This web-based tool enables you to develop Business Intelligence content, such as dashboards, visualizations, reports, charts, maps, and InfoApps.

For more information on the BI Portal, see the *Business Intelligence Portal* Technical Library.

Collaborative Portal

In WebFOCUS Release 8.2 Version 01M, you have access to the Collaborative Portal, a new type of portal that allows rearranging, reusing, and sharing content and pages between users more easily. The Collaborative Portal is characterized by the following features:

❏ **Independent Pages and Portals.** Portals and pages can be created independently under the Domains node in your WebFOCUS repository. You can rearrange the order and location of these items. Additionally, you can link and copy pages from the repository, which makes sharing content and updates instantaneous.

❏ **Page Designer.** A new tool that enables you to create stand-alone pages and store them in a repository folder of your choice.

❏ **Page Templates.** Functionality that allows you to select one of many pre-configured page layouts, and then populate it with your own content.

❏ **Commenting and Collaboration.** Developers and users of the Collaborative Portal can view, post, edit, and manage comments. Comments are available on several content levels, including pages and panels.

The ability to create collaborative portals is controlled in the Administrative Console. This feature is disabled by default. Once it is enabled, collaborative portals can coexist with portals that you create under the Portals node, adding a new level of flexibility to the content management.

Learn More

For more information, see the *Business Intelligence Portal* Technical Library.

User Experience Improvements

In this release, you can take advantage of the improved drag-and-drop function, which allows you more flexibility in adding content to your page. Now, when you drag an item on the canvas, the drop target highlights the entire area, in which the content will be placed. Furthermore, you now have a choice to either replace a content item or add it as another tab. If you choose the latter, a tabbed container will be automatically created. Using this simple and intuitive action, you can build many complex layouts, for example, rows spanning columns can be accomplished by dragging content to a 25% top, bottom, or either side of the page. The drag-and-drop enhancement applies to all page layouts.

Another notable enhancement is the introduction of the Easy Selector container. You now have a choice to either enable Easy Selector on the columnar level or place it as a container on the page. You can even put Easy Selector inside the Responsive Container. This provides users and developers with more options in working with content. Also, if you place an empty plain panel on the canvas of a base page at design time and then save and run a portal, this panel automatically transforms into an Easy Selector container at run time.

Among other enhancements is the redesigned Remove Customizations function, which now includes new runtime menus on the page tab and under the User ID option in the Menu bar. Also, developers can now remove all customizations from a portal by using the *Remove Customizations from All Users* option in the Resources tree.

Furthermore, this release introduces several features that simplify working with containers. One of these enhancements is the tabbed Properties panel. It streamlines the way you interact with containers on the page canvas. Now, when you click any container element, the entire container is selected. You can modify specific aspects of the container by navigating to different tabs of the Properties panel. Additionally, you can now quickly change the type of the container at design time by clicking the *Change Panel Type* button, without losing any previous customizations. At run time, you can now change a title of a container, by right-clicking it and typing a new title.

Learn More

For more information, see the *Business Intelligence Portal* Technical Library.

Or click here to watch the Key Feature video now!

Samples Generator

The enhanced Samples Generator expands the ability to automatically generate a suite of analytic content based on existing single-segment Master Files in your repository. The Samples Generator is an instant introduction to reporting, demonstrating how any spreadsheet or Master File can become a basis for a set of compelling content to quickly help you visualize and analyze your data.

To generate new sample content from an existing Master File, right-click a domain or folder, point to *New*, and click *Sample Content*. After you select a Master File, the Samples Generator will populate your directory with sample charts, reports, and dashboards. Additionally, the suite will contain charts and reports that provide quick and easy navigation through the levels of each available hierarchy.

The sample content generated typically contains 15 to 40 items organized in subfolders, in the selected folder or domain. You can view, edit, or delete this content, as well as use it as a starting point to develop new content or dashboards.

Responsive Design Enhancements

The new percentage-based responsive design, introduced in this release, is a simple and flexible way to build a responsive portal. It works with your existing HTML and CSS, making your configuration fast and intuitive.

The key benefits of the percentage-based responsive design are:

❏ **You can build any number of columns.** Instead of having a fixed number of columns across your page, you can build any layout, with any number or combination of columns on the page.

❏ **Percentage-based layouts scale to any width.** Because the new responsive design uses percentages, the columns and margins will fit any width.

❏ **Focus on the content.** You no longer have to fit your content to the layout of your page. With the percentage-based responsive design, you can make your layout suit your content.

❏ **Simplicity.** We have built the Custom CSS Class field into the Portal Designer UI, so designing your percentage-based responsive layout can be done by simply typing the CSS class and viewing the changes in the real time.

❏ **No math required.** There are no elaborate calculations needed for creating a percentage-based responsive layout. All you need to count is the number of columns.

In addition to the responsive columnar layouts, you can incorporate responsive filter panels, created in App Studio, and turn any page into a compelling and functional dashboard.

External CSS Theme Support

External CSS Theme support is an advanced feature that enables you to customize a portal by applying or modifying external CSS files. It also allows you to edit any HTML element of your portal by adding CSS classes to it and specifying CSS properties, and see the visual impact of your changes in the real time. You must be logged in as a developer or administrator to use this feature in the Portal Designer.

The CSS Theme feature consists of two parts:

❏ Portal Theme Files Browser

❏ CSS Editor

In the Portal Theme Files browser, you can select Base Theme CSS and Custom Theme CSS files, and apply them to your portal. If you have a custom CSS file already configured and stored in your repository, you can navigate to this file and select it. The file overrides a base theme, instantly modifying the look of your portal.

The CSS Editor is designed for a more detailed theme editing. Through the intuitive CSS Editor UI, you can pinpoint any HTML element of your current portal theme, find its CSS class and modify it. It also allows you to save your changes in a CSS file, which then can be applied to another theme or another portal.

Learn More

For more information, see the *Business Intelligence Portal* Technical Library.

Or click here to watch the Key Feature video now!

Mobile Viewer

The Mobile Viewer is a web-based interface that you can use to access content and share it with other users, from a basic URL. When you use the Mobile Viewer, you do not need to save content as a Mobile Favorite or create a portal. Instead, you can organize content in a folder and distribute the URL to this folder to other users who can bookmark the URL and run that content online at any time.

One of the benefits of the Mobile Viewer is its simplicity. You can create and share your content through a URL in just three steps. Additionally, the Mobile Viewer instantly syncs with the designated repository folder. When you add, subtract, or modify content in the designated folder, these changes are instantly reflected in what you can access. Folder content also respects WebFOCUS security, so you can optionally hide some of the folder content from a group of users with a security rule.

WebFOCUS content can be viewed across different devices using Mobile Viewer. While the feature is especially helpful to users on mobile devices, it can also be used by desktop users in a Web browser. In both scenarios, it provides secure access to a specific set of content.

Data Preparation

The Upload wizard and Connect to Data wizard offer a suite of data wrangling options, which are designed to help you prepare your data for future analytics. With these data wrangling tools, you can assess your data for validity and consistency, weed out errors, and enhance accuracy and uniformity of your data. Thanks to these options, you can spend less time collecting and cleaning data, and more time working on analysis and reporting.

Learn More

For more information, see *New Upload Wizard* on page 308.

New Upload Wizard

The new Upload wizard allows you to preview and change the uploaded spreadsheets and delimited data files before you upload them to the repository. The tool supports multiple sheet upload. After the initial file selection is complete, the wizard shows you the default breakdown of your data into measures, dimensions, and hierarchies. At this point you can perform many advanced data preparation techniques, such as:

❑ Data grouping

❑ Joining multiple fact tables into a cluster

❑ Geo role determination

❑ Geo encoding

❑ Data profiling

❑ Pivoting with immediate preview/undo

❑ Creating and editing measure and dimension fields, dimension hierarchies, and attributes.

The full ribbon based interface of the new Upload wizard makes the process of preparing your data easy and intuitive. You can configure the view options to customize your Upload wizard UI and make it suit your needs. Once your synonym is complete, you can upload it to the repository, append it to an existing synonym, or save it as a template to allow repeated transformations.

In Release 8.2 Version 01M, the Upload wizard has been expanded to include additional functionality, such as BV+ capabilities, and an enhanced workflow.

Learn More

For more information on the new Upload wizard, see the *Working With Data* topic in the Business Intelligence Portal Technical Library.

*Or click here to watch the Key Feature video now!*

Metadata-Driven Esri Integration

Customers with Enterprise Data often have data that represent metrics associated with their territories, events, or logistical information.

The GEOGRAPHIC_ROLE attribute in a Master File can be used to identify the geographic role represented by the values in a column of data. The geographic roles known to the Reporting Server are listed in its geo_services.xml file, along with rules that associate combinations of characters with a specific geographic role.

The Upload wizard and Synonym Editor automatically assign a geographic role to a column if its field name contains characters that satisfy the rules associated with one of its known roles. For example, the following image shows that the upload wizard has assigned the geographic role State (Name) to the column named STATE.
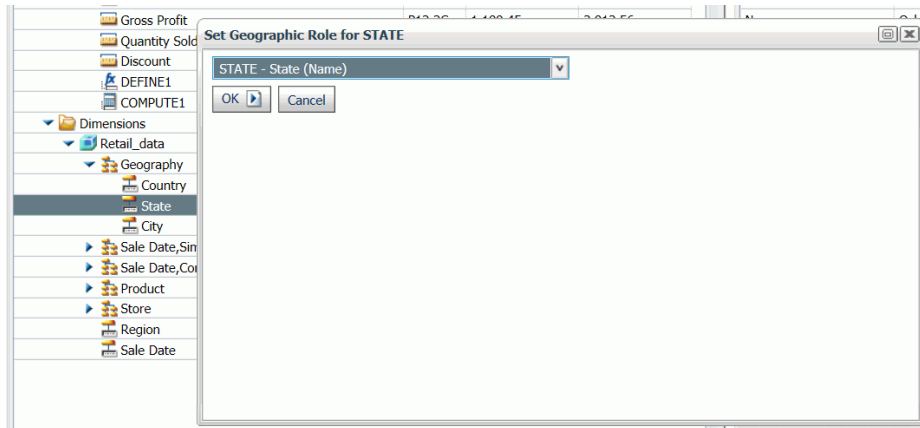
If this role is not the correct one for the column, the user can override the association using a drop-down list to select an alternate geographic role. Following are the geographic roles assigned automatically assigned based on field names:

❏ CONTINENT

❏ COUNTRY

❏ STATE

❏ CITY

❏ US CITY

❏ US STATE

❏ US COUNTY

❏ ZIP3

❏ ZIP5

Learn More

For more information, see the *Reporting Server* Technical Library.

Or click here to watch the Key Feature video now!

WebFOCUS Embedded Business Intelligence

Embedded Business Intelligence (BI) provides the capability of incorporating WebFOCUS content and functionality (features) into an external application. There are several approaches and techniques that can be used to embed BI, including:

1. Embedding WebFOCUS BI Portal pages or other WebFOCUS content into an HTML iframe.

2. Using WebFOCUS web services to embed content into the application.

3. Launching WebFOCUS tools such as InfoAssist+ from the application.

4. Using WebFOCUS Open Portal Services to embed content (specifically, WebFOCUS portlets) in a JSR 286-compliant portal environment (for example, Microsoft SharePoint).

In WebFOCUS Release 8.2 Version 01M and higher, a demonstration ("demo") application is available for deployment that allows you to embed WebFOCUS BI content and functionality as an external application. The embedded BI demo application enables you to explore the iframe and web services embedding options.

The embedded BI demo application files are located in the following folder of your WebFOCUS installation:

```
<drive>:\ibi\WebFOCUS82\samples\embedded_demo
```

For more information on installing and using the embedded BI demo application that is packaged with WebFOCUS, see the *WebFOCUS Embedded Business Intelligence User's Guide* in the *Embedded Business Intelligence* Technical Library.

Scheduling and Distributing Information

WebFOCUS ReportCaster ensures secure, automatic dissemination of critical information to the right person in the right context. A cutting-edge report delivery engine and state-of-the-art business event monitoring provides companies with a single point of control for real-time alerts, as well as a mechanism for fully automating, scheduling, storing, and instantly distributing information. For example, WebFOCUS reports and dashboards or third-party content, to anyone within or outside the organization.

In this chapter:

❏   ReportCaster Enhancements

ReportCaster Enhancements

ReportCaster is a scheduling and distribution application that centralizes the execution and distribution of WebFOCUS reports, the contents of URLs, and files. ReportCaster supports multiple administrators and provides a single point of control for managing information distribution within an organization.

Updates to the ReportCaster Console

The ReportCaster Console has been updated in WebFOCUS Release 8.2 Version 01 to reflect a new layout and design. The updates include changes to the graphical user interface (GUI), as well the integration of certain menu or toolbar options into the newly revised ribbon. You can access the ReportCaster Console through the WebFOCUS Administration Console or from the Tools menu in the Business Intelligence (BI) Portal. The new ReportCaster Console is shown in the following image.
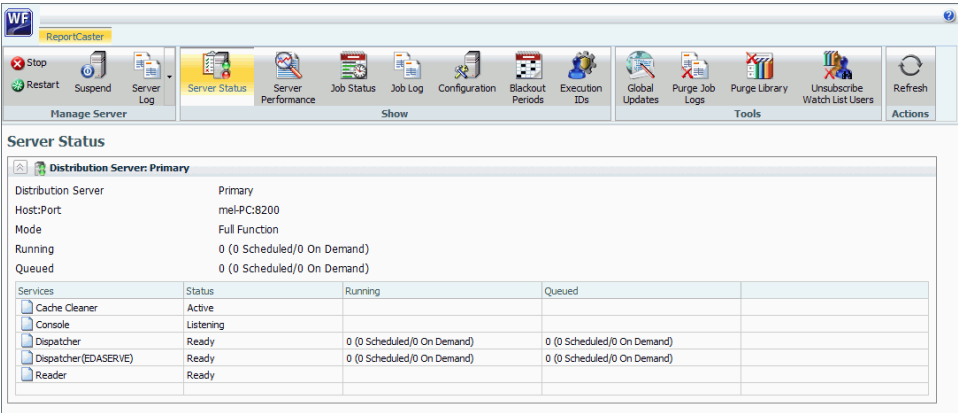
ReportCaster Distribution Option for File System Locations

In Release 8.2 Version 01, ReportCaster has a new distribution option to distribute to file system locations that are defined by the WebFOCUS Client configuration and user authorization. This option, the Repository File System Distribution function, is available in the Basic and Advanced Scheduling Tools.

Learn More

For more information, see the *Creating Schedules* and *Creating a ReportCaster Schedule in the Advanced Scheduling Tool* topics in the ReportCaster Technical Library.

Ability to Set Blackout Periods for Schedules

You can determine dates and times that schedules cannot be created, saved, or run. This feature gives administrators the power to override individual schedule settings by applying time period restrictions to all future schedules.

The Blackout Periods dialog box is shown in the following image.
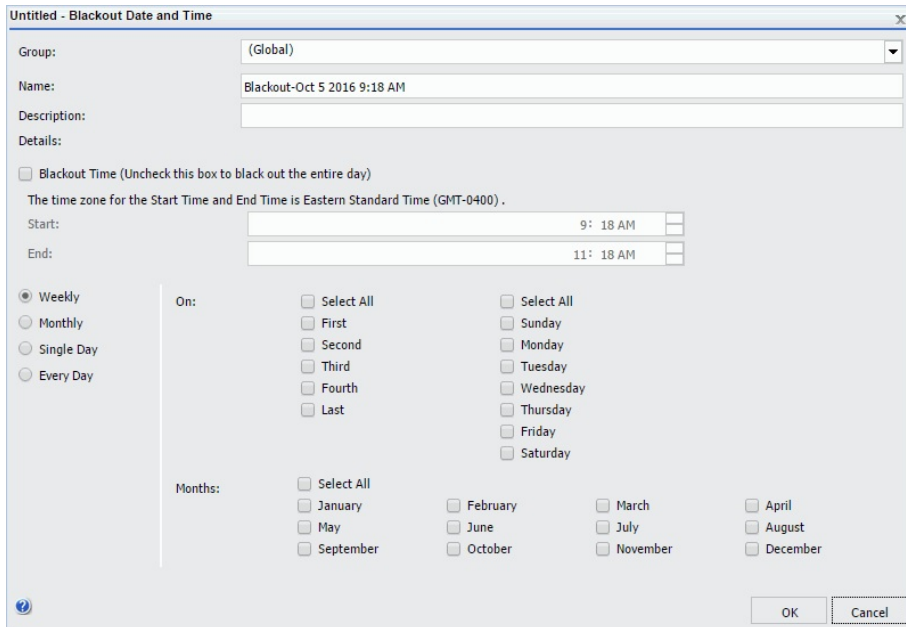
Ability to Distribute Reports to the File System

You can send scheduled reports directly to a folder in the File System of your computer. This feature provides another way to distribute reports in addition to sending them to your repository, an email address, FTP server, or a printer.

The following image shows the Browse for folder dialog box, in which a folder in the File System can be selected.
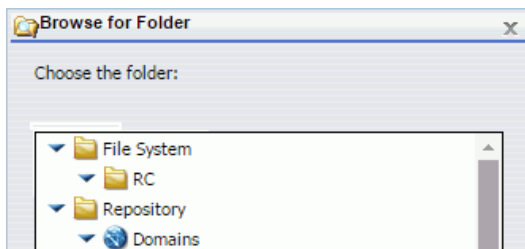
An administrator must grant the *Distribute to File System* privilege before you can use this method. They must also populate the File System Distribution Directories field in the Application Directories section of the Administration Console, with a valid path for the folder.

The Ability to Override Global Configuration Settings on a Per-Schedule Basis

❏ When distributing by email, you can specify a setting for Packet Email. The Packet Email feature enables you to send all attachments in the burst distribution in one email. If Packet Email is set to No, each attachment is emailed separately. The Packet Email is set to Default on initial access, or you can select Yes, No, or By Burst Value for this field.

❏ You can adjust the Zip Minimum Size settings for each individual schedule, regardless of global configuration settings.

The Packet Email and Zip Minimum Size fields in the Advanced Scheduling tool are shown in the following image.

❑ The global configuration option for No Report to Distribute can be set within individual schedules to convert the No Report to Distribute error message to a warning. This option is shown in the following image.

Addition of Packet Email Settings with Email Distribution

When distributing by email, you can specify a setting for Packet Email, which is a feature that enables you to send all attachments in the burst distribution in one email. If Packet Email is set to No, each attachment is emailed separately. The Packet Email is set to Default on initial access, or you can select *Yes*, *No*, or *By Burst Value* for this field. The Packet Email field in the Advanced Scheduling tool is shown in the following image.

Information Builders

Ability to Add Parameterized, Descriptive Text to Library Version

You can use the Library Advanced Options dialog box in the Basic and Advanced Scheduling tools to specify parameterized, descriptive text for each Library version, as shown in the following image.

The resulting text displays in the Description column of the Report Viewer. If you specify %BURST, ReportCaster creates a folder for each burst value.

PPTX Enhancements

Bursting is now supported for PPTX and PPTX Template formats. This enables you to select *PPTX* or *PPTX Template* from the drop-down menu associated with the Override the Format Specified in the Procedure check box. When either of these formats is selected, the Burst Report check box is enabled.

Updates to System Notifications

When the *Enable System Notifications* option is selected, the fields within the System Notifications section must be filled out before this configuration can be saved, as shown in the following image:
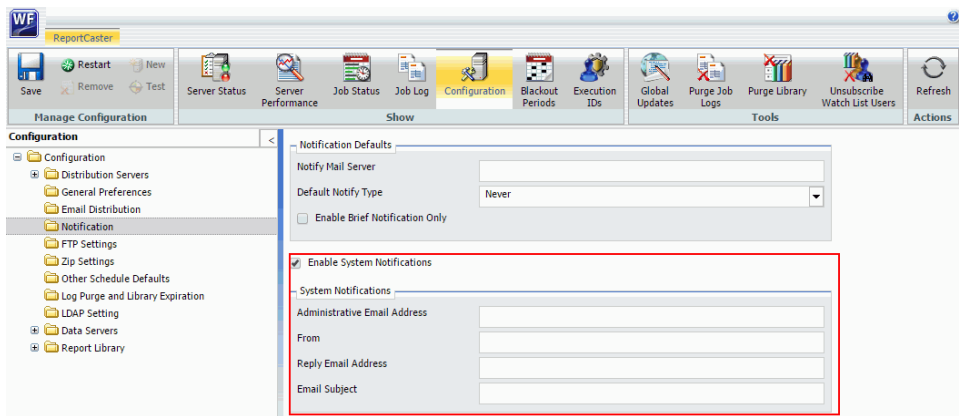
When a Distribution Server changes from Failover to Full Function mode, the body of the email will display as follows:

The Distribution Server at *<Host>:<Port>* has changed from Failover to Full Function mode.
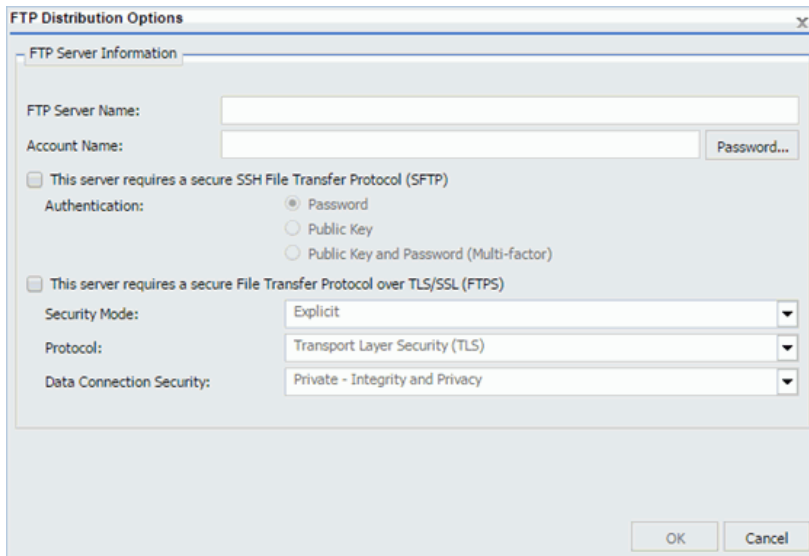
When a Distribution Server has stopped, the body of the email will display as follows:

The Distribution Server at *<Host>:<Port>* is going to stop.

Support for FTP Servers Using the FTPS Protocol

You can create schedules that require FTP distribution to a server using FTPS. This feature provides an added layer of security for distributed reports, especially reports containing sensitive client information.

You can access this feature when you create a schedule, using FTP distribution in the Basic and Advanced Scheduling tools. An example is shown in the following image.

Importing a List of Members to Create Distribution Lists

You can create new Distribution Lists by importing members from an external existing Distribution List file, without entering individual members manually. This feature streamlines the process of entering multiple, individual members.

The Import option is available on the Distribution List tab, in the Actions group, as shown in the following image.
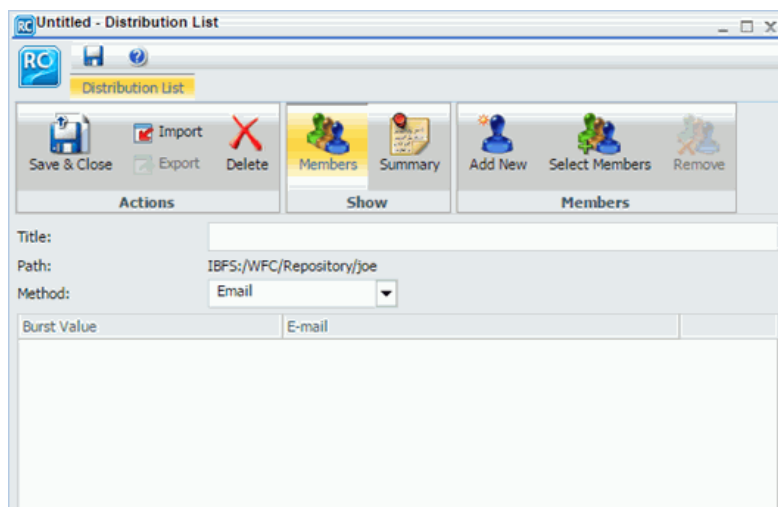
For more information, see the *Creating and Maintaining Distribution Lists* topic in the WebFOCUS ReportCaster technical content.

Ability to Turn Off Subscription Privileges for Library Reports

Administrators can turn off subscription privileges for library reports. This allows administrators to restrict subscription privileges for all users. The following image shows the Enable Library Watch List option, located in the ReportCaster Console Configuration tab.
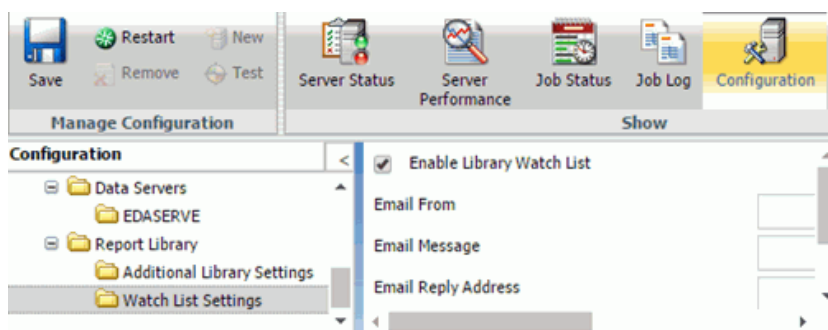
When this option is selected, the Subscribe option is removed from the shortcut menu of all library reports.

Deleting a Version of a Report From the ReportCaster Library

As of Release 8.2 Version 01, you can now use a RESTful web service request to delete a specific version of a report from the ReportCaster Library.

Ability to Create Top-Level Folders During Library Report Distribution

When creating a schedule with Report Library distribution, you can select the Domains folder in the repository, as the top-level folder location to which the sub-folders containing library reports are distributed. This feature allows you to burst a library report into multiple sub-folders that are automatically generated to receive the library reports.

The following image shows library reports that have been burst into multiple subfolders.
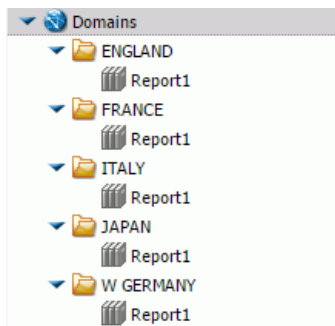
Ability to Change Default Library Viewing Options

When selecting a library report from the Resources tree or the ReportCaster Explorer, you can change the default View option for viewing library reports. When a library report is selected, you can choose to view a list of all versions of the report instead of immediately opening the latest version of the report. For more information about enabling this feature, see the *WebFOCUS Security and Administration* technical content.

New Server Performance Tab in ReportCaster Console

The Server Performance tab has been added to the ReportCaster Console. This tab allows you to view a one-hour performance history of memory usage, active jobs, and CPU usage for the Distribution Server that you select. You can also see a one day history of active jobs. You can easily track server performance in one place.

The following image shows the graphs displayed in the Server Performance tab.
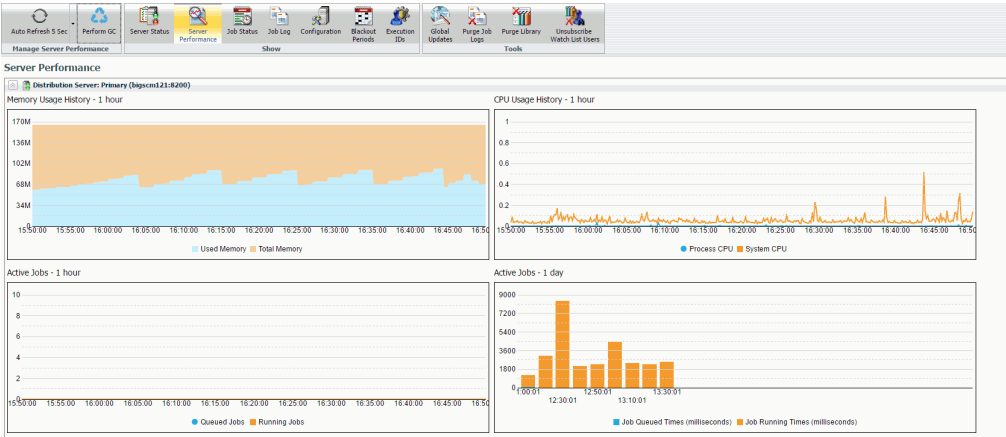
Ability to Restrict Email Address to Schedule Owners

You can now restrict email distribution to the email address of the schedule owner. This feature is useful for administrators and managers who want to control the scheduled email distributions of users in their enterprise. The Restrict Email Distribution to the Email Address of the Schedule Owner check box is shown in the following image.
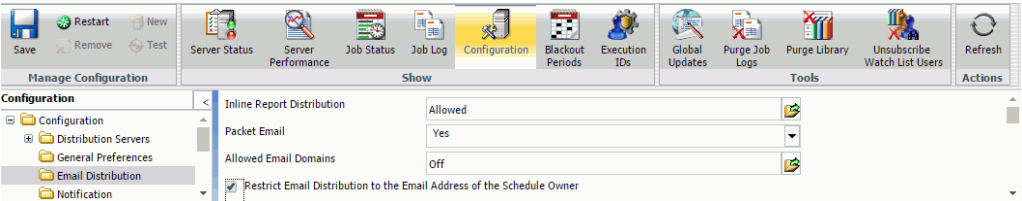
Ability to Use Repository Distribution With All Task Types

In past releases, the Repository distribution option in the scheduling tool could only be used with the WebFOCUS Report task type. As of Release 8.2 Version 01M, users can now create a schedule that uses Repository distribution with all other task types, including WebFOCUS Server Procedure, URL, File, and FTP.

This update gives users access to all task types when using the Distribution to the File System feature that is available through the repository distribution method in both the Basic and Advanced Scheduling tool.

For more information about each task type, see the *About Tasks in the Basic Scheduling Tool* and *About Tasks in the Advanced Scheduling Tool* topics in the *ReportCaster* technical content.

Enabling Global Updates for Schedule Notification Settings

You can now update schedule notification settings for all schedules at once. This feature gives users another way to add additional settings to older schedules.

The schedule notification settings that can now be globally updated are Notification Type, Notification Reply Address, Notification Subject, Notification Brief Message To, and Notification Full Message To, as shown in the following image.
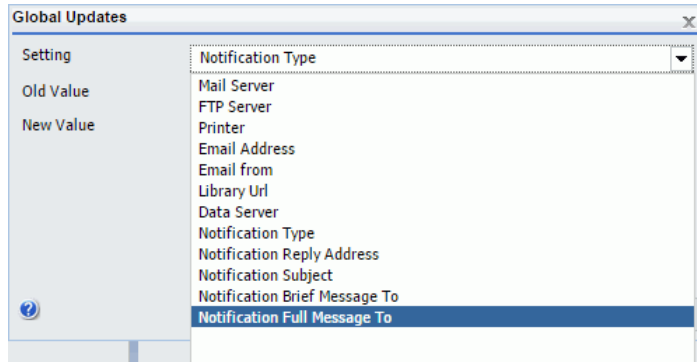
Using the WebFOCUS Client Universal Profile for Scheduled Reporting Server Procedures

The WebFOCUS Client Universal Profile enables an administrator to declare commands to be executed prior to the execution of a procedure by the WebFOCUS Client. Unlike the WebFOCUS Client Site Profile, which is not executed when a procedure is run by ReportCaster, the Universal Profile is executed when a procedure is run by ReportCaster.

A Universal Profile can be created using the following procedure:

1. In the Administration Console, click *Configuration*, and then click *Client Settings*.

2. Type the desired procedure in the Universal Profile field.

The IBI_UNIVERSAL_PROFILE parameter uses the following syntax:

```
IBI_UNIVERSAL_PROFILE=command
```

where:

command

    Is any valid Reporting Server syntax.
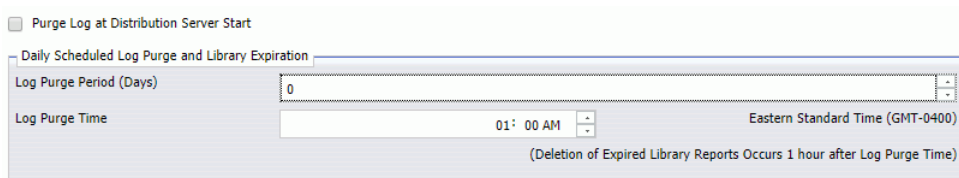
Once you have completed these steps, the profile procedure or procedures run automatically. There is no need to restart the Distribution Server.

The Universal Profile is executed by ReportCaster when a WebFOCUS Repository procedure or WebFOCUS Reporting Server procedure is run. For more information, see the *Security and Administration* Technical Library.

Disabling Log Purges

In previous versions of WebFOCUS, although you could schedule Log Purge jobs to occur continuously, these jobs could not be turned off. As of Release 8.2 Version 01M, you can now turn off daily log purges. This feature allows you to keep all logs indefinitely.

To access the Daily Scheduled Log Purge and Library Expiration settings, navigate to the ReportCaster Console. On the ribbon, in the Show group, click the *Configuration* button to display the configuration sidebar. In the sidebar, click the *Log Purge and Library Expiration* folder to display the Daily Scheduled Log Purge and Library Expiration settings, as shown in the following image.

To disable daily scheduled log purges, set the Log Purge Period (Days) value to 0. To save this setting, navigate to the Manage Configuration group on the ReportCaster Console ribbon, click the *Save* button, then click the *Restart* button to restart ReportCaster from the ReportCaster Console.

For more information, see the *ReportCaster Guide* technical content.

Administering and Securing the Environment

The WebFOCUS Client repository and authorization security model uses an implementation of Role-Based Access Control (RBAC) to enforce security across all resources in the repository. The flexibility of this model enables an administrator to implement security at a granular level for every resource in the WebFOCUS repository, if needed. User actions can be permitted for individual combinations of users and resources. Access can be granted or specifically denied on a group or individual level, and it can be inherited from higher folders.

Resource Analyzer and Resource Governor help Information Systems (IS) organizations analyze and control end user data access, as well as provide site-specific control options.

In this chapter:

❑   Administration Console Configuration

❑   WebFOCUS Client Repository and Authorization Security Enhancements

Administration Console Configuration

This section describes the enhancements to the Administration Console Configuration tab.

Consolidation of Autoprompt Parameters

In Release 8.2 Version 01, the Parameter Prompting Type, the Default Template, and Default HTML Template settings were consolidated. This consolidation streamlines the options that you need to select when choosing an Autoprompt Template.

Learn More

For more information, see *Responsive Autoprompt* on page 31.

InfoAssist+ Auto Drill Properties

The Auto Drill Properties section has been added to the InfoAssist+ Properties page of the Configuration Tab on the Administration Console. Settings in this section control the use of drill-down navigation options in reports and charts configured to use Auto Drill functionality, as shown in the following image.

These options enable you to control how certain aspects of Auto Drill display and function when working with reports and charts in InfoAssist+ with Auto Drill enabled. The new settings include:

❏ **Single Click Navigate.** Enables the use of single click navigation when using Auto Drill in a report or chart. This option is disabled, by default. Therefore, top-level Auto Drill report entries display the Drilldown menu in response to a single click. If this check box is selected, single click navigation is enabled and you can navigate the hierarchy of your data without using standard Auto Drill menus.

❏ **Breadcrumbs.** Controls the display of a breadcrumb trail when using Auto Drill in a report or chart. A breadcrumb trail defines your current location in the hierarchy of your data source and enables you to navigate back and forth between different levels in your data.

The Breadcrumbs option is enabled by default. Therefore, a breadcrumb trail automatically displays along the top of the canvas when navigating the hierarchy of your data. If this option is cleared, a breadcrumb trail does not display, giving you the option of hiding the navigation trail in your reports or charts.

❏ **Restore Original.** Controls the display of the Restore Original option in the Drilldown menu when using Auto Drill in a report or chart. The Restore Original option enables you to start your data analysis over by re-executing the original Auto Drill request.

This Restore Original check box is selected, by default, and the option appears in the Drilldown menu. If this option is cleared, the Restore Original option does not appear in the Drilldown menu.

❑ **Drill Up.** Controls the display of the Drill Up option when using Auto Drill in a report or chart. The Drill Up option refreshes the report with results based on the next level above the current level in your data source. The Drill Up option displays on the Drilldown menu when working with an Auto Drill-enabled report or chart. You can clear this checkbox so that the Drill Up option does not display on the Drilldown menu.

❑ **Drill Down.** Controls the display of the Drill Down option when using Auto Drill in a report or chart. The Drill Down option refreshes the report with results based on the next level below the current level in your data source. The Drill Down option displays on the Drilldown menu when working with an Auto Drill-enabled report or chart. You can clear this check box so that the Drill Down option does not display on the Drilldown menu.

To open and review these properties:

1. In the BI Portal, on the Menu bar, click *Administration*, and then click *Administration Console*.

2. On the Configuration tab, under the Application Settings folder, click *InfoAssist+ Properties*.

3. Scroll down to the Auto Drill section and review the default settings.

4. Click each check box to select or clear the option it represents.

Library Item Default Action

You can now use the new Library Item Default Action setting to control the result when you view a library item in the WebFOCUS Environments Tree or BI Portal Resources tree. You can select the latest version of the report (*Last*) or a list of report versions (*Versions*).

To view the Library Item Default Action setting, in the Administration Console, on the Configuration tab, expand the *Application Settings* folder and click *Other*, as shown in the following image.
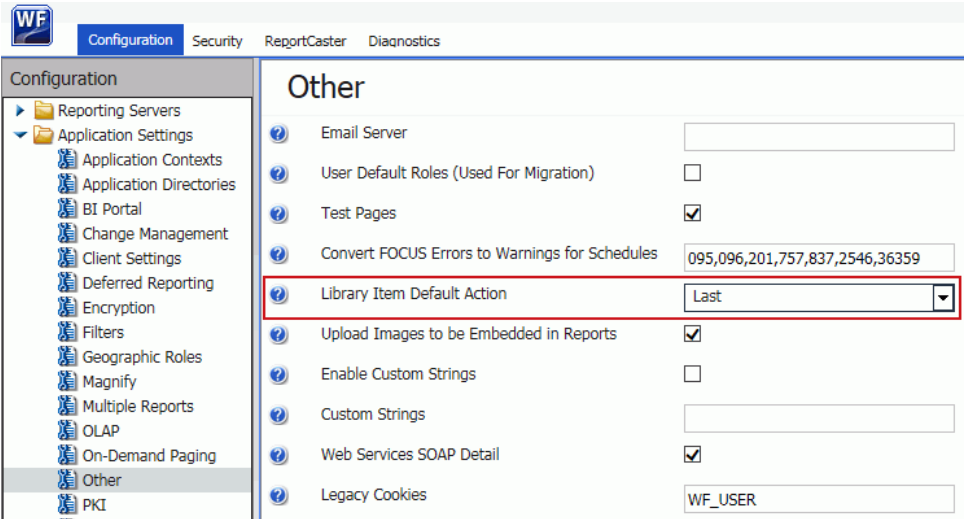
The value you select in this setting appears first in the shortcut menu when you right-click a library item in the WebFOCUS Environments Tree or BI Portal Resource tree and click *View*.

Adding Comments to WebFOCUS Configuration Files

When placed at the start of a line in a configuration file, the number sign (#) character converts that line into a comment, excluding the variables or commands in that line from execution when WebFOCUS invokes this file. You can use this feature to convert a variable into a comment. You can also use this feature to add comments that include notes, explanations, and reminders about settings and the values assigned to them that appear in these files.

To convert a variable into a comment, type a number sign (#) as the first character of the line in which the variable appears. To add a comment, start a new line, type the number sign (#), and then type a brief note, explanation, or reminder. When your changes are complete, click *Clear Cache* from the Administration Console menu bar to save your changes to the configuration file.

Add Namespace When Creating Users by Group Administrators (IBI_USER_NAMESPACE)

To allow Group Administrators to create users in SaaS multi-tenant implementations, you can utilize the Add Namespace (IBI_USER_NAMESPACE) setting, which will automatically add the namespace of the Group Administrator who is creating a new user to the name of that user.

The additional level of identification provided by the use of a namespace helps prevent conflicts when the same name is assigned to users in more than one group, and supports SaaS installations that assign users to multiple tenant groups.

When set to (NONE), the default setting, user names do not include a namespace.

When set to PREFIX, the namespace, followed by a slash (\), precedes the user name. For example, if a Group Administrator signs in as tenant1\groupadmin, tenant1 is the namespace for this Group Administrator and all of the users for whom this Group Administrator is responsible. When creating users, the namespace of the Group Administrator is automatically prepended to all new user names when created: tenant1\username.

When set to SUFFIX, the namespace, preceded by an at sign (@), follows the user name. For example, if a Group Administrator signs in as groupadmin@tenant1.com, the namespace of the Group Administrator is tenant1.com. The namespace of the Group Administrator is appended to all new user names when created: username@tenant1.com.

To view the Add Namespace when creating users by Group Administrators (IBI_USER_NAMESPACE) setting, in the Administration Console, on the Security tab, click the Advanced page under the Security Configuration folder. The new setting appears at the bottom of the list, as shown in the following image.

Event Log Repository Database Error Messages

When setting the log level for org.eclipse.persistence to DEBUG or TRACE, the event.log will contain tracing information that includes a list of the bound parameters for SQL queries. You can set the log level for org.eclipse.persistence on the Log Files page of the Administration Console, Diagnostics tab.

Maximum content size of multipart requests (IBI_MAX_CONTENT_SIZE)

You can now use the Maximum content size of multipart requests setting to define the maximum size for data files uploaded to the Repository or the EDA Server. Data files that are larger than the value in this setting cannot be uploaded. The default value is 2048 megabytes. The maximum allowable value is 10240 megabytes. A value of -1 deactivates this setting.

To view this setting, in the Administration Console, on the Configuration tab, expand the *Application Settings* folder and click *Filters*.

Maximum memory size of uploads, before cached (IBI_UPLOAD_MAX_MEMORY)

You can now use the Maximum memory size of uploads, before cached setting to define the maximum amount of memory that data from files uploaded to the Repository or the EDA Server can occupy. During the upload process, data moves into memory until it reaches the limit defined in this setting. Any additional data is temporarily cached to disk. The default value is 256 megabytes. A value of -1 deactivates caching.

To view this setting, in the Administration Console, on the Configuration tab, expand the *Application Settings* folder and click *Filters*.

Allowed File Extensions to Upload (IBI_UPLOAD_EXTENSIONS)

The Allowed File Extensions to Upload setting now limits the type of file you can create or upload through the BI Portal. Files that do not use one of the extensions listed in this setting cannot be uploaded to the BI Portal or created within it. The list includes the following file extensions, by
default: .acx, .bmp, .css, .doc, .docx, .fex, .gif, .htm, .html, .ico, .jpeg, .jpg, .js, .mas, .pdf, .png, .ppt, .pptx, .sty, .svg, .txt, .xls, .xlsx, .xml.

To view the Allowed File Extensions to Upload setting, in the Administration Console, on the Configuration tab, expand the *Application Settings* folder and click *BI Portal*.

Working With Log Files

The new Log Files page displays links to all log files in a single location where you can review or capture copies of them instantaneously. This centralized location makes it easy to locate log files and the system events they contain, whenever you must provide them to the Customer Support Team for troubleshooting or analysis. The Log Files page appears on the Diagnostics tab of the Administration Console. The main grid lists log files in alphabetical order by name, identifies the pages or events that contributed entries to that log, and identifies the level of events captured by that log, from high level events to low level events. The Zip All button saves copies of the current version of all log files into a single zip file. You can use this button to capture records of system events from the current day whenever necessary.

Working With Log Pages

Log pages list detailed system event records in order of the time of their occurrence, from the earliest event on a specific day to the most recent. Features on this page help you navigate through the log, or retrieve a copy of the log from a previous date. To open a log file for review, click the link to that log file from the Log Name column on the Log Files page. The page for your selected log file opens in a separate window. You can use the Save or Print command in your browser to save or print a copy of the log page, or you can capture a zipped copy of it using the Zip All button from the Log Files page.

Custom Sign-In Messages

Using the Sign-In Message property, you can now display a custom text message to users as they sign in to the BI Portal. In the Configuration tab of the Administration Console, expand the Application Settings folder, and click *BI Portal*. You can paste your text or type text in the Sign-In Message field, as shown in the following image.
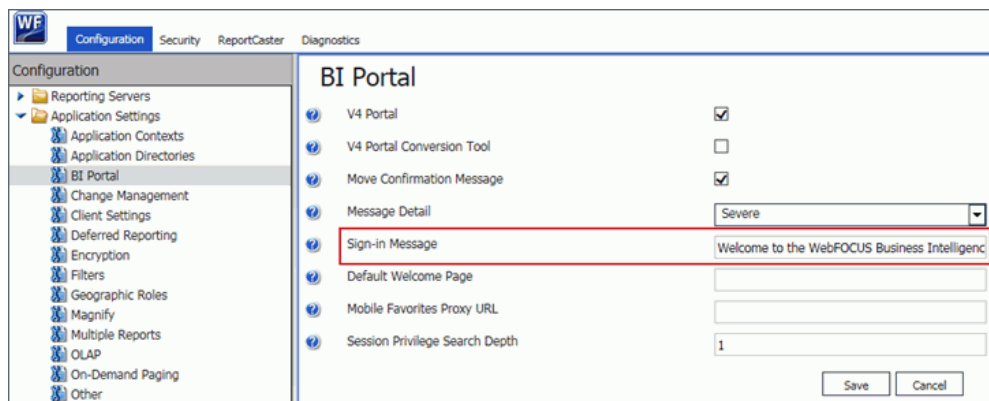
You can make this a general message, or make it topical and update it as needed. This message appears in the Messages dialog box, as shown in the following image.
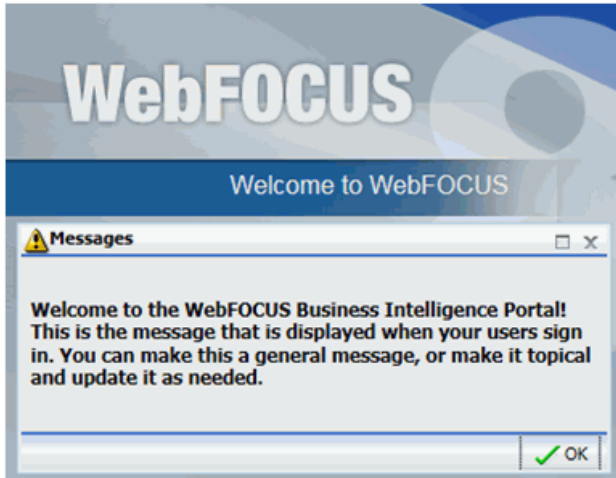
If you leave the Sign-in Message field blank, the Messages dialog box does not display when a user signs in to the BI Portal.

Change Management Package Zip File Downloads

The change management export process now creates zip files containing change management packages as well as folders that contain the expanded contents of the zip file. The creation of this zip file takes place automatically during the export process, and it stores zip files on the server, in the change management export directory, *drive*:\ibi\WebFOCUS82\cm\export, by default.

Procedure: **How to Download a Change Management Package Zip File**

The export process saves a CM zip file to *drive*:\ibi\WebFOCUS82\cm\export. The download process takes that CM zip file, and downloads it to your local machine. You can then transfer the copy of that CM zip file to another WebFOCUS environment for use as a change management package.

1. In the Resources tree, expand the *Change Management* node.

2. Expand the *Export* node.

3. Right-click the change management package zip file you want to download, and then click *Download*, as shown in the following image.
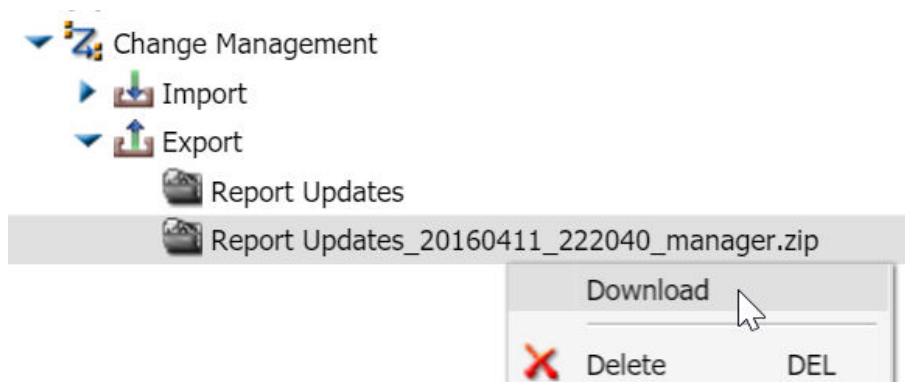
Change Management Package Zip File Uploads

The change management export process now accommodates updates from change management package zip files as well as folders that contain the expanded contents of a CM zip file.

Procedure: **How to Upload a Change Management Package Zip File**

The zip file upload process saves a copy of a CM zip file stored on your local machine to the change management import directory on the server, *drive*:\ibi\WebFOCUS82\cm\import. You can then import the copy of that CM zip file to WebFOCUS.

1. Open the Change Management node, right-click *Import*, and then click *Upload a Zip File*.

2. In the Upload a Zip File dialog box, click *Browse*, navigate to the location where you have saved the change management package, click the CM zip file you want to upload, and then click *Open*.

3. Ensure that the correct CM zip file appears in the File to Upload field, and decide whether or not to import files from the package as published or unpublished files.

   ❑ To establish the CM zip file as published after the upload is complete, select the *Publish Documents* check box. This is the default setting.

   ❑ To establish the CM zip file as private after the upload is complete, clear the *Publish Documents* check box.

4. Click *Upload*.

   A confirmation dialog box opens. Click *OK* to complete the upload.

5. In the Upload a Zip File dialog box, click *Close*.

    If an entry for the new zip file does not appear below the Import node, right-click it, and then click *Refresh*.

Sending WebFOCUS Variables to the Reporting Server Profile

You can now send secure requests from the WebFOCUS Client to the Reporting Server that include a list of variables and their associated values that enable the Reporting Server profile, using conditional logic, to activate different DBMS settings and create a customized server environment in response. For example, one set of values could activate a test environment and a different set of values could activate a production environment.

By including variables in the request, the Reporting Server can tailor its environment to the specific needs of each individual client. The Custom Settings page allows Administrators to establish the variables and their accompanying values that will invoke an appropriate server response directly from the client.

To open the Custom Settings page, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. Under the Application Settings folder, click *Custom Settings*. You can use this page to type the variables and their accompanying values that are to be included in Reporting Server Requests.

Paths to be Executed on User Sign-in (IBI_SIGNIN_PATHS)

You can now use the Paths to be executed on user Sign-in setting to define the paths to all procedures that run when a user signs in to a portal or to web services. This setting is blank, by default, and no procedures run in response to user sign in. To configure a list of one or more procedures to run in response to user sign in, type the path name for each of those procedures in this setting, and separate each path name with a comma.

The ability to run multiple procedures can serve a variety of purposes. For example, administrators can use this setting to run a procedure that sends a message of the day to users upon sign in, or to run a procedure that initializes the environment and establishes a procedure within the repository that creates a single foccache ticket that can be used for all subsequent requests.

To view the Library Item Default Action setting, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. On the Configuration tab, expand the *Application Settings* folder and click *Other*.

Administration Console Security Tab

A new tab dedicated to the configuration of security settings appears in the Administration Console. This tab contains the Internal, External, and Advanced pages that configure general security settings for your installation of WebFOCUS. It also contains folders for four zones, Default, Mobile, Portlet, and Alternate, which contain pages that enable Administrators to customize user authentication, URL request matching, and session management settings to meet the varying requirements of users in each of these four zones.

This new tab makes all security configuration and testing resources available in a single location within the WebFOCUS graphic user interface. There is no need to open, inspect, and update settings in external security configuration files. The interface also helps protect the quality of information added to the Reporting Server configurations by prompting Administrators when they enter duplicate records or data that does not conform to the requirements of a setting.

To open the External Security pages, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. Click the Security Tab. Nodes for the general security settings appear under the Security Configuration folder. Folders for the four zones appear beneath the general security settings. Each zone folder contains the same three nodes, Authentication, Request Matching, and Session Management.

Reporting Servers Features

New features on the Administration Console Configuration tab provide Administrators with the server configuration and management tools that maintain client-server connections for an installation of WebFOCUS. These features appear under the Server Connections folder, the Alternate Server Mapping folder, the Cluster Manager folder, and the Legacy Cluster folder. Once configured, individual connections, mappings, and clusters appear under these folders as nodes. When you click an individual node, configuration information about the connection, mapping, or cluster appears on the associated configuration page. When you right-click an individual node, you can edit, test, or delete an individual connection, mapping, or cluster.

These new features make all reporting server connection configuration and testing resources available in a single location within the WebFOCUS graphic user interface. There is no need to open or inspect settings in external configuration files. The interface also helps protect the quality of information added to the Reporting Server configurations by prompting Administrators when they enter duplicate records or data does not conform to the requirements of a setting.

To open the new Reporting Server features, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. On the Configuration tab, expand the Reporting Servers folder, and then expand the Server Connections folder. Click a node to open the corresponding page containing configuration details for that server connection, mapping, or cluster. Expand the *Advanced* tab on the configuration page to display advanced configuration settings. To test any server, right-click the icon for it, point to *Test*, and then click *TABLE Request*, *GRAPH Request*, or *Stored Procedure*.

Display Deferred Request Submitted Notification Setting

You can now use the new Display Deferred Request Submitted Notification setting to control the display of the Deferred Report Notification and eliminate the confirmation that the request to run a deferred report has been successfully submitted. If you select this check box, the default setting, whenever a user runs a deferred report, a notification appears prompting the user that the report has been submitted and providing a link directly to the Deferred Report Status interface that shows the status of the deferred report. If you clear this check box, no notification appears after a user submits a deferred report.

The ability to suppress the Deferred Report Notification enables an Administrator to free users who must run a large number of reports from having to close the notification for every individual report, speeding the process and requiring less effort.

To view the Display Deferred Request Submitted Notification setting, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. Under the Application Settings folder, click *Deferred Reporting*.

Prompt for Custom Deferred Report Description Setting

You can use the new Prompt for Custom Deferred Report Description setting to control the display of the Deferred Report Description option in a new page or within the Autoprompt page when users submit a new deferred report request. If you select this check box, the default setting, users are prompted to optionally customize the description of the deferred report, which defaults to the title of the report being run deferred. When this check box is cleared, the title of the report being submitted to run deferred is assigned to the deferred report description automatically, and the Deferred Report Description prompt does not appear.

This setting allows Administrators to suppress the display of the Deferred Report Description option when end users do not need to customize the descriptions of deferred reports, or to retain it if they believe end users require the opportunity to customize the description of each deferred report.

Note: When the Custom Deferred Report Descriptions setting is selected, users can select the Use Title for Deferred Report Description reports (FEX) property to specify the use of the title value of the report for the deferred description. This allows the user to suppress the Deferred Report Description option for specific reports. This property is available in the Properties option for a report (FEX).

To view the Prompt for Custom Deferred Report Description setting, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. On the Configuration tab, under the Application Settings folder, click *Deferred Reporting*.

Support for Embedded BI Applications and Cross-Origin Resource Sharing

In Release 8.2 Version 01M, the new Cross-Origin Settings dialog box now appears on the Security tab of the Administration Console, as shown in the following image.
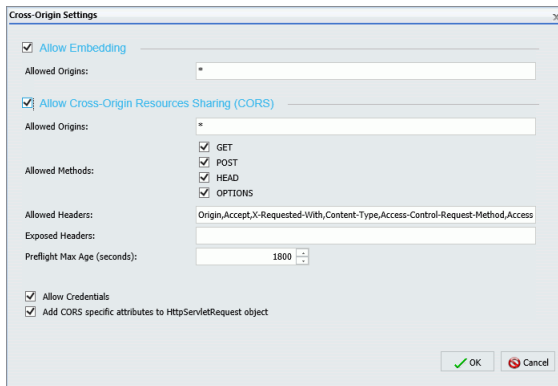
This dialog box contains two settings that activate and secure the use of embedded WebFOCUS content and resources in external applications. The Allow Embedding check box allows WebFOCUS content and resources to be embedded within a Frame or Iframe served from a third party application. The range of applications can include all third party applications, if the Allowed Origins field beneath it contains the asterisk wild card character (*), or it can be limited to specific applications, if the Allowed Origins field contains a comma-delimited whitelist of allowed URLs.

The Allow Cross-Origin Resource Sharing check box allows WebFOCUS content and resources to be utilized within Ajax requests issued from the browser of a user of one of the comma-delimited whitelisted URLs identified in the Allowed Origins field beneath it. This section of the dialog box also contains a default configuration of allowed methods, headers, and other components of the cross-origin resource sharing standard established by the World Wide Web Consortium.

For more information about embedding WebFOCUS content in third party applications, see the WebFOCUS Embedded Business Intelligence User's Guide. For more information about the configuration of this dialog box, see the topic *Allowing Embedding*, and the topic *Allowing Cross-Origin Resource Sharing* in the *Security and Administration Manual*.

To open the Cross-Origin Settings dialog box, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. On the Administration Console, click the *Security* tab. On the Security tab, click the *Authentication* node under any of the folders for the four security zones. On the Authentication page, click *Cross-Origin Settings*.

Allow Account Creation On Sign In

In Release 8.2 Version 01M, the Allow Account Creation On Sign In setting, found on the External Page of the Administration Console Security Tab, now includes the value. *Off*. This value deactivates the automatic creation of a user account whenever a new user attempts to sign in to WebFOCUS for the first time. When this value is selected, administrators must use the Security Center commands *New User* or *Import Users* to create or upload accounts for all new users before their first sign in attempt.

To locate this updated setting, from the BI Portal Menu bar, click *Administration*, and then click *Administration Console*. On the Administration Console, click the *Security* tab, and then, under the Security Configuration folder, click the *External* node. To make this setting available, select the *Enable External Security* check box. Type the Server Administrator ID and click *Connect*.

For more information about this updated setting, see the topic *Understanding External Security Page Settings* in the *Security and Administration Manual*.

Synchronize User Information Check Box

In WebFOCUS Release 8.2 Version 01M, the Synchronize User Information check box, found on the External page of the Security tab in the Administration Console, includes two new options that are activated when this check box is selected. These options identify the source of automatic updates made to the Description and EMail Address fields assigned to a WebFOCUS User whenever that user signs in.

When the *With Authentication Provider* option is selected, WebFOCUS receives updated Description and EMail Address field information from the authentication provider. This option is selected, by default.

When the *With Authorization Provider* option is selected, WebFOCUS receives updated Description and EMail Address field information from the authorization provider.

These options apply to users who sign in to a security zone using Form Based authentication as well as Pre-authentication, as long as they use External Security.

To locate these new options, in the Administration Console, click the *Security* tab, and then, under the Security folder, click the *External* node. The Synchronize User Information check box becomes available only after you select the *Enable External Security* check box, type a valid Server Administrator ID, and click *Connect*. The new options become available only after you select the *Synchronize User Information* check box.

WebFOCUS Client Repository and Authorization Security Enhancements

This section describes the enhancements to the WebFOCUS Client Repository and authorization security.

Single Sign On - Trusted-Ticket Authentication

WebFOCUS Release 8.2 Version 01M introduces support for Single Sign On between an external web application and WebFOCUS, using a trusted ticket feature, in which an external application requests a ticket for a user on a trusted back channel and presents this ticket to WebFOCUS in a trusted sign on request.

You can configure Trusted Ticket Authentication in the Edit Trusted Ticket Authentication Settings dialog box which is available from the Authentication page of the Security tab in the Administration Console. A sample application that uses the trusted ticket feature is included in the *drive*:\ibi\WebFOCUS82\samples\embeddemo folder.

Learn More

For more information on trusted-ticket single sign on, see the *Configuring Pre-Authentication With Trusted Ticket Authentication* topic in the *Security and Administration* Technical Library. For more information on Embedded BI Applications, see the *WebFOCUS Embedded Business Intelligence User's Guide* in the *Embedded Business Intelligence* Technical Library.

Automated Configuration File Password Encryption

WebFOCUS automatically encrypts any password entered directly into a configuration file, such as install.cfg or webfocus.cfg, the next time you start the application or run a command line utility, such as Change Management. There is no need to run a separate encryption utility.

New Users Bulk Load

You can now import a .csv file to create new WebFOCUS users in bulk. This can be quicker and more efficient than creating multiple users with the New User dialog box from the Security Center.

On the Security Center Users & Groups tab, there is a new Import Users button on the Users toolbar, as shown in the following image.
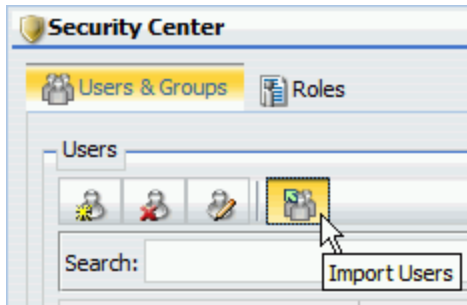
This opens the Import Users dialog box, where you can browse to locate the .csv file containing multiple users.

Updates to Page Privileges

In WebFOCUS Release 8.2 Version 02, the scope of accessible resources granted by the Basic Reporting privilege opRun was expanded from reports, graphs, and schedules to include pages and static content. To reflect this change, the opRun privilege was renamed from Run Procedures to Run Resources, and the following new description was assigned to it: User can run resources including reports, graphs, pages, schedules and access static content.

In order to give users access to the new (Pegasus) Page Designer tool, the new opAppDesigner privilege, named Page Designer, was added to the Advanced Reporting privileges with the following description: User can create and edit App Pages. The description in the existing opPageDesigner privilege was also updated to replace the term Page Editor with Portal Page Designer. The description now states that it gives a user the ability to use the Portal Page Designer to create and edit Portal pages.

Custom Templates

Templates used by WebFOCUS to define the layout and text of user interface objects, such as the deferred reporting windows, or error messages, such as error 42, were previously stored together in the single ENtemplates.xml file. They are now stored as separate xml files in the prod directory, located in *drive*:\ibi\WebFOCUS\client\wfc\etc\.

For example, when the Reporting Server generates error 42, WebFOCUS invokes the message template for error 42, and populates it with text strings that are identified within the error 42 template, as shown in the following image.

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Copyright 1996-2015 Information Builders, Inc. All rights reserved. -->
<!--$Revision: 1.1 $:-->
<templates>
    <template name='error_42'>
        <![CDATA[
<HTML>
<HEAD>
<TITLE><inserttext err_42 /></TITLE>
</Head>
<Body>
<HR><H3>
<inserttext err_42_explain1 /><p>
<inserttext err_42_explain2 /><br>
<inserttext err_42_explain3 /><br>
<inserttext err_42_explain4 /><br>
<inserttext err_42_explain5 />
</H3><HR>
<PRE>
<H5>
<insertvariable html_no_output_msg />
</H5>
</PRE>
</Body>
</HTML>
        ]]>
    </template>
</templates>
```

The links in the inserttext tags in this example connect to the localization files that contain the text displayed in the message.

Custom templates are based on standard templates, but can contain specialized text, images, and layout that conform to the requirements of a local installation of WebFOCUS. Multiple language versions of custom templates ensure that the same customized information is available to all users, regardless of the language they use in daily operations. When used in place of a standard template, custom templates enable a local installation to display localized text and branding.

To activate the use of a custom template, administrators copy a standard template, paste it into the custom directory, located in *drive*:\ibi\WebFOCUS\client\wfc\etc\, and adapt that copy to their requirements. Once established in the custom directory, WebFOCUS automatically retrieves the custom template instead of the standard template. If there is no template in the custom directory, WebFOCUS uses the standard template from the prod directory instead. If customization of the text used in a custom template is necessary, please contact Customer Support.

Custom templates remain unchanged during the upgrade process, preserving the time and effort spent to develop them. A separate utility enables administrators to review custom templates after an upgrade and ensure that they remain intact.

Chapter **7**

Server Enhancements

This section describes new server features on the Web Console.

The server provides a wide range of capabilities and tools for adapter configuration, metadata creation, application and path management, security control, communications configuration, and for monitoring, tuning, and troubleshooting server performance. Authorized users can perform most server administration tasks from a graphical Web Console.

The server supports WebFOCUS reporting functions, extraction, load and transformation functions, and analysis and data access control functions.

In this chapter:

❏ Applications

❏ Configuration and Monitoring

❏ Core Server and Clients

❏ Diagnostics

❏ Metadata

❏ Security

❏ Web Console

Applications

This section provides detailed descriptions of new features for server applications.

Executing a Repository FOCEXEC From EDASPROF

In the current release, repository procedures can be executed, and Master and Access Files stored in a repository can be accessed, during server, group, and user profile execution after all DBMS connections and an APP MAP command to the repository have been executed.

For information about creating and managing an SQL Repository, see Chapter 3, *Managing Applications*, in the *Server Administration* manual.

Storing Deferred Reports in an Application Directory or an SQL Repository

Deferred requests and reports can be written to any application, including applications that are stored in an SQL repository.

To route deferred requests to any application:

1. Sign on to the server with a server administrator ID.

2. On the Workspace menu, expand *Special Services and Listeners*.

3. Right-click *SCHEDULER*, and select *Properties* from the shortcut menu.

   The Scheduler Configuration page opens.

   By default, dfm_app is set to a physical directory location.

4. You can accept or edit the dfm_dir location or select an application from the *dfm_app* drop-down list, as shown in the following image.
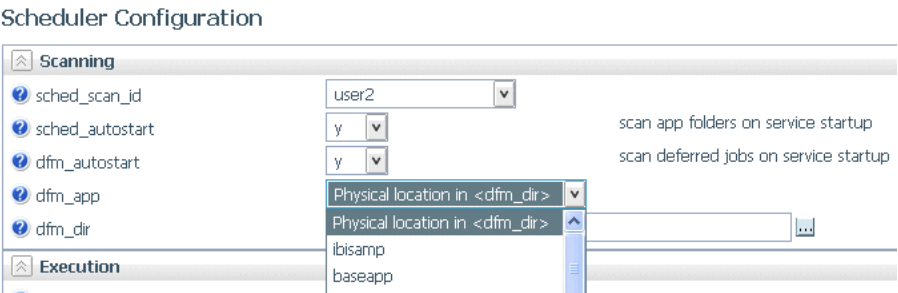
   If you select an application, it will override the directory identified in dfm_dir, and the dfm_dir text box will be hidden.

5. Click *Save and Restart Scheduler*.

Deferred requests and output will be returned to that application

Unification of Deferred and Schedule Processing

Deferred (DFM) execution functionality has been extended by unifying major features for deferred execution and scheduler processing. These extended features include the ability to send email notifications on start, completion, and failure of deferred jobs, deriving the email destination from the deferred job, deferred job settings, or the connected User ID, and unified logging. Scheduler and DFM properties have been restructured to reflect the unification of their configuration settings.

The new keywords dfm_email and dfm_email_from_userid were added for DFM jobs to provide a variety of email destinations.

To configure deferred and scheduler properties, right-click *SCHEDULER* in the Special Services and Listeners folder on the Workspace tab, and select *Properties*.

The Scheduler Configuration page opens. The page has Scanning, Execution, Logging and Output, and E-mail Notification sections.

Reference: **Scheduler Scanning Properties**

The Scheduler Scanning properties are shown in the following image.

`sched_scan_id`

Determines what user ID the Scheduler uses to scan the application path for scheduled flows. It can be used to restrict the set of application directories scanned by the Scheduler to a subset of the APP PATH of the effective administrator. The default value is the effective administrator ID of the server.

`sched_autostart`

If set to *y*, scanning for scheduled events is started when the DFM listener or a Scheduler service starts. If a service is not running, turning on *sched_autostart* will not make scanning available.

If set to *n*, a user may still start the scanning manually.

Depending on the number of files in the application path, *sched_autostart* may affect server performance.

The default value is *n*.

`dfm_autostart`

If set to *y* (the default), the DFM listener/Scheduler Service is started with the server. If it is set to *n* the Service does not start automatically on server start. The user can start the Scheduler manually.

`dfm_dir`
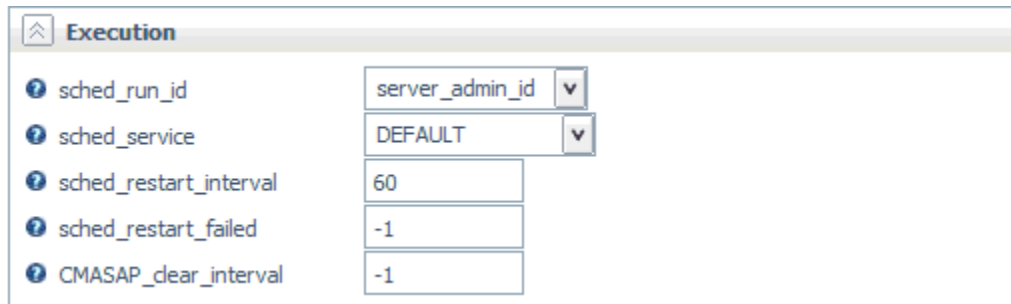
Defines the location where deferred requests and responses are stored. This is ignored if dfm_app is set.

dfm_app

Defines the application name where deferred requests and responses are stored.

Reference: **Scheduler Execution Properties**

The Scheduler Execution properties are shown in the following image.

sched_run_id

Determines the user ID the a flow uses to run scheduled flows, either server_admin_id or user. The default value is server_admin_id.

Note: Flows submitted from the Data Management Console, the Web Console, or CMRUN are run under the userid that submits the specific flow.

sched_service

Defines the agent service that the Scheduler will use when running flows. If not set, the DEFAULT service will be used.

sched_restart_interval

Specifies the time interval in seconds between restart attempts for all restartable flows. The default value is 60 seconds.

sched_restart_failed

Determines whether scheduled agents will be restarted after they fail. The valid values are:

n - Failed agents will be restarted at most *n* times.

0 - Failed agents will not be restarted.

-1 - Failed agents will be restarted infinitely.

The default value is *-1*.

CMASAP_clear_interval

Specifies how often (in seconds) CMASAP agents are removed from the agents list. The default value is -1, meaning never.

Reference: Scheduler Logging and Output Properties

The Scheduler Logging and Output properties are shown in the following image.

sched_log_lines

Defines the maximum number of lines per request that the Scheduler will write to the log. When this number of lines is reached, logging stops. Exceeding this limit for one request does not affect logging for other requests.

When set to -1, the number of lines is unlimited. When set to 0, logging is disabled. The default value is -1.

sched_standalone_log

If checked, generates a separate log file for each job.

sched_dmlog_app

Is the name of the application in which the scheduler separate log and statistics files are located.

sched_log_commit_interval

Specifies the maximum time interval in seconds that can elapse before log data is committed to the log. Used in conjunction with *sched_log_commit_maxlines*, these settings can fine-tune Scheduler logging behavior. The logging subsystem will commit data to the log whenever one of these maximums has been reached. Finding the best commit interval is a compromise among latency (the delay between the time a log message is received and when it is committed to the log database), reliability, and performance. Longer intervals enable greater I/O efficiency, but increase the potential amount of log information lost in a crash. The default value is 10.

sched_log_commit_maxlines

Specifies the maximum number of log lines to collect before committing them to the log. Used in conjunction with *sched_log_commit_interval*, these settings can fine-tune Scheduler logging behavior. The logging subsystem will commit data to the log whenever one of these maximums has been reached. Larger numbers enable greater I/O efficiency, but increase the potential amount of log information lost in a crash. The default value is 1000.

Merge formatted output into log

Changes value of sched_log_output_destination keyword.

When checked, it specifies that only the job Log is stored in the Scheduler log (sched_log_output_destination=Log). The output is stored in the dfm_dir location.

When unchecked, it specifies that the job Log and Output are stored in the Scheduler log (sched_log_output_destination=LogAndOutput).

dfm_maxage

Defines the maximum number of days that deferred reports are kept in the server after they are created. The value zero (0) means the age is unlimited. The default value is 30.

dfm_maxoutput

Defines the maximum size of a deferred report. Reports that over this limit will be removed.

On z/OS PDS deployment, the number represents a number of records. The valid value is any number between 0 and 15,728,688 inclusive.

On all other platforms, the number represents a number of kilobytes or megabytes with the suffix K or M. A valid value is any number between 0 and 65535 inclusive.

The default value is zero (0), which means the output is unlimited.

Reference: Scheduler E-Mail Notification Properties

The Scheduler E-Mail Notification properties are shown in the following image.

On Start

   Sends email when the procedure starts.

On Completion

   Sends email when the procedure completes.

On Failure

   Sends email if the procedure fails.

sched_email_address

   Defines the list of email recipients. The list can contain one or multiple email addresses and/or user IDs. Multiple entries should be separated by semicolons (;).

dfm_email

   When checked, the scheduler email settings are applied to deferred requests. The default is unchecked, which does not apply the scheduler email settings to deferred requests.

dfm_email_from_userid

   When the response of a deferred request is ready to be retrieved, an email notification can be sent to a specific email address. If this keyword is set to n, no email notification will be sent. If it is set to y and there is no email address specified in the deferred request, an email notification will be sent to the email address of the requestor specified in the admin.cfg configuration file or in the corresponding security provider. The default value is n.

Downloading Files From the Server

The right-click shortcut menu for a file in an application on the Web Console and Data Management Console now has a Download option, as shown in the following image.
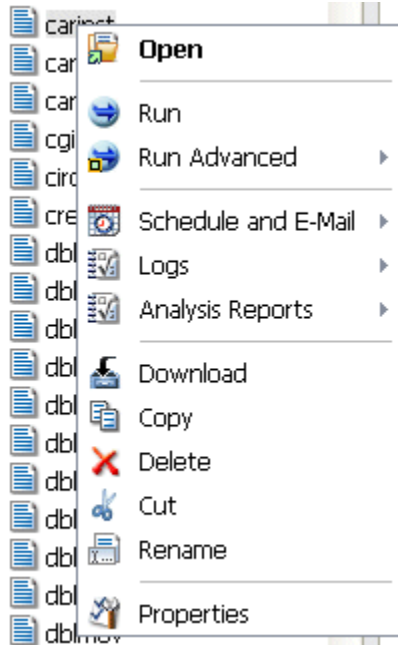
When this option is selected, the file is transferred to the Downloads folder of the user. On Windows, this folder is, by default, the following directory:

`C:\users\`*`username`*`\Downloads`

If you right-click a synonym, the shortcut menu gives you a choice of Master File or Access File.

Simplified User Interface for Managing the Application Path

The new User Interface for configuring the application path uses a double list.

You configure the application path from the Applications tab on the Web Console.

1. Click *Application Path* on the ribbon, or right-click the Application Directories tree and select *Application Path* from the shortcut menu.

The Application Path Configuration page opens as a double-list table. The left pane shows a list of all available applications, the right shows all applications in the active Application Path, as shown in the following image.

2. To add an application to the application path, drag it from the Available Applications list to any position on the Application Path list.

   You can move applications up or down on the path by dragging them up or down on the list.

3. To remove an application from the application path, drag it from the Application Path list to the Available Applications list.

4. When you have finished, Click *Save*.

On both lists, you can

❏ Search for applications using the Binocular Search. For information about the binocular search, see *Using the Web Console Binocular Search* on page 391.

❏ Customize the columns displayed, or reset the display to its default, using the View icon.

On the Application Path list, you can:

❏ Select a different profile.

❏ Preview the commands in the selected profile.

❏ Click the *Test* button to view the APP PATH command and the effective application path.

Renaming Applications and Application Files

Rename has been added as a right-click option for files and folders in the Web Console and Data Management Console.

Selecting *Rename* from the shortcut menu opens a dialog box in which you can enter a new name and click *OK*, as shown in the following image.
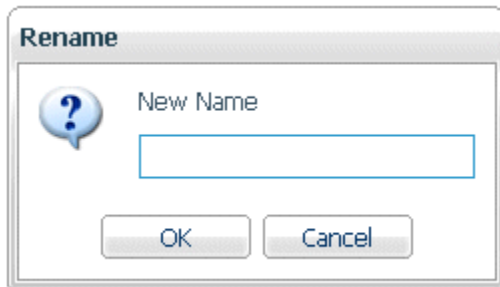
You cannot rename mapped applications (including SQL Repository apps), foccache, myhome, homeapps, or baseapp.

Note: If you rename an application that is directly under approot, it will no longer be on the application path. You can manually add the renamed application to APP PATH, if you want it to be on the search path of the server.

Configuration and Monitoring

This section provides detailed descriptions of new configuration and monitoring features.

Forcing a Scheduler Scan

A scheduler scan is initiated on server startup, if sched_autostart=y. In addition, the scheduler is updated for a procedure if you edit schedule information for a procedure or DataMigrator job using *Manage Schedule and Email* from the Web Console or DMC. At other times, you can force scanning of scheduler and deferred jobs in the following ways.

❑ On the Applications page, click the *Schedule/E-Mail* button on the ribbon and select *Force Scheduler Scan*.

❑ On the Workspace page, open the Special Services and Listeners folder, right-click Scheduler, and select *Force Scheduler Scan*.

❑ Issue the following command in the server command window.

```
edastart –forcescan
```

Adding Cc and Bcc to Email Actions

On the Schedule and E-Mail, the Customizing Event Routing, and Customizing New Event Routing pages of the Web Console and Data Management Console, you can add carbon copy (Cc) and blind carbon copy (Bcc) email recipients, as shown in the following image.

You can enter lists of email addresses by separating the addresses with semicolons (;).

Increase in Maximum Length of a Server Node Name

The maximum length of a server node name has been increased from eight characters to 16 characters.

Core Server and Clients

This section provides detailed descriptions of new features for the core server and clients.

Keeping Browser Cache Files Separate for Each Release

The Web Console browser cache files for each server build will be stored separately. This means that multiple Web Console sessions using the same browser will not impact each other. Therefore, you will not have to clear the browser cache to switch between multiple servers using the same machine and browser.

To implement separate cache files, each Web Console URL will automatically be invoked using a unique identifier. For example, if you enter the following URL:

```
http://mypcname:8021/wc/bcstart.html
```

The URL will automatically be issued with a unique identifier. For example:

```
http://mypcname:8021/A4643588A8A7C435/wc/bcstart.html
```

All other URLs generated by web connections to the server will use the same identification string.

Returning a JSON Answer Set Using the SOAP Listener

Using the Simple Object Access Protocol (SOAP) Listener, you can run report requests or DataMigrator flows using RESTful Web Service calls. The answer set is returned in JSON format.

The following steps describe how to configure and use the SOAP Listener to make the web service calls and return the answer set.

1. First, configure the SOAP Listener.

   On the Workspace tab, right-click the *Special Services and Listeners* folder, point to *New*, and then click *SOAP*.

   The Listener Configuration page opens, as shown in the following image.

2. Enter the SOAP Listener port and click *Save and Restart Listener*.

3. Place the procedure to run in an application directory in the APP PATH of the Reporting Server.

Assuming you created the WebFOCUS Retail tutorial in the ibisamp application, the following FOCEXEC can be created in ibisamp to demonstrate the JSON Answer Set feature. If you created the WebFOCUS Retail tutorial in another application name, substitute application names where applicable.

```
TABLE FILE WF_RETAIL_LITE
SUM
   COGS_US
BY BRAND
BY PRODUCT_CATEGORY
BY PRODUCT_SUBCATEG
IF PRODUCT_CATEGORY EQ '&CATEGORY'
END
```

Note that the request has an IF test that requires a value for the variable &CATEGORY. You will supply the parameter name and value as part of the URL.

4. In a browser window, enter a URL in the following form.

    ```
    http://host:port/rest/app/proc?param=value ...
    ```

    where:

     host

        Is the Reporting Server host name.

     port

        Is the SOAP Listener port number.

     app

        Is the application that contains the procedure. This application must be on the APP PATH of the Reporting Server.

     proc

        Is the procedure name and extension.

     param

        Is a parameter name.

     value

        Is the parameter value.

For example, to run the retail_ws.fex procedure with the parameter &CATEGORY=Accessories, in the ibisamp application, on the host localhost, enter the following URL and press Enter.

```
http://localhost:8050/rest/ibisamp/retail_ws.fex?CATEGORY=Accessories
```

The following answer set is returned in JSON format. In this answer set, after the message header information and report statistics, each row is listed in an array named *rows*. The array of all rows is enclosed in square brackets ([ ]). Each row is enclosed in curly braces ({ }) and separated from the other rows by a comma (,). The rows consist of *fieldname:value* pairs separated by commas. Alphanumeric values are enclosed in double quotation marks (").

```
{ "_ibi_Report" : {"Messages" : [ "0 NUMBER OF RECORDS IN TABLE=        10
LINES=      10"],
"rows" : [
 { "BRAND" : "Audio Technica" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            38000.00},
 { "BRAND" : "Denon" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            25970.00},
 { "BRAND" : "Grado" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            21930.00},
 { "BRAND" : "Logitech" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Universal Remote Controls" ,
"COGS_US" :           61432.00},
 { "BRAND" : "Niles Audio" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Universal Remote Controls" ,
"COGS_US" :           73547.00},
 { "BRAND" : "Pioneer" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            16720.00},
 { "BRAND" : "Samsung" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Charger" , "COGS_US" :            5405.00},
 { "BRAND" : "Sennheiser" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            78113.00},
 { "BRAND" : "Sony" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Charger" , "COGS_US" :            3168.00},
 { "BRAND" : "Sony" , "PRODUCT_CATEGORY" : "Accessories" ,
  "PRODUCT_SUBCATEG" : "Headphones" , "COGS_US" :            18592.00}
     ]
}
}
```

Automatic Java Lookup on Windows

The server has an automatic Java lookup feature on Windows to enable the Java Listener to start without any direct server configuration steps.

At server startup time, if no explicit JAVA_HOME or JDK_HOME variables are set either at the system environment level or in the server environment configuration file (EDACONF\bin \edaenv.cfg), the Windows registry will be searched for an applicable Java JDK or JRE release (currently 1.7 or higher) and the appropriate variable will be set.

This feature assumes that a Java installation has been done using the Oracle Windows JRE or JDK installation tool (which sets the Windows registry) prior to running the server (but the server itself requires no configuration).

EDAMAIL Support for Carbon Copy and Blind Carbon Copy

The EDAMAIL command now supports carbon copy (cc) and blind carbon copy (bcc) options.

The syntax is:

```
EDAMAIL to=tadrlist1,
[toaddr=tadrlist2],
[cc=cadrlist2,]
[ccaddr=cadrlist2,]
[bccaddr=bcadrlist,]
[from=fadr1],
[fromaddr=fadr2],
[replyto=radr],
[importance={low|normal|high}],
[subject=string],
[flags={a|A|i}],
[filetype=extension],
[filename=file],
[message=bodymessage]
```

where:

to=tadr1

Is the email recipient displayed by the user email client (and used in an email client Reply To All, if a toaddr header is not supplied). Multiple addresses are allowed, using a semi-colon as the address separator. A comma (,) is also allowed as a separator, if the overall address string is enclosed in single quotation marks (').

If the *to* parameter is used in conjunction with *toaddr*, the value of *to* may be an arbitrary string, such as "Group Managers", which most email clients will display as a pseudo title in the To field, without displaying the actual addresses used in the toaddr parameter. A forced blank can be supped for the To field by using to="".

toaddr=tadrlist2

Is the email recipient. If not supplied, SMTP servers will use the *to* header. Email clients will use the toaddr value in an email client Reply To All. Multiple addresses are allowed, using a semi-colon as the address separator. A comma (,) is also allowed as a separator, if the overall address string is enclosed in single quotation marks (').

cc=cadrlist1

Is the carbon copy recipient displayed by the user email client (and used in an email client Reply To All, if a ccaddr header is not supplied). Multiple addresses are allowed, using a semi-colon as the address separator. A comma (,) is also allowed as a separator, if the overall address string is enclosed in single quotation marks (').

If the *cc* parameter is used in conjunction with *ccaddr*, the value of *cc* may be an arbitrary string, such as "Group Managers", which most email clients will display as a pseudo title in the Cc field, without displaying the actual addresses used in the ccaddr parameter. A forced blank can be supped for the Cc field by using to="".

`ccaddr=`*`cadrlist2`*

Is the carbon copy recipient. If not supplied, SMTP servers will use the *cc* header. Email clients will use the ccaddr value in an email client Reply To All. Multiple addresses are allowed, using a semi-colon as the address separator. A comma (,) is also allowed as a separator, if the overall address string is enclosed in single quotation marks (').

`bccaddr=`*`bcadrlist`*

Is the blind carbon copy recipient. Email clients will use the bccaddr value in an email client Reply To All. Multiple addresses are allowed, using a semi-colon as the address separator. A comma (,) is also allowed as a separator, if the overall address string is enclosed in single quotation marks (').

`from=`*`fadr1`*

Is the email sender displayed by the email client (and used in an email client Reply, unless overridden by a fromaddr or Reply To header). If the from parameter is used in conjunction with fromaddr, the from value may be an arbitrary string, such as The Boss, which most email clients will display as a pseudo title in the From field, and will not display the actual address used in the fromaddr parameter.

`fromaddr=`*`fadr2`*

Is the email sender. If not supplied, most email clients will use the From header when doing a reply.

`replyto=`*`radr`*

Is the email sender. If not supplied, most email clients will use the *fromaddr* or *from* parameter value.

`importance={low|normal|high}`

Is the email importance level for email clients that support importance flags. Valid values are high, normal, and low.

`subject=`*`string`*

Is the email subject string. If the subject string contains a comma (,), the string must be enclosed in quotation marks (').

`flags=value`

> If set to a or A, it indicates that a file specified with the filename and filetype parameters is to be sent as an attachment. If set to i, the file is included as the body of the email.

`filetype=extension`

> Defines the data file type for an email message body that uses a file as an attachment. Any application file type or ddname is valid, including MASTER, FOCEXEC, HTML, TEXT, and so on. Leave the parameter out to use the inline email message body feature.

`message=bodymessage`

> Is the inline data stream containing the email message body. If used, it must be the last parameter in the EDAMAIL command. To use the inline data stream feature, the filetype and filename parameters cannot be supplied. The data stream may also be spread onto multiple lines if EDAMAIL is used with the EX -LINES {n|*} feature.

> If an inline data stream message body is spread across multiple lines in the procedure, the resulting email is a single line of output. Multi-line message bodies are respected when the message body from a file option is used.

Example: **Mailing an HTML File as a Message Body Using Carbon Copy and Blind Carbon Copy**

```
TABLE FILE file1
PRINT A B C
ON TABLE HOLD AS MYFILE FORMAT HTML
END
EX EDAMAIL to=Managers,toaddr=user1@corp1.com;user2@corp1.com,
cc=Subordinates,ccaddr=user3@corp1.com,bccaddr=boss@corp1.com,
from=support1@corp1.com,subject=File1 Report, filetype=HTML,
filename=MYFILE
```

Diagnostics

This section describes new diagnostic features.

Logging All Environment Variables in EDAPRINT

Starting with this release, the top of the EDAPRINT log file contains all environment variables. In addition, if JDK_HOME and JAVA_HOME are both not set, the following warning message displays in EDAPRINT:

```
W JDK_HOME= or JAVA_HOME= required for Java Listener start
```

The following example shows a sample of the top portion of the EDAPRINT log file:

```
02/24/2016 09:57:11.753 I Workspace initialization started
02/24/2016 09:57:11.753 I EDACONF=C:\ibi\srv99\wfs
02/24/2016 09:57:11.753 I EDAHOME=C:\ibi\srv99\home
02/24/2016 09:57:11.753 I Environment Variables...
02/24/2016 09:57:11.753 I  ALLUSERSPROFILE=C:\Documents and Settings\All
Users
02/24/2016 09:57:11.753 I  APPDATA=C:\Documents and Settings
\se02703\Application Data
02/24/2016 09:57:11.753 I  CLASSPATH=.
02/24/2016 09:57:11.769 I      C:\Program Files\Java\jre6\lib\ext
\QTJava.zip
02/24/2016 09:57:11.769 I  CommonProgramFiles=C:\Program Files\Common Files
02/24/2016 09:57:11.769 I  COMPUTERNAME=INFORMAT-31B4D7
02/24/2016 09:57:11.769 I  ComSpec=C:\WINDOWS\system32\cmd.exe
02/24/2016 09:57:11.769 I  DEFLOGDIR=C:\Documents and Settings\All Users
\Application Data\McAfee\DesktopProtection
02/24/2016 09:57:11.769 I  EDACONF=C:\ibi\srv99\wfs
02/24/2016 09:57:11.769 I  EDAEXTSEC=OFF
02/24/2016 09:57:11.769 I  EDAHOME=C:\ibi\srv99\home
02/24/2016 09:57:11.769 I  EDAPRINT=C:\ibi\srv99\wfs
02/24/2016 09:57:11.769 I  EDASHARE=C:\ibi\srv99\wfs
02/24/2016 09:57:11.769 I  EDATEMP0=C:\ibi\srv99\wfs\edatemp
02/24/2016 09:57:11.769 I  FP_NO_HOST_CHECK=NO
02/24/2016 09:57:11.769 I  HOMEDRIVE=H:
02/24/2016 09:57:11.769 I  HOMEPATH=\
```

Metadata

This section provides detailed descriptions of new server metadata features.

Business View Plus (BV+) Candidate for Release

Business View Plus (BV+) combines the power and capabilities of Business View (BV) and Dimension View (DV) into one feature that allows a customized view of the data source and enables the use of joins, measures, hierarchies, attributes, expressions, and filters. This allows for robust report, chart, document, and visualization development using a customized logical view of a data source.

A traditional Business View offered users a customized logical view of a data source by grouping related items into folders that reflect business logic for an application, rather than the physical position of items in the data source. However, the fields in these folders did not have any indication of their roles in a request.

A traditional Dimension View, on the other hand, categorized fields on the basis of their roles in a request. Measures were placed in measure groups, hierarchies were organized within dimensions, levels were organized within hierarchies, and attributes were organized within levels. Then, when a field was double-clicked in InfoAssist+ or dragged onto the report or chart canvas in App Studio, it was added as a sort field or aggregation field depending on its placement in the Dimension View structure. Dimension Views, however, offered no ability to create a custom logical view of the data source.

BV+ combines Business Views and Dimension Views by enabling you to group fields into folders and, for each field, assign a role that indicates its role in a request. The syntax is clear and simple, and it provides all of the functions of both traditional Business Views and Dimension Views. In addition, BV+ gives you total flexibility in creating folders anywhere in the structure, and in reusing fields in multiple folders.

For example, if you assign the role DIMENSION to a field, it will automatically be added to the By field container for reports and the horizontal axis for charts if you double-click or drag the field onto the report or chart canvas. If you assign the role Drill Level to successive fields in a folder and turn AUTODRILL on, automatic drilldowns will be generated from the top level to the bottom level on the generated output.

You can create or edit a synonym to use BV+ in the Reporting Server Web Console, the Data Management Console, or the App Studio Metadata Canvas.

Introduction to BV Namespace Modes

When you upload a file or create or open a synonym in the Reporting Server Web Console or Data Management Console, the synonym opens in one of two modes for creating a BV+ structure, BV_NAMESPACE=OFF mode or BV_NAMESPACE=ON mode. The mode in which the synonym opens determines the types of BV+ structures you can add to your synonym. It also controls the type of field name qualifiers that will be used, after the synonym is saved, when you create a request using the WebFOCUS tools.

You can set your Web Console preferences to open Data Assist, the wizards, the DMC, and the App Studio Metadata Canvas in your preferred BV Namespace mode by going to the *Workspace* tab, clicking *FOCUS Sets and Info*, clicking *Settings for Web Console Preferences*, and setting the parameter AUTO_BV_NAMESPACE to OFF (the default if you install a new server) or ON. If the synonym already contains a DV or BV structure, the presence of this existing structure will override your setting with BV_NAMESPACE=OFF or BV_NAMESPACE=ON, respectively.

If you create a new synonym, or open an existing synonym that has no DV or BV, it will respect the setting you set in the Web Console. When you upload a file, the synonym has no existing DV or BV structure, so it respects the mode you set in the Web Console.

Reference: **BV_NAMESPACE=OFF Mode**

BV_NAMESPACE=OFF mode uses physical segment names to qualify field references in reports. If you open an existing synonym that has a DV, it will open in this mode, regardless of the setting you configured. In this mode, you can only add nodes that conform to the DV structure. That is, you can add new measure groups and dimensions under the existing measure group and dimension structure.

The following describes the structures and actions available in new or existing synonyms in BV_NAMESPACE=OFF mode:

❑ **Creating a new cluster synonym or opening an existing synonym that has no BV or DV.** If the synonym has no logical view defined, It opens with three default nodes in the Business View pane, Filters and Variables, Measure Groups, and Dimensions, as shown in the following image.
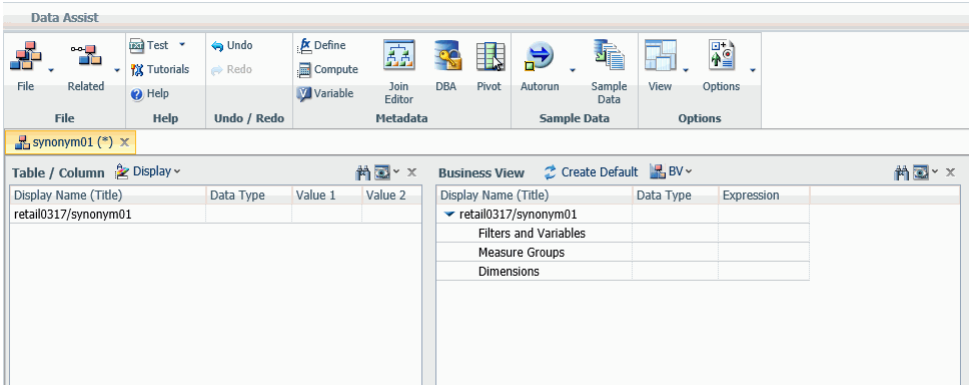
These nodes are based on a DV structure, and any edits you make to the synonym in this pane using BV_NAMESPACE=OFF mode must adhere to this structure. The right-click menu options provide only the structures available for a DV. You can insert a new measure group under the Measure Group node or a new dimension folder under the Dimensions node, but you cannot create a new node in the synonym. In a measure group folder, you can only place measures. In a dimensions folder, you can only place dimensions. Under a dimension, you can only add hierarchies, and under a hierarchy field, you can only add attributes.

❏ **Opening an existing synonym with a DV defined.** It opens showing the DV organization and icons in the Business View pane. The synonym syntax is converted to use BV+ folders with the DV structure. You cannot create new folders, you are limited to the structure already defined in the Business View pane. The right-click menu options provide only the structures available for a DV, as shown in the following image that shows the right-click options for the Measure Group folder.
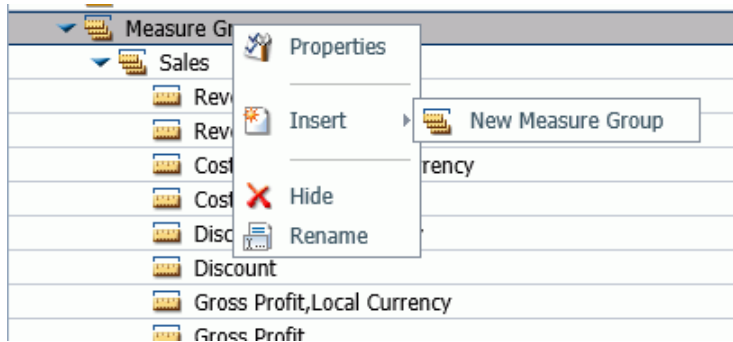
Reference: **BV_NAMESPACE=ON Mode**

BV_NAMESPACE=ON mode uses logical folder names to qualify field references in reports. If you open an existing synonym that has a BV, it will open in this mode, regardless of the setting you configured. In this mode, you can create your own logical view of the synonym. You are free to add new folders and assign DV roles to fields and folders.

The following describes the structures and actions available in new or existing synonyms in BV_NAMESPACE=ON mode:

❏ **Creating a new cluster synonym or opening an existing synonym with no DV or BV.** No nodes are pre-configured, as shown in the following image.
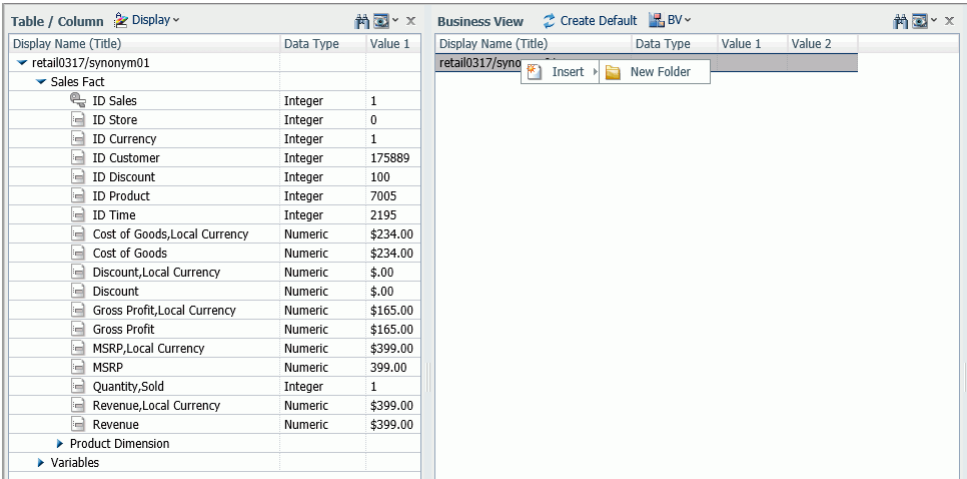
The right-click menu options provide all BV+ options.

❑ **Opening an existing synonym with a BV defined.** It opens in BV_NAMESPACE=ON mode. It will open showing the Business View structure defined within it. The right-click menu options provide BV+ options, as shown in the following image.

Reference: ### Usage Notes for BV_NAMESPACE Modes

❑ In BV_NAMESPACE=ON or OFF mode, the folder structure must include all of the fields referenced in the request, as fields not included in folders will not be accessible.

❑ In BV_NAMESPACE=ON mode, moving a field from one folder to another may also make the field inaccessible, as the request will not have the correct folder qualifier for the field.

❑ Synonyms in BV_NAMESPACE=OFF mode have the attribute BV_NAMESPACE=OFF on the file declaration.

❑ You can change BV Namespace modes in the Reporting Server Web Console by clicking the *BV* menu at the top of the Business View pane and selecting *BV_NAMESPACE=ON* or *BV_NAMESPACE=OFF*.

❑ If you generate a request using the WebFOCUS tools in one BV_NAMESPACE mode, it may not run if the synonym is converted to the other BV_NAMESPACE mode, as the field qualifiers will be incorrect for the new mode.

❏ If you change the BV_NAMESPACE mode, a popup window opens to warn you of the potential effects on existing requests.

❏ When you begin the cycle of developing reports and metadata in parallel, use BV_NAMESPACE=OFF mode to make sure that procedures developed earlier in the cycle will continue to run as changes are made to the metadata.

❏ Any changes to metadata should be thoroughly tested before use in production environments.

Assigning DV Roles

In BV+, you define folders, which function as segments to provide a view of the synonym and to define the accessible fields and their relationships. Folder relationships are the same as segment relationships, with parent folders, child folders, and sibling folders.

While you have total flexibility defining a structure using any fields from your data source, when you issue a report request against the synonym, the retrieval path for the data must conform to any constraints imposed by your DBMS entity diagrams and by the rules of WebFOCUS retrieval.

Only the folders will be displayed in the WebFOCUS tools, not the real segments, and only the fields within the folder structure will be accessible for reporting.

You can assign a DV role to a folder or field by right-clicking the folder or field and selecting a DV role. The following image shows the right-click options for a folder.
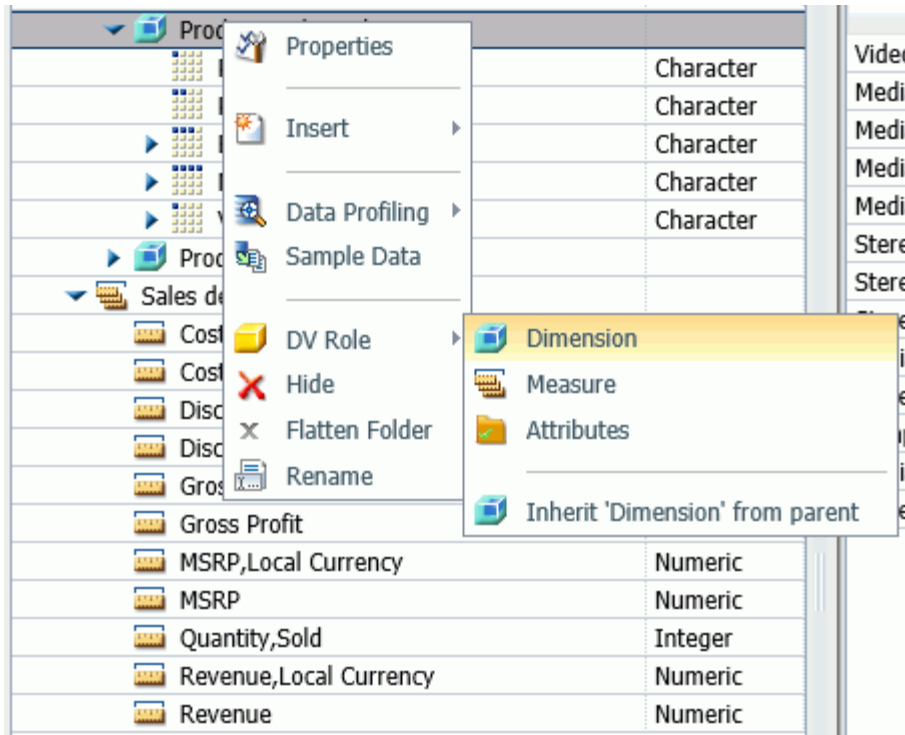
You can explicitly assign a DV role to a folder or field, or have it automatically inherit its role from its parent. If you explicitly assign a DV role, that role moves with the object if you drag it to another location within the BV+ structure. If you do not explicitly assign a DV role, the role changes as you move the object under a new parent, except if you drop it onto a field with the Drill Level role. If dropped onto a Drill Level field, the moved field inherits the Drill Level role.

The following DV roles can be assigned.

❏ **Dimension.** A dimension field, when double-clicked or dragged onto the report or chart canvas in the WebFOCUS tools, will automatically be added to the request as a vertical (BY) sort field.

A folder can be assigned the role Dimension.

A field can be assigned the role Dimension (Standalone) or Dimension (Drill Level). When it is assigned the role Dimension (Drill Level), it will become part of a hierarchy where the levels depend on the order of the fields in the folder. Then, when AUTODRILL is turned on, automatic drill-downs will be created on the report or chart output. The following image shows the choices for DV role when you right-click a dimension field.
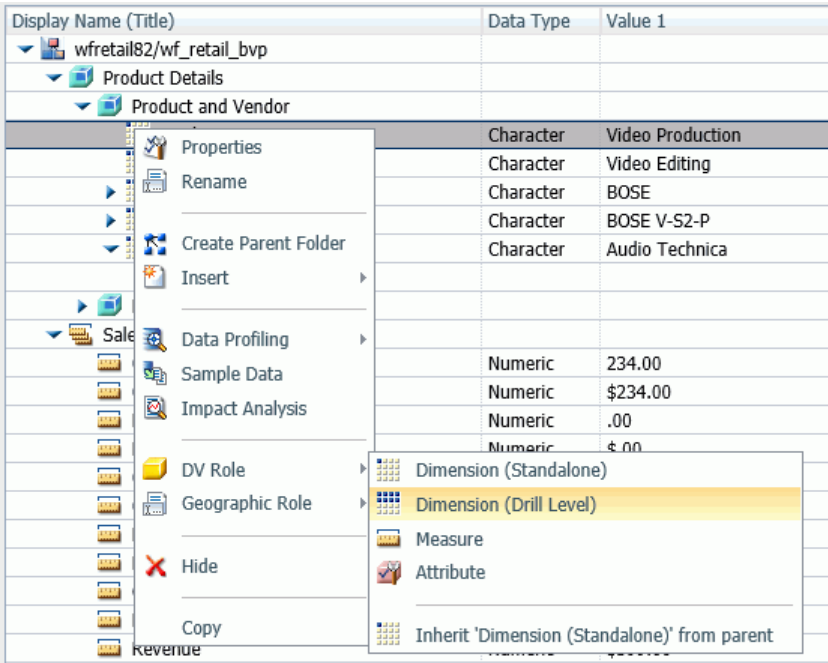
For a folder assigned the DV role Dimension or a field assigned the DV role Dimension (Standalone), the following attribute is added to the folder or field declaration in the synonym.

```
DV_ROLE=DIMENSION
```

For a field assigned the DV role Dimension (Drill Level), the following attribute is added to the field declaration in the synonym.

```
DV_ROLE=LEVEL
```

A folder can contain only one drill level hierarchy. However, you can use the same fields in multiple hierarchies by placing each hierarchy in a separate folder. A folder with a drill level hierarchy is not limited to just the hierarchy. It can contain other fields with different DV_ROLEs.

❑ **Measure.** A measure field, when double-clicked or dragged onto the report or chart canvas in the WebFOCUS tools, will automatically be added to the request as an aggregated value (SUM), if it is numeric. If it is alphanumeric, it will be added as a vertical (BY) sort field. A folder or field can be assigned the role Measure.

For a folder or field assigned the DV role Measure, the following attribute is added to the folder or field declaration in the synonym.

```
DV_ROLE=MEASURE
```

❑ **Attribute.** An attribute field, when double-clicked or dragged onto the report or chart canvas in the WebFOCUS tools, will automatically be added to the request as an aggregated value (SUM), if it is numeric, or as a vertical sort field (BY), if it is alphanumeric.

For a folder or field assigned the DV role Attribute, the following attribute is added to the folder or field declaration in the synonym.

```
DV_ROLE=ATTRIBUTE
```

❑ **Folder.** A folder is a virtual segment in a BV+. It can be assigned the roles Dimension, Measure, or Attribute.

Note: When a folder is inserted as a child of a field, the attribute PARENT_FIELD describes this relationship. By default, such a folder and its fields will be assumed to have the Attribute role.

❑ **None.** If no role is assigned, the field or folder will inherit its role from its parent. If a role has been assigned, you can remove it by selecting the option to inherit its role from its parent, as shown in the following image.
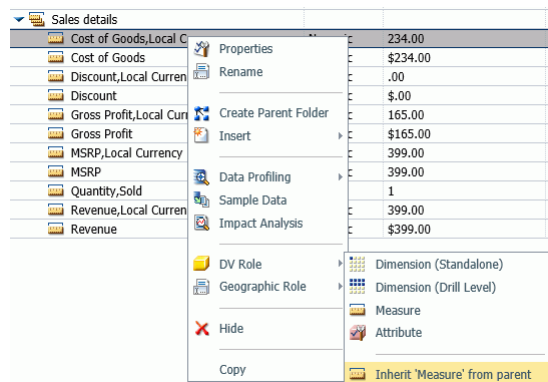
Example: ## Sample BV+ Declarations

The following declarations show sample BV+ folder and field definitions. Note that the declaration for each field in a BV+ folder specifies the real segment it actually belongs to.

Sample Dimension Folder Declaration

The DV_ROLE for the PRODUCT_CATEGORY folder is DIMENSION.

```
FOLDER=PRODUCT_CATEGORY, PARENT=FOLDER1,
   DV_ROLE=DIMENSION,
   DESCRIPTION='Product and Vendor', $
```

Sample Attributes Folder Declared as a Child of a Field

The ATTRIBUTES1 folder has the DV_ROLE ATTRIBUTE. Its parent folder is PRODUCT_CATEGORY, and its parent field is MODEL.

```
FOLDER=ATTRIBUTES1, PARENT=PRODUCT_CATEGORY, PARENT_FIELD=MODEL,
   DV_ROLE=ATTRIBUTE,
   DESCRIPTION='Model Details', $
```

Sample BV+ Level Hierarchy and Standalone Dimension

The PRODUCT_CATEGORY folder has a hierarchy defined consisting of the PRODUCT_CATEGORY, PRODUCT_SUBCATEG, BRAND, and MODEL fields. The field VENDOR_NAME is a standalone dimension field.

```
FOLDER=PRODUCT_CATEGORY, PARENT=FOLDER1,
   DV_ROLE=DIMENSION,
   DESCRIPTION='Product and Vendor', $
   FIELDNAME=PRODUCT_CATEGORY, ALIAS=PRODUCT_CATEGORY,
     BELONGS_TO_SEGMENT=WF_RETAIL_PRODUCT,
     DESCRIPTION='Product Category',
     DV_ROLE=LEVEL,  $
   FIELDNAME=PRODUCT_SUBCATEG, ALIAS=PRODUCT_SUBCATEG,
     BELONGS_TO_SEGMENT=WF_RETAIL_PRODUCT,
     DESCRIPTION='Product Subcategory',
     DV_ROLE=LEVEL,  $
   FIELDNAME=BRAND, ALIAS=BRAND,
     BELONGS_TO_SEGMENT=WF_RETAIL_PRODUCT,
     DESCRIPTION='Product Brand',
     DV_ROLE=LEVEL,  $
   FIELDNAME=MODEL, ALIAS=MODEL,
     BELONGS_TO_SEGMENT=WF_RETAIL_PRODUCT,
     DESCRIPTION='Product Model',
     DV_ROLE=LEVEL,  $
   FIELDNAME=VENDOR_NAME, ALIAS=VENDOR_NAME,
     BELONGS_TO_SEGMENT=WF_RETAIL_VENDOR,
     DESCRIPTION='Vendor Name',
     DV_ROLE=DIMENSION,  $
```

Sample Measure Field

The PRODUCT_COST field has been assigned the DV_ROLE MEASURE.

```
FIELDNAME=PRODUCT_COST, ALIAS=PRODUCT_COST,
BELONGS_TO_SEGMENT=WF_RETAIL_PRODUCT,
     DESCRIPTION='Product Cost',
     DV_ROLE=MEASURE,  $
```

Data Assist

Data Assist is a unified environment for managing and enhancing synonyms. It is available on the WebFOCUS Reporting Server Web Console and is incorporated in the Upload Wizard.

Data Assist provides an extensive user interface using a ribbon and right-click sensitive paradigm for enhancing synonyms. You see the results of all changes in the tabbed output pane.

The following are some of the features you might want to add to the synonym to enhance your data access and reporting capabilities.

❏ Add virtual columns (DEFINE fields) and columns for aggregated values (COMPUTE fields).

❏ Apply functions to fields.

❏ Grouping, phonetic grouping, and binning field values.

❏ Add filters to specify data selection criteria.

❏ Change the format of fields (for example, the size of an alphanumeric field or the format of a date field).

❏ Create a cluster join view by linking available synonyms to create a multi-segment (multi-table) file for reporting.

❏ Create Business Views of the metadata in order to limit the fields available to any retrieval request that references the Business View and to group fields together based on their roles in an application.

❏ Pivot data, for example, pivot repeating columns or groups of repeating columns into rows.

❏ Define hierarchies for automatic drilldowns.

❏ Apply security rules for fields and values.

For more information, see the *Server Administration* manual.

LNGPREP Utility: Preparing Metadata Language Files

The LNGPREP utility extracts TITLE, DESCRIPTION, CAPTION, and PROMPT attribute values from application Master Files into specially formatted language translation files for each language you need. Once you have the contents of these language files translated, your users can run these applications in the language they choose.

LNGPREP does two things. It extracts attribute values from a Master File into language files, and it inserts or updates the TRANS_FILE attribute in the Master File with a value identifying the application folder where the language files reside and a prefix used for naming the set of language files. If the Master File is part of a cluster, LNGPREP will extract translatable strings from every Master File referenced in the cluster, and will update each with the same TRANS_FILE value.

LNGPREP requires an input file listing the three-character codes of the languages you need.

The name of each language file starts with the prefix specified in the TRANS_FILE value, followed by a three-character language code, and the extension *.lng*.

For example, assume the language input file contains the French and Spanish language codes:

```
fre
spa
```

If the Master File specifies:

```
trans_file = xlate/xl_
```

The language translation files would be in the *xlate* application folder, named:

`xl_fre.lng` for French

`xl_spa.lng` for Spanish

Reference: The Base Language File

Each Master File must have a single base language in which the DESCRIPTION, TITLE, CAPTION, and PROMPT attributes are specified. This language need not be English.

LNGPREP extracts these attribute values into the base language file, whose language code, for historical reasons, is *eng*. In this case, *eng* does *not* mean English. It means *whatever language the Master File is written in*.

The base language file (*prefix*eng.lng) should *never* be hand edited. All other .lng files *must* be hand edited by translators, to translate the string values from the base language to the appropriate language.

Translating Applications into English

Since language code *eng* is reserved to mean base language, you cannot use it to contain English translations of an application whose base language is not English. In those cases, use any of the other English dialect language codes, such as AME, UKE, CAE, or AUE. For example, if the base language is German, specify AME in the languages file, run LNGPREP, and it will produce *prefix*eng.lng and *prefix*ame.lng files, both in German. Translate the contents of *prefix*ame.lng into English. Leave *prefix*eng.lng untouched.

Reference: ## How Translated Master File Attributes Are Displayed

Each language file contains a line for each attribute value from a related set of Master Files. Each attribute value has a unique index number assigned to it. For example, if the Master File contains FIELDNAME=PRODUCT_CATEGORY, TITLE='Product,Category', and that TITLE happens to be the 39th translatable attribute value, LNGPREP will produce lng files all containing the line:

```
39 = Product,Category
```

Your French translator will edit *prefix*fre.lng, leaving the index values unchanged while translating the string values, producing, in this case,

```
39 = Produit,Catégorie
```

At run time, when the TITLE for field PRODUCT_CATEGORY needs to be displayed, if WebFOCUS is configured for LANG=FRE, WebFOCUS looks up "Product,Category" in *prefix*eng.lng, finds index value 39, looks up *39* in *prefix*fre.lng, and displays the TITLE as "Produit,Catégorie."

LNGPREP Modes

You can run LNGPREP from the Web Console using the *Prepare Translation Files* option, or you can run it using syntax. In either case, you must first create a configuration file containing the three-character language codes for each translation file you need, one language code on each line. The first invocation of LNGPREP for a given Master File adds the TRANS_FILE attribute in that and all related Master Files, creates the base language file by scanning the Master Files for supported attribute values, and creates a copy of the base language file with the correct name for each additional language. Then, a translator has to translate the values in each additional language file from the base language to the correct language for that file.

On each subsequent run, LNGPREP will check for updates to the list of related Master Files and attribute values and update the files as needed. Translators will then have to translate any attribute values added to the language files.

Reference: **LNGPREP Best Practice**

The recommended best practice is to create an app directory solely for the purpose of containing .lng files, and use this appname and a common prefix value for all LNGPREP commands. In addition, put the languages *fn*.cfg file in this app folder. This will create one set of .lng files for all apps, minimizing the time and effort spent on translation.

Procedure: **How to Prepare Metadata Language Files Using the Web Console**

1. Right-click a synonym, select *Metadata Management*, then *Prepare Translation Files*, as shown in the following image.
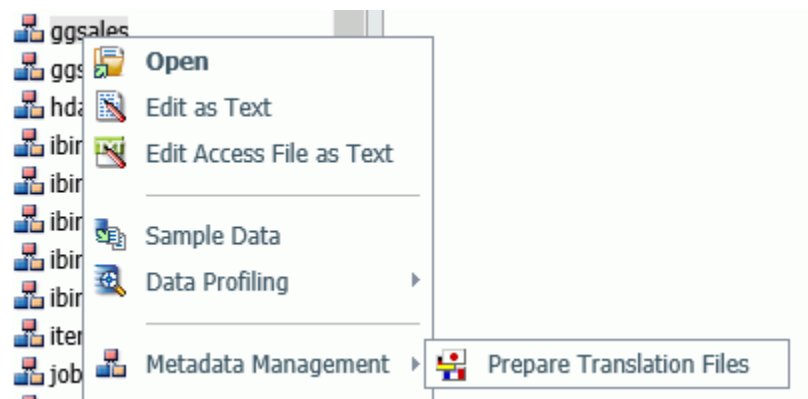
The Set Translation Files page opens, as shown in the following image.

2. Enter the following values or accept the defaults.

    `Application for Translation Files`
    Is the name of the application where the language files will be stored. You can click the ellipsis to select an application from the current application path. By default, it is the application where the synonym resides.

    `Prefix`
    Is the prefix value for the translation files for the selected synonym.

> Languages File
>
> Is the file containing the list of language codes for which translation files should be prepared. The file must have the extension .cfg, be stored in an application directory on the application path, and have one language code on each line. You can click the ellipsis to select the application where the languages file is stored.

3. Click *OK*.

   The language files are prepared using the application, prefix, and languages configuration file you specified. A status page will open listing the language files created and the Master Files processed.

Syntax: **How to Run the LNGPREP Command Using Syntax**

```
LNGPREP FILE n_part_name LNGAPP appname LNGPREFIX prefix
        LNGFILE appname/fn
```

where:

n_part_name

Specifies the n-part (app1/app2...) name of a Master File.

appname

Specifies the location where .lng files will be written and updated.

prefix

Specifies the literal characters that will precede the three-character language code in the names of the .lng files.

appname/fn

Specifies the *appname* and *filename* of a user-created .cfg file containing the list of three-character language codes, one per line. For example, the following file named langretail.cfg contains language codes for American English, French, and Japanese:

```
ame
fre
jpn
```

Example: **Sample LNGPREP Command**

Assume the lnglist.cfg file contains the language codes fre (French) and spa (Spanish):

```
fre
spa
```

Issue the following LNGPREP command:

```
LNGPREP FILE weather/forecast LNGAPP xlate LNGPREFIX tq_ LNGFILE  xlate/lnglist
```

Alternately, you can right-click the forecast synonym, point to *Metadata Management*, and select *Prepare Translation Files*. The *Set Translation File for weather/forecast.mas* page opens. Enter the values shown in the following image and click *OK*.

The following language files will be created:

❏ xlate / tq_eng.lng

❏ xlate / tq_fre.lng

❏ xlate / tq_spa.lng

The Master File weather/ forecast.mas will be updated with the following attribute

```
TRANS_FILE= xlate/tq_
```

Translators then have to translate the values in xlate/tq_fre.lng and xlate/tq_spa.lng.

Security

This section provides detailed descriptions of new security features.

Encrypting the admin.cfg File

The admin.cfg file contains the users and groups registered for the internal server security (PTH). To encrypt this file, do the following.

1. Connect to the Web Console as a Server Administrator.

2. On the Access Control page ribbon, click *Settings* and select *Encryption Settings*.

3. Select *y* from the encrypt_admincfg drop-down list.

4. Click *Apply and Restart Server*.

When the server restarts, admin.cfg will be encrypted.

Improved User Interface for Configuring an LDAP Security Provider

The user interface for configuring an LDAP security provider has been redesigned. The configuration parameters have been grouped into categories, and there are new buttons for retrieving sample lists of users and groups.

1. To configure a new LDAP provider, on the Access Control page, right-click *LDAP* under Security Providers and select *New* from the shortcut menu.

   The following LDAP Security Provider Configuration page opens on which you configure the provider name and connection parameters.

2. Configure the following connection parameters.

   LDAP_PROVIDER

   Specifies a name for this provider.

   ldap_host

   Is a host identifier consisting of a host name or an IPv4 dotted string representing the IP address of a host running the LDAP server to connect to.

   Alternatively, it may contain a list of space-delimited host identifiers. Each host identifier may include a trailing colon and port number. In the case where more than one host identifier is specified, each host identifier in turn will be contacted until a connection can be established. For example:

   ```
   directory.example.com
   192.0.2.0
   directory.example.com:1050 people.catalog.com 192.0.2.0
   ```

ldap_secure_connection

Specifies whether the server uses a *Secure Socket Layer (SSL) session with the LDAP server*. Select *No* or *Yes*. The server default is *No*.

An LDAP (Lightweight Directory Access Protocol) security provider supports Secure Sockets Layer (SSL) API calls to establish an SSL/TLS connection. Using server authentication only, the Reporting Server initiates API calls to verify that the LDAP server being connected to is the same server that provided certification.

You can set the LDAP secure connection from the Web Console:

❏ Select *No*, the default value, if you do not wish to enable SSL.

❏ Select *Yes* to enable an encrypted Secure Sockets Layer (SSL) session with the LDAP server.

If you have selected IBM, Sun, or Novell as the your ldap_lib_vendor, when you select Yes in the ldap_secure_conection field, additional options are added to the Connection tab:

❏ For Sun and IBM, ldap_ssl_certificate is added.

❏ For Novell, ldap_ssl_certificate and ldap_ssl_certification_encoding are added.

`ldap_ssl_certificate`. Enter the name of the LDAP attribute used by the API to establish the SSL/TLS connection. The server employs server authentication only, checking through API calls that the LDAP server you are connecting to is the one that provided the certificate. Values depend on the LDAP vendor, as follows:

❏ *Novell API* specifies the file name, including path, of the Trusted Root Certificate that the LDAP server provided for authentication.

❏ *Sun/Netscape API* specifies the path to cert7.db, Netscape certificate database, excluding the file name, that the LDAP server provided for authentication.

❏ *IBM API* specifies the file name, including the path, for ldapkey.kdb (IBM key database file that the LDAP server provided for authentication). The ldapkey.sth password stash file should be in the same directory. Note that in addition to IBM LDAP client libraries, Global Security Kit libraries are needed to make SSL work. On Windows machines, GSK must be installed.

❏ *Microsoft API* ignores the ldap_ssl_certificate configuration parameter since it is not used in an Active Directory. The server certificate should be installed in a certificate store.

`ldap_ssl_certificate_encoding`. For Novell, select the standard used to encode the certificate from the drop-down list. Encryption and file format depend on API vendor specifications. The options are B64 and DER.

ldap_port

Is a positive integer that defines the TCP port number used to connect to the LDAP server. Note that ldap_port is ignored for any host identifier which includes a colon and port number. The server default port is 389 or 636 (for SSL connection).

security

Determines the type of bind used. Can be one of the following.

Anonymous

The bind is performed using no credentials. This is the internal default value.

Windows security (NEGOTIATE)

The reporting server authentication is performed against Active Directory utilizing a Windows-specific API.

The bind is done under the Windows account that started the server.

The windows machine that hosts the reporting server should be in the same domain as Active Directory.

Explicit

The bind is performed under the account that is defined by configuration parameters *ldap_principal* and *ldap_credentials*.

Note: When connecting to Active Directory using *Explicit* or *NEGOTIATE*, ldap_user_attribute should have the value *sAMAccountName* or *userPrincipalName*.

ldap_search_timeout

Specifies the timeout in seconds for ldap_search. The server default value is 60 seconds.

3. Click *Next*.

The User Search category of parameters opens, as shown in the following image. The common parameters for User Search and Group Search are automatically populated.

4. Configure the following user search and group search parameters.

User properties

`ldap_user_base`

Specifies the DN of the entry that serves as the starting point for the search. Consists of attribute=value pairs, separated by commas. The server default is *dc=ibi,dc=com*.

`ldap_user_scope`

Specifies the scope with which the LDAP realm should search for users. Select *Subtree*, *Onelevel*, or *Base*:

Subtree scope indicates that the LDAP realm should search everything under the base DN.

Onelevel scope tells the LDAP server to only search entries one level down from the base DN.

Base indicates that the search should be done at the search base only.

The server default is *Subtree*.

`ldap_user_class`

Specifies the object class used when searching for user entries. The server default is *person*.

`ldap_user_attribute`

Specifies the LDAP attribute used when searching for user entries. *uid* is the default value for LDAP and *sAMAccountName* is the suggested value for Active Directory. One possible reason to change the default value would be to allow users to logon with an email address instead of a user ID. In this case, you might change the value to *mail* or *userPrincipalName* (if this corresponds with the name of the appropriate attribute in your directory).

`ldap_user_group_attribute`

Specifies the LDAP attribute used to identify a group in a user object.

The Active Directory standard is *Memberof*.

`ldap_user_description`

Optional. Specifies the name of the attribute whose value contains description of an object (user, group). The server default is *description*.

`ldap_user_email`

Optional. Specifies the name of the attribute whose value contains the user email address. The server default is *mail*.

Note: ldap_user_class, ldap_user_attribute, ldap_group_class, ldap_group_attribute are parameters that form a search filter.

The search filter standard syntax conforms to the following structure:

`(&(Property_Name=Property_Value)(Property_Name=Property_Value))`

If you change value of the ldap_user_class and ldap_group_class parameters to an asterisk (*), the search filter syntax can be reduced to the following simplified form (although group support will not work properly):

`(Property_Name=Property_Value)`

By specifying an asterisk for these parameters, you achieve simplified search filter syntax, but in effect, disable group support.

Group properties

`ldap_group_base`

Specifies the DN of the entry that serves as the starting point for the search. The server default is the *ldap_user_base* value.

`ldap_group_scope`

Specifies the scope with which the LDAP realm should search for groups. Select *Subtree*, *Onelevel*, or *Base*:

Subtree scope indicates that the LDAP realm should search everything under the base DN.

Onelevel scope tells the LDAP server to only search entries one level down from the base DN.

Base indicates that the search should be done at the search base only.

The server default is *Subtree*.

`ldap_group_class`

Specifies the object class used when searching for *group entries*. The server default is *groupofuniquenames*. The Active Directory standard is *group*.

`ldap_group_attribute`

Specifies the LDAP attribute used to identify the name of the group. The server default is *cn*.

`ldap_member_attribute`

Specifies the LDAP attribute used to identify users in a group. The server default is *uniqueMember*. The Active Directory standard is *Member*.

`ldap_nested_groups`

Disables or enables LDAP nested groups support. Select *No* or *Yes*. The server default is *No*, which disables nested group support.

`ldap_group_description`

Optional. Specifies the name of the attribute whose value contains description of an object (user, group). The server default is *description*.

5. Specify whether the server should accept trusted connections.

   `trust_ext`

   Specifies whether the server should accept trusted client connections. If there are multiple security providers, some may allow trusted connections and some may not. In these cases, if the trusted connection is made using a provider without the ability to accept trusted connections, the user will get an authentication error. The server default is *n*.

6. To test the configuration, click *Test User Authentication*.

   A *Testing LDAP Security* sign-in window opens.

   Enter a valid user ID and password for this LDAP security provider and click *Continue*.

   If your configuration and credentials are valid, a window opens telling you that you were successfully authenticated.

   If they are not valid, you will get a corresponding message.

7. To generate a sample user list, click *Sample User List*.

   A partial list of users with their descriptions and group memberships opens.

8. To generate a sample group list, click *Sample Group List*.

   A partial list of groups with their descriptions and a partial list of members opens.

9. To save this configuration, click *Save*. To go back to the first configuration page, click *Back*.

Support for OpenSSL Ciphers and DH and ECDH Key Exchange

The following parameters are now supported in the edaserve.cfg configuration file to support OpenSSL ciphers and Diffie-Hellman (DH) and Elliptic Curve Diffie-Hellman (ECDH) key exchange.

`ssl_ciphers`

Configures the list of supported cipher strings. For example, the following is the default.

```
ALL:!ADH:!LOW:!EXP:@STRENGTH
```

`ssl_dhparams_file`

Specifies the full path to the Diffie-Hellman (DH) parameters file. To create a DH key exchange with key size 1024 bits, issue the following command.

```
'openssl dhparam -outform PEM -out dHParam.pem 1024'
```

ssl_ecdhcurve

Specifies a curve name for a specific Elliptic Curve Diffie-Hellman key exchange. To list all available curves, issue the following command.

```
'openssl ecparam -list_curves'
```

Server-Wide Kerberos Support for Hive/Cloudera

Connections to a Hive server with Kerberos enabled can be run in one of two ways:

❏ **Server wide.** The same Kerberos credential is used for all connections. You must obtain a Kerberos ticket before starting the server.

❏ **Per user.** Each user connecting to the server connects to Hive using their own credentials from the Hive Adapter connection in the user profile.

To setup connections to a Kerberos enabled Hive instance:

1. The Reporting Server has to be secured. The server can be configured with security providers PTH, LDAP, DBMS, OPSYS, or Custom, as well as multiple security providers environment,

2. The following jar files have to be added to the server CLASSPATH or IBI_CLASSPATH variable. These are default locations and vary by distribution and release:

```
/hive_home/lib/hive-jdbc-standalone.jar
/hadoop_home/hadoop-common.jar
/hadoop_home/client/hadoop-auth.jar
```

Kerberos Server-Wide Requirements

In this configuration, all connections to the Hive instance will be done with the same Kerberos user ID derived from the Kerberos ticket that is created before the server starts.

1. Create Kerberos ticket using *kinit*:

kerbid01

where:

kerbid01

Is a Kerberos ID.

2. Verify Kerberos ticket using *klist*. The following message should be returned:

   ```
   Ticket cache: FILE:/tmp/krb5cc_532
   Default principal: kerbid01@REALM.COM

   Valid starting    Expires          Service principal
   04/29/16 16:26:50  04/30/16 02:26:53  krbtgt/REALM.COM@REALM.COM
        renew until 05/06/16 16:26:50
   ```

3. Before configuring the Hive Adapter connection to a Kerberos enabled instance, the connection should be tested. Log in to the system running Hive and use Beeline, the native tool, to test it.

4. Start the server in the same Linux session where the Kerberos ticket was created. Log in to the Web Console and click the *Adapters* tab.

5. Right-click *Apache Hive also Cloudera Impala*. Use the following parameters to configure the adapter:

   URL

   Enter the same URL that you use to connect to the Hive Instance using Beeline.

   `jdbc:hive2://server:10000/default;principal=hive/server@REALM.COM`

   Security

   Set to Trusted.

6. In the Select profile drop-down menu, select the *edasprof* server profile.

7. Click *Configure*.

8. Next, configure Java services. Click the *Workspace* tab and expand the *Java Services* folder.

9. Right-click *DEFAULT* and select *Properties*.

10. Expand the *JVM Settings* section. In the JVM options box, add the following:

    `-Djavax.security.auth.useSubjectCredsOnly=false`

11. Restart Java services.

Once these steps are completed, the adapter can be used to access a Kerberos-enabled Hive instance.

Kerberos Per User Requirements

In this configuration, each connected user has a Hive Adapter connection with Kerberos credentials in the user profile.

1. Enable multi-user connection processing for Kerberos by adding the following line to your profile (edasprof.prf):

```
ENGINE SQLHIV SET ENABLE_KERBEROS ON
```

2. Configure the Hive Adapter Connection in the user profile using the following values:

   URL

   ```
   jdbc:hive2://server:10000/default;principal=hive/server@REALM.COM;
   auth=kerberos;kerberosAuthType=fromSubject
   ```

   Security

   Set to Explicit

   User and Password

   Enter your Kerberos user ID and password. The server will use those credentials to create a Kerberos ticket and connect to a Kerberos-enabled Hive instance.

   Note that the user ID that you use to connect to the server does not have to be the same as the Kerberos ID you use to connect to a Kerberos enabled Hive instance.

   Select Profile

   Select your profile or enter a new profile name consisting of the security provider, an underscore and the user ID. For example, *ldap01_pgmxxx*.

3. Click *Configure*.

Using Kerberos for Single Sign-On on Linux

A server started with security provider OPSYS can be configured for Kerberos connections.

To implement the single sign on Kerberos security:

1. On the Access Control page, right-click the OPSYS provider, and select *Properties* from the shortcut menu.

   The OPSYS Security Configuration page opens.

2. In the krb5_srv_principal * field, enter your server principal used for Kerberos security.

3. Click *Save*.

   The edaserve.cfg file is updated with this attribute.

4. On the Workspace page, expand the Special Services and Listeners folder, right-click *TCP/ HTTP*, and select *Properties of TCP*.

5. Check SECURITY=KERBEROS.

6. Click *Save and Restart Listener*.

   The odin.cfg file is updated with this attribute.

When the server is started, a user can connect to the Web Console from Internet Explorer without a prompt for user ID and password. The *Login Info* shows connection type *Kerberos*. The connection is done using the Kerberos ticket from the browser. The connected user ID is derived from this ticket.

Connection to the server requires that there is a local OPSYS user ID with the same name as the Kerberos user ID on the operating system running the server. This user ID is used for tscom3 process impersonation.

If a user signs off from the Kerberos connection, the user can make explicit connections with the local Unix user ID and password. Connection with another Kerberos user ID as an explicit connection will not work.

Upload Support for Validation of File Extensions

You can configure uploads to operate on a specific list of file extensions.

1. On the Applications tab, click the *Application Settings* button on the ribbon, or right-click the Application Directories tree and select *Application Settings* from the shortcut menu.

   By default, the upload_allowed entry field contains a comma-separated list of all file extensions that the server can upload.

2. Edit the list to contain only the file extensions that should be allowed.

3. Click *Save and Restart Server*.

   After the server has restarted, the Upload Wizard will not show files with unsupported extensions if you click *Select Upload File*. If you try to drag a file with an unsupported file extension to the Upload Wizard, a message will be displayed that it is an invalid type of file.

Encoding Passwords for a Custom Security Provider

You can configure Custom Provider authentication to encode passwords so that they cannot be viewed when they are passed as parameters to the authentication procedure.

1. On the Access Control tab, right-click a Custom Security Provider and select *Properties* from the shortcut menu, or right-click the *CUSTOM* folder and select *New* from the shortcut menu.

   The CUSTOM Security Provider Configuration page opens.

2. Select *y* from the *cust_hashpasswd* drop-down list.

3. Click *Save*.

When a user is authenticated, the server will send SHA-256 hashed passwords to the authentication procedure. This means that the passwords will be transformed into values that will be unusable for signing in to the Web Console and server. The hashed values have to be stored as passwords in the SQL database being used for authentication. As an alternative, you can create a utility called from the CUSTOM provider authentication procedure that decodes hashed passwords before sending a request to the SQL database for authentication.

Support for One-Part or Two-Part Names for the Primary Security Provider

The server administrator can choose whether to register users and groups for the primary security provider with one-part or two-part names. With two-part names, the user ID or group name is prepended with the provider name and a backslash. For example:

```
OPSYS\user1
```

or

```
LDAP01\user2
```

By default, all users and groups are registered using two-part names. To configure one-part registrations:

1. On the Access Control tab, click *Settings* and then *Access Control Settings* on the ribbon, or right-click the Access Control tree and select *Settings* and then *Access Control Settings* from the shortcut menu.

2. Select *n* from the *prepend_provider_name* drop-down list in the General section of the page, as shown in the following image.

3. Click *Apply and Restart Server*.

The *prepend_provider_name=n* attribute is added to the edaserve.cfg file.

Simplified User Interface for Configuring Directory/File Privileges

The server administrator can now access Directory/File Privileges as a right-click menu option from any security subject (role, user, or group) on the Access Control tree.

The new Directory/File Privileges page enables the server administrator to configure privileges for all directories and files in those directories from a single page.

The new page has individual check boxes for Read, Write, and Execute privileges that can be changed on this page. The page is refreshed to update privileges for all inherited locations.

Each directory on the page has a right-click option to *Show All Directories/Files*. If this option is chosen, all nested folders and files are listed with their privileges.

The new Directory/File Privileges page is shown in the following image.

Registration of Users and Groups for inactive Security Providers

From the Access Control page, the server administrator can now register users and groups in server roles for a security provider that is not currently activated. These registrations will be available when the server is started with security ON and with that provider activated.

In addition, a server running with security OFF now has an Access Control page that a server administrator can use to register users and groups and to activate and deactivate providers.

One use for this feature is to register a Server Administrator for a Provider that will be active after the next server restart.

Web Console

This section describes new Web Console features.

Setting a Web Session Timeout Warning

The server can post a warning about web session expiration before the session actually expires.

To set the number of minutes prior to session expiration that the warning displays:

1. On the Workspace tab, expand the *Special Services and Listeners* folder.

2. Right-click TCP/HTTP and select *Properties of HTTP* from the shortcut menu.

   The Listener Configuration page opens.

3. Expand the *Sessions Control* group, as shown in the following image.
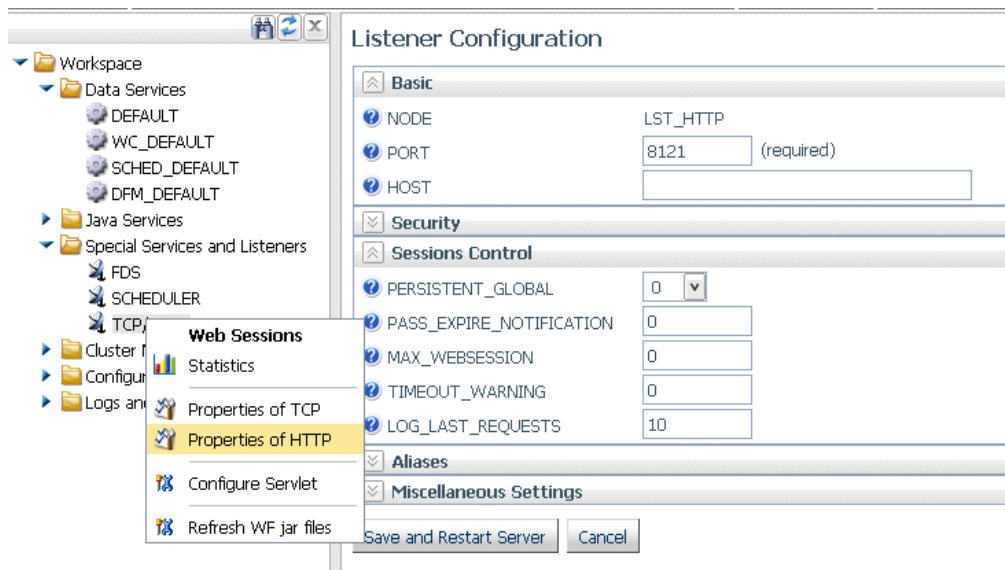
4. Enter a number of minutes, *n*, in the TIMEOUT_WARNING text box.

   By default, the value is zero (0), meaning that no warning will be displayed.

5. Click *Save and Restart Server*.

   The TIMEOUT_WARNING=*n* attribute is added to the odin.cfg file.

Responding to the warning message resets the session expiration timer.

Using the Web Console Binocular Search

The binocular search is available on all web Console pages that display a list of files. For example, the binocular search is available on the Synonym Candidates pages, the Manage Files page, and the Application Path Configuration page.

Clicking the binoculars icon opens a Find box where you can enter characters, as shown in the following image.
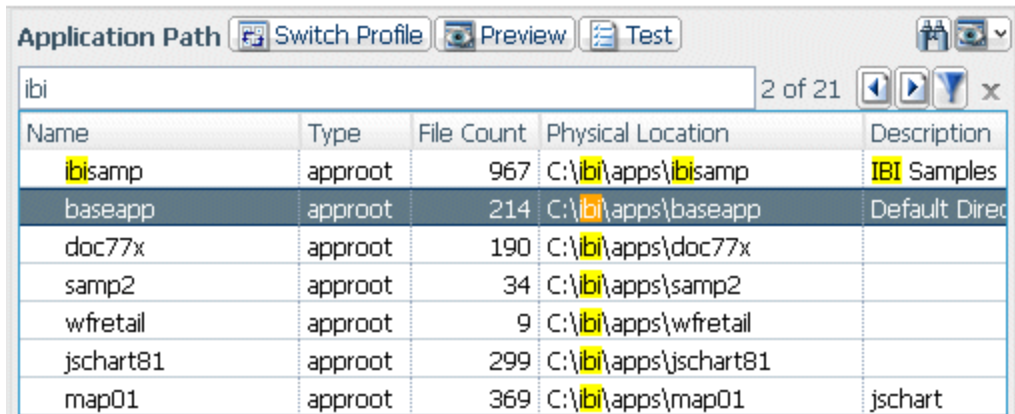
As you click on each row with a match, its number within the total number of matches is displayed in the form *n* of *m*.

All matching characters on the list will be highlighted. You can move from one matching row to the next or prior match using the arrow keys.

You can filter the list to display only the rows with matching characters by clicking the Filter icon. Clicking the Filter icon again restores the list.

Web Console Text Editor Enhancements

The Web Console Text Editor that is used to edit procedures, files, and server configuration files was enhanced with line numbers and an improved search facility. A search for characters in the *Find text* box opens a window with the list of lines matching the pattern, as shown in the following image.
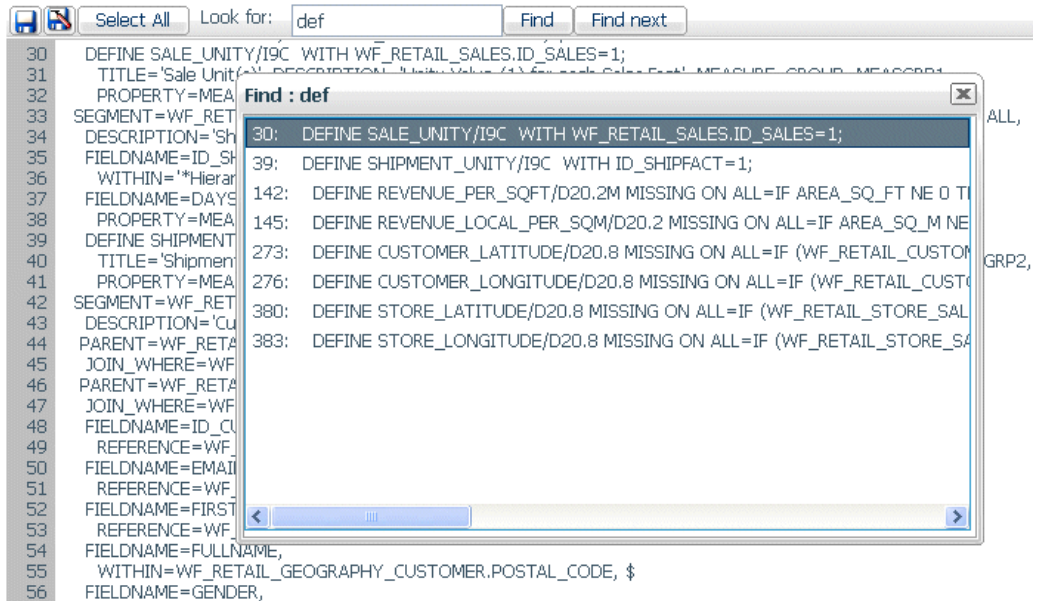
As you click each line in the Find window, the Web Console text editor scrolls to display that line.

When you edit configuration files from the Workspace tab, the editor toolbar has new actions to:

❑ Refresh from disk.

❑ Reset to the server default settings.

Displaying the Connected User ID on the Web Console

When a server is running with security enabled, the upper right corner of the Web Console browser window displays the security provider (for two-part names) and the user ID of the connected user.

Adapter Enhancements

This section describes new adapter features. All adapters can be used for WebFOCUS Reporting and SQL requests, and as sources for DataMigrator flows.

The server supports adapters designed to access a wide variety of data sources. Using the graphical Web Console, you can configure these adapters and create the metadata you need to seamlessly access the corresponding type of data.

On the Web Console, adapters are grouped as SQL, XML-based, ERP, OLAP, Procedures, Sequential and Indexed, DBMS, and Social Media.

In this chapter:

All Adapters

This section provides descriptions of new features for all adapters.

Changing Common Adapter Settings

The Web Console Adapters page has a new button in the Troubleshooting group labeled *Change common adapter settings* that allows you to customize data type mappings and other miscellaneous settings that are common to all adapters.

Adapter-specific settings are customizable as well, and can be accessed by right-clicking a configured adapter folder and selecting *Change Settings* from the shortcut menu.

SQL Adapters

This section provides detailed descriptions of new features for SQL adapters.

All SQL Adapters

This section provides detailed descriptions of new features for all SQL adapters.

Optimization of Simplified Numeric Functions

The following new simplified numeric functions are optimized by the SQL adapters:

❏ **CEILING.** Returns the smallest integer value greater than or equal to a value.

❏ **EXPONENT.** Raises the constant e to a power.

❏ **FLOOR.** Returns the largest integer less than or equal to a value.

❏ **MOD.** Calculates the remainder from a division.

❏ **POWER.** Raises a value to a power.

Optimization of Simplified Functions REPLACE, TOKEN, and POSITION

The following simplified character functions are optimized by the SQL adapters.

❏ **REPLACE.** Replaces all instances of a string.

❏ **TOKEN.** Extracts a token (substring) from a string.

❏ **POSITION.** Returns the first position of a substring.

Enhancement to the Optimization of LIKE for Fixed Length Fields

In prior releases, the LIKE operator was not optimized for those RDBMS engines (such as Db2) that count trailing blanks when comparing columns because the FOCUS LIKE operator is not sensitive to trailing blanks. Now, LIKE is optimized by removing trailing blanks in the SQL passed to those RDBMS engines using the RTRIM function. (RTRIM(*column*) LIKE *mask*).

LIKE optimization works as long as the mask does not end with an underscore character (_). Optimization does work when the mask starts or ends with a percent sign (%).

Example: **Optimizing the LIKE Operator for Fixed Length Fields**

The following request creates a fixed-length field named CATEGORY and uses it in a WHERE test with the LIKE operator.

```
SET TRACEUSER=ON
SET TRACEON=STMTRACE//CLIENT
SET TRACESTAMP=OFF
DEFINE FILE WF_RETAIL_LITE
CATEGORY/A10 = PRODUCT_SUBCATEG;
END
TABLE FILE WF_RETAIL_LITE
SUM COGS_US
BY CATEGORY
WHERE CATEGORY LIKE '%phone'
ON TABLE SET PAGE NOLEAD
END
```

The following SQL is generated, which trims trailing blanks from the CATEGORY column.

```
AGGREGATION DONE ...
SELECT
T7."PRODUCT_SUBCATEG",
SUM(T1."COGS_US")
FROM
D999OL29_wf_retail_sales T1,
D999OL29_wf_retail_product T7
WHERE
(T7."ID_PRODUCT" = T1."ID_PRODUCT") AND
(TRIM(TRAILING ' ' FROM T7."PRODUCT_SUBCATEG") LIKE '%phone')
GROUP BY
T7."PRODUCT_SUBCATEG"
ORDER BY
T7."PRODUCT_SUBCATEG"
FOR FETCH ONLY;
```

The output is shown in the following image.

CATEGORY	Cost of Goods
Smartphone	$1,341.00

PERSISTENCE Option for HOLD FORMAT *sqlengine*

The PERSISTENCE option has been added to the HOLD command when it is used to create an SQL table.

This new command option allows you to generate intermediate tables of different types that will be used only during UPLOAD and EBL requests to accelerate performance by keeping all processing on the DBMS server instead of downloading data into a HOLD file. The actual type of the intermediate table will be determined at run time, based on specific DBMS-supported features and the data-populating mechanisms being used.

The syntax is:

```
HOLD FORMAT sqlengine PERSISTENCE {STAGE|PERMANENT}
```

where:

sqlengine
Identifies the relational DBMS in which to create the table.

STAGE
Will create either a Volatile or GLOBAL TEMPORARY table, for a DBMS that supports that functionality, currently HP Vertica, Db2, Oracle, Teradata, MS SQL, and MySQL. For a DBMS that does not support that functionality, a message will display and the table will not be created.

PERMANENT
Will create a regular SQL table with a uniquely-generated name that will be used in the request and will be available for further use after the request ends, but will be dropped at the end of the session. This is the default value for PERSISTENCE for HOLD FORMAT *sqlengine*.

Optimizing a Heterogeneous Join for a Qualified DBMS

Joins, including outer joins, between segments that belong to different SQL engines now are eligible for SQL optimization. The SQL adapters will optimize a join for segments that belong to the same engine, and then intermediate results from each engine will be combined on the server into one resulting join.

Enhanced BY Clause Optimization

The relational adapters now optimize reports that contain a BY field more efficiently, by no longer passing MAX(field) in the SELECT list to the RDBMS.

Tutorials Now Created With Foreign Key Constraints

When creating Star Schema or Retail Demo tutorial tables from the Web Console or Data Management Console, the fact tables now have foreign key constraints for each of the dimension tables. This facilitates building a cluster join from these tools. It also prevents loading rows in the fact table without corresponding rows in the dimension tables.

For example, the following is the Access File for the wf_retail_labor fact table, which has a foreign key constraint for the wf_retail_employee table.

```
SEGNAME=WF_RETAIL_LABOR,
  TABLENAME=wrd_wf_retail_labor,
  CONNECTION=wfretail,
  KEY=ID_LABOR, $
 FOREIGN_KEY=fact_labor_id_employee_fk,
    PRIMARY_KEY_TABLE=wrd_wf_retail_employee,
    FOREIGN_KEY_COLUMN=ID_EMPLOYEE,
    PRIMARY_KEY_COLUMN=ID_EMPLOYEE, $
```

Creating Tutorials With Lowercase Column Names

Previously, column names for the tutorials were always created in uppercase. However, certain databases, such as PostgreSQL and those based on it For example, Greenplum) expects column names to be lowercase.

Now, when the adapter setting ALIAS_CASE is set to LOWER, tutorial column names will be lowercase.

Saving Adapter Settings in a Profile or Stored Procedure

When you customize SQL adapter settings by right-clicking an adapter and selecting *Change Settings* from the shortcut menu, the top of the page lets you select either *Profile* or *Procedure* from the *Save settings in* drop-down list, as shown in the following image.

If you select *Procedure*, a procedure is automatically generated with the settings you changed. You can accept the default application and procedure name, or you can select a different application in which to store the procedure and enter a file name for the procedure.

The procedure can be added to a Process Flow, making you able to define flow-level settings rather than global settings using the Web Console.

Mapping Spatial Data Stored in RDBMS Columns

The Adapters for MS SQL Server, Oracle, Teradata, and MySQL now support direct read from DBMS spatial columns that store Esri data.

The Access File contains the expression needed to retrieve the spatial data, which is different for each DBMS. The geographic data is returned as a Geometry object that can be used to render maps in WebFOCUS GRAPH requests.

For example, in the Following SQL Server Master File, the field GEO contains spatial data representing geographic areas. In SQL Server, the data type for this field is GEOMETRY or GEOGRAPHY. In the Master File, it is mapped as text, with a GEOGRAPHIC_ROLE attribute.

```
FIELDNAME=GEO, ALIAS=GEO, USAGE=TX50, ACTUAL=TX,MISSING=ON,
GEOGRAPHIC_ROLE=GEOMETRY_AREA, $
```

The following are the Access File attributes for this field.

```
IELD=GEO,
SQL_FLD_OBJ_TYPE=OPAQUE,
SQL_FLD_OBJ_PROP=GEOMETRY_SHAPE,
SQL_FLD_OBJ_EXPR='DB_EXPR("GEO".STGeometryType()
+ '','' 
+ CAST( "GEO".STSrid AS VARCHAR(10) )
+ '','' 
+ "GEO".STAsText())', $
```

The following request retrieves the GEO field.

```
TABLE FILE EUROPE_SWASIA
PRINT NAME GEO
WHERE NAME IN ('FRANCE','GERMANY','UNITED KINGDOM')
END
```

The SQL passed to SQL Server as a result of this request follows.

```
SELECT
T1."NAME",
(T1."GEO".STGeometryType() + ',' + CAST(
T1."GEO".STSrid AS VARCHAR(10) ) + ',' +
T1."GEO".STAsText())
FROM
EUROPE_SWASIA T1
WHERE
(T1."NAME" IN ('FRANCE','GERMANY','UNITED KINGDOM'));
```

The following are sample Access File attributes for Oracle.

```
SQL_FLD_OBJ_EXPR='DB_EXPR(CASE "GEO".Get_GType()
WHEN 1 THEN ''Point''
WHEN 2 THEN ''LineString''
WHEN 3 THEN ''Polygon''
WHEN 4 THEN ''GeometryCollection''
WHEN 5 THEN ''MultiPoint''
WHEN 6 THEN ''MultiLineString''
WHEN 7 THEN ''MultiPolygon''
WHEN 8 THEN ''PolyhedralSurface''
ELSE ''Geometry'' END
|| '',''
|| CAST( "GEO".SDO_SRID AS VARCHAR(10) )
|| '',''
|| "GEO".Get_WKT())', $
--Teradata:
SQL_FLD_OBJ_EXPR='DB_EXPR(Substring("GEO".ST_GeometryType() From
4)
|| '',''
|| CAST( "GEO".ST_SRID() AS VARCHAR(10) )
|| '',''
|| "GEO".ST_AsText())', $
```

Enhanced Messages About SQL Optimization

More descriptive messages have been developed when SQL Optimization is not done for a request. In some cases, a message will contain information about ways to possibly change the syntax so that optimization can be used.

Optimization of Function DTRUNC for First Day of Week

Calls to the DTRUNC function can be optimized when using the new WEEK parameter that returns the first day of the week in which the date occurs.

Optimization of Function DTRUNC for YEAR_END, QUARTER_END, MONTH_END and WEEK_END

Calls to the DTRUNC function can be optimized when using the new YEAR_END, QUARTER_END, MONTH_END and WEEK_END parameters that return the last day of the period in which the date occurs.

CONCAT Function Optimization

Simplified character function CONCAT is passed to the Relational Adapters in the generated SQL.

Optimization of the DT_CURRENT_DATE, DT_CURRENT_DATETIME, and DT_CURRENT_TIME Functions

The simplified functions DT_CURRENT_DATE, DT_CURRENT_DATETIME, and DT_CURRENT_TIME are passed to the Relational Adapters in the generated SQL request.

Example: Optimizing the DT_CURRENT_DATETIME Function

The following request calls the DT_CURRENT_DATETIME function.

```
SET TRACEUSER=ON
SET TRACEON=STMTRACE//CLIENT
SET TRACESTAMP=OFF
DEFINE FILE WF_RETAIL_LITE
CURRDT/HYYMDS = DT_CURRENT_DATETIME(SECOND);
END
TABLE FILE WF_RETAIL_LITE
SUM QUANTITY_SOLD CURRDT
BY PRODUCT_CATEGORY
ON TABLE SET PAGE NOLEAD
END
```

The following SQL is generated for Microsoft SQL Server.

```
SELECT
T7."PRODUCT_CATEGORY",
SUM(T1."QUANTITY_SOLD"),
MAX(SYSDATETIME())
FROM
( wrd_wf_retail_sales T1
LEFT OUTER JOIN
wrd_wf_retail_product T7
ON T7."ID_PRODUCT" = T1."ID_PRODUCT" )
GROUP BY
T7."PRODUCT_CATEGORY"
ORDER BY
T7."PRODUCT_CATEGORY";
```

The output is shown in the following image.

Product Category	Quantity Sold	CURRDT
Accessories	2,034	2016/03/25 14:03:54
Camcorder	1,956	2016/03/25 14:03:54
Computers	865	2016/03/25 14:03:54
Media Player	3,140	2016/03/25 14:03:54
Stereo Systems	4,679	2016/03/25 14:03:54
Televisions	362	2016/03/25 14:03:54
Video Production	887	2016/03/25 14:03:54

SQL Adapters Support CREATE FILE With FOREIGNKEYS

The CREATE FILE command now supports defining foreign key constraints to enforce referential integrity.

Syntax: ## How to Issue a CREATE FILE Command With Foreign Keys

```
CREATE FILE app/synonym [WITHFK [DROP]]
```

where:

app/synonym

   Is the synonym that describes the table to be created.

DROP

   Drops the table if it already exists and then creates it.

Application Access Control for HyperStage Tables

SQL Adapters Optimize Calls to the GIS_POINT Function in a DEFINE

Given a WKID (Well-Known ID) spatial reference, longitude, and latitude, the GIS_POINT function builds a JSON point defining a Geometry object with the provided WKID, longitude, and latitude. The function is optimized for those SQL engines that can build a JSON geometry object.

Example: **Optimizing Calls to the GIS_POINT Function**

The following request calls the GIS_POINT function in a DEFINE command. Note that the field WKID is defined in the WF_RETAIL_LITE Master File.

```
SET TRACEUSER=ON
SET TRACEON = STMTRACE//CLIENT
SET TRACESTAMP=OFF

DEFINE FILE wf_retail_lite
Point/A150 MISSING ON ALL=GIS_POINT(WKID, CONTINENT_LONGITUDE,
CONTINENT_LATITUDE);
END
TABLE FILE wf_retail_lite
PRINT Point
BY WF_RETAIL_GEOGRAPHY_STORE.CONTINENT_CODE AS 'Continent Code'
ON TABLE SET PAGE NOLEAD
END
```

The following SQL is generated.

```
SELECT
T1."ID_STORE",
T1."ID_CUSTOMER",
T2."ID_GEOGRAPHY",
T3."ID_GEOGRAPHY",
T3."CONTINENT_LATITUDE",
T3."CONTINENT_LONGITUDE",
T5."ID_GEOGRAPHY",
T6."ID_GEOGRAPHY",
T6."CONTINENT_CODE"
FROM
( ( ( ( wrd_wf_retail_sales T1
INNER JOIN
wrd_wf_retail_customer T2
ON (T2."ID_CUSTOMER" = T1."ID_CUSTOMER") )
LEFT OUTER JOIN
wrd_wf_retail_geography T3
ON T3."ID_GEOGRAPHY" = T2."ID_GEOGRAPHY" )
INNER JOIN
wrd_wf_retail_store T5
ON (T5."ID_STORE" = T1."ID_STORE") )
LEFT OUTER JOIN
wrd_wf_retail_geography T6
ON T6."ID_GEOGRAPHY" = T5."ID_GEOGRAPHY" )
ORDER BY
T6."CONTINENT_CODE";
```

The partial output is shown in the following image.

Continent Code	Point
NA	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-57.11502100, "y":-22.83625000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":106.45999900, "y":36.41999800} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-57.11502100, "y":-22.83625000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-57.11502100, "y":-22.83625000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-57.11502100, "y":-22.83625000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":17.48000000, "y":53.54999900} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":-105.00000000, "y":54.00000000} }
	{ "spatialReference": {"wkid": 4326},"geometryType": "esriGeometryPoint","geometry": {"x":106.45999900, "y":36.41999800} }

Enhanced Optimization of Selection Tests

In prior releases, all optimized selection tests were passed to the RDBMS and also re-evaluated when the answer set was returned to WebFOCUS. Starting in this release, individual tests passed to the SQL engines may be excluded from execution. This enhances performance and also allows tests to be optimized that are not totally compatible with how WebFOCUS evaluates them.

Optimization of the PARTITION_REF Function

Calls to the PARTITION_REF function in an aggregation request with a WHERE TOTAL phrase can be passed to SQL engines that have a LAG function, such as Db2, Oracle, Teradata, and Microsoft SQL Server.

Example: **Optimizing the PARTITION_REF Function**

The following request using the Adapter for Oracle calls the PARITION_REF function, which displays values from prior rows.

```
TABLE FILE WF_RETAIL_LITE
SUM
  COGS_US  COMPUTE COGS1 MISSING ON = PARTITION_REF(COGS_US,TABLE, -1);
  BY PRODUCT_CATEGORY
WHERE TOTAL COGS_US GT 421;
ON TABLE SET PAGE NOPAGE
END
```

The following SQL is generated that calls the Oracle LAG function.

```
SELECT
"SK001_PRODUCT_CATEGORY",
"VB001_SUM_COGS_US",
"LAG002"
FROM (
SELECT
T7."PRODUCT_CATEGORY" AS "SK001_PRODUCT_CATEGORY",
SUM(T1."COGS_US") AS "VB001_SUM_COGS_US",  LAG( SUM(T1."COGS_US"), 1)
OVER( ORDER BY
T7."PRODUCT_CATEGORY") AS "LAG002"
FROM
( D99964R6_sales T1
LEFT OUTER JOIN
D99964R6_product T7
ON T7."ID_PRODUCT" = T1."ID_PRODUCT" )
GROUP BY
T7."PRODUCT_CATEGORY"
) X
WHERE ("VB001_SUM_COGS_US" > 421);
```

The output is shown in the following image.

Product Category	Cost of Goods	COGS1
Camcorder	$799.00	421.00
Computers	$1,936.00	799.00
Media Player	$3,506.00	1,936.00
Stereo Systems	$2,561.00	3,506.00

New Optimization Controls Using SET FEATOPT

The adapter SET FEATOPT command can be used to selectively disable optimization of specific WebFOCUS features when the results may be undesirable. The ability to disable IF-THEN-ELSE and IF TOTAL or WHERE TOTAL optimization has been added. By default, all optimization features are enabled.

FEATOPT settings are displayed in Web Console debug mode.

The SET OPTIFTHENELSE command has been deprecated.

Syntax: **How to Control IF TOTAL and WHERE TOTAL Optimization**

```
ENGINE sqlengine SET FEATOPT TOTALTEST {ON|OFF}
```

where:

sqlengine

Specifies the adapter.

ON

Passes the HAVING clause to the DBMS, as well as CASE logic, when applicable. The HAVING clause results from passing an IF TOTAL or WHERE TOTAL phrase from the WebFOCUS request. ON is the default value.

OFF

Suppresses adding the HAVING clause to the generated SELECT.

Example: **Disabling WHERE TOTAL Optimization Using FEATOPT**

The following request against SQL Server has a WHERE TOTAL test.

```
SET TRACEUSER=ON
SET TRACEON = STMTRACE//CLIENT
SET TRACESTAMP=OFF
TABLE FILE WF_RETAIL_LITE
SUM COGS_US GROSS_PROFIT_US
BY PRODUCT_CATEGORY
WHERE TOTAL COGS_US GT 400000
END
```

The default generated SQL follows. The WHERE TOTAL test has been passed to the DBMS as a HAVING clause.

```
SELECT
T7."PRODUCT_CATEGORY",
SUM(T1."COGS_US"),
SUM(T1."GROSS_PROFIT_US")
FROM
( wrd_wf_retail_sales T1
LEFT OUTER JOIN
wrd_wf_retail_product T7
ON T7."ID_PRODUCT" = T1."ID_PRODUCT" )
GROUP BY
T7."PRODUCT_CATEGORY"  HAVING
( SUM(T1."COGS_US") > 400000)
ORDER BY
T7."PRODUCT_CATEGORY";
```

Adding the ENGINE SQLMSS SET FEATOPT TOTALTEST OFF command generates the following SQL. The WHERE TOTAL test has not been passed in the generated SQL and will be handled by WebFOCUS.

```
SELECT
T7."PRODUCT_CATEGORY",
SUM(T1."COGS_US"),
SUM(T1."GROSS_PROFIT_US")
FROM
( wrd_wf_retail_sales T1
LEFT OUTER JOIN
wrd_wf_retail_product T7
ON T7."ID_PRODUCT" = T1."ID_PRODUCT" )
GROUP BY
T7."PRODUCT_CATEGORY"
ORDER BY
T7."PRODUCT_CATEGORY";
```

Syntax: How to Control IF-THEN-ELSE Optimization

```
ENGINE sqlengine SET FEATOPT IFTHENELSE {ON|OFF}
```

where:

sqlengine

Specifies the adapter.

ON

Passes the IF-THEN-ELSE expressions used to create a DEFINE field to the DBMS as CASE logic, when possible. ON is the default value. This optimization is subject to the limitations on optimizing DEFINE fields. The DEFINE field must be an object of a selection test or an aggregation request.

OFF

Suppresses passing IF-THEN-ELSE expressions in the generated SQL.

Note: The SET OPTIFTHENELSE command has been deprecated.

Example: **Disabling IF-THEN-ELSE Optimization Using FEATOPT**

The following request against SQL Server has a DEFINE field created using IF-THEN-ELSE syntax.

```
SET TRACEUSER=ON
SET TRACEON = STMTRACE//CLIENT
SET TRACESTAMP=OFF
DEFINE FILE WF_RETAIL_LITE
DEF1 = IF (PRODUCT_CATEGORY EQ ' Accessories') AND (BRAND EQ 'Sony ')
AND (PRODUCT_SUBCATEG EQ 'Headphones') THEN 1 ELSE 0;
END
TABLE FILE WF_RETAIL_LITE
PRINT PRODUCT_CATEGORY PRODUCT_SUBCATEG BRAND
WHERE DEF1 EQ 1
END
```

The default generated SQL follows. The IF-THEN-ELSE syntax has been passed to the DBMS as CASE logic.

```
SELECT
T7."BRAND",
T7."PRODUCT_CATEGORY",
T7."PRODUCT_SUBCATEG"
FROM
wrd_wf_retail_product T7
WHERE
((CASE WHEN ((T7."PRODUCT_CATEGORY" = ' Accessories') AND
(T7."BRAND" = 'Sony ') AND (T7."PRODUCT_SUBCATEG" =
'Headphones')) THEN 1 ELSE 0 END) = 1);
```

Adding the ENGINE SQLMSS SET FEATOPT IFTHENELSE OFF command generates the following SQL. The IF-THEN-ELSE syntax has not been passed in the generated SQL and will be handled by WebFOCUS.

```
SELECT
T7."BRAND",
T7."PRODUCT_CATEGORY",
T7."PRODUCT_SUBCATEG"
FROM
wrd_wf_retail_product T7;
```

New SQL Functions

The SQL Functions MOD, CEIL, FLOOR, LEAST, and GREATEST are now supported.

MOD: Returning the Remainder of a Division

The SQL function MOD returns the remainder of the first argument divided by the second argument.

Syntax: ### How to Return the Remainder of a Division

```
MOD(n,m)
```

where:

n

    Numeric

    Is the dividend (number to be divided).

m

    Numeric

    Is the divisor (number to divide by). If the divisor is zero (0), MOD returns NULL.

Example: ### Returning the Remainder of a Division

MOD returns the remainder of *n* divided by *m*.

```
MOD(N,M)
```

For N=16 and M=5, the result is 1.

For N=34.5 and M=3, the result is 1.5.

CEIL: Returning the Smallest Integer Greater Than or Equal to a Value

CEIL returns the smallest integer value not less than the argument. CEILING is a synonym for CEIL.

Syntax: ### How to Return the Smallest Integer Greater Than or Equal to a Value

```
CEIL(n)
```

where:

n

    Numeric or Alphanumeric

    Is the value less than or equal to the returned integer. For exact-value numeric arguments, the return value has an exact-value numeric type. For alphanumeric or floating-point arguments, the return value has a floating-point type.

Example: **Returning an Integer Greater Than or Equal to a Value**

CEIL returns an integer greater than or equal to the argument.

```
CEIL(N)
```

For N=1.23, the result is 2.

For N=-1.23, the result is -1.

FLOOR: Returning the Largest Integer Less Than or Equal to a Value

FLOOR returns the largest integer value not greater than a value.

Syntax: **How to Return the Largest Integer Less Than or Equal to a Value**

```
FLOOR(n)
```

where:

n

   Numeric or Alphanumeric

   Is the value greater than or equal to the returned integer. For exact-value numeric arguments, the return value has an exact-value numeric type. For alphanumeric or floating-point arguments, the return value has a floating-point type.

Example: **Returning an Integer Less Than or Equal to a Value**

FLOOR returns an integer less than or equal to the argument.

```
FLOOR(N)
```

For N=1.23, the result is 1.

For N=-1.23, the result is -2.

LEAST: Returning the Smallest Value

With two or more arguments, LEAST returns the smallest (minimum-valued) argument. The arguments are compared using the following rules:

❑ If any argument is NULL, the result is NULL. No comparison is needed.

❑ If the return value is used in an INTEGER context, or all arguments are integer-valued, they are compared as integers.

❑ If the return value is used in a floating-point context, or all arguments are floating-point-valued, they are compared as floating-point values.

❏ If the arguments comprise a mix of numbers and strings, they are compared as numbers.

❏ If any argument is a character string, the arguments are compared as character strings. In all other cases, the arguments are compared as binary strings.

Syntax: **How to Return the Smallest Value**

```
LEAST(value1, value2, ... , valuen)
```

where:

value1, value2,... , valuen

Numeric or alphanumeric

Are the values to be compared.

Example: **Returning the Smallest Value**

LEAST returns the smallest argument.

```
LEAST(X,Y,Z)
```

For X=2, Y=0, and Z=-1, the result is -1.

For X='B', Y='A', and Z='C', the result is 'A'.

GREATEST: Returning the Largest Value

With two or more arguments, GREATEST returns the largest (maximum-valued) argument. The arguments are compared using the following rules:

❏ If any argument is NULL, the result is NULL. No comparison is needed.

❏ If the return value is used in an INTEGER context, or all arguments are integer-valued, they are compared as integers.

❏ If the return value is used in a floating-point context, or all arguments are floating-point-valued, they are compared as floating-point values.

❏ If the arguments comprise a mix of numbers and strings, they are compared as numbers.

❏ If any argument is a character string, the arguments are compared as character strings. In all other cases, the arguments are compared as binary strings.

Syntax: **How to Return the Largest Value**

```
GREATEST(value1, value2, ... , valuen)
```

where:

value1, value2,... , valuen
     Numeric or alphanumeric

     Are the values to be compared.

Example: **Returning the Largest Value**

GREATEST returns the smallest argument.

```
GREATEST(X,Y,Z)
```

For X=2, Y=0, and Z=-1, the result is 2.

For X='B', Y='A', and Z='C', the result is 'C'.

SQL Adapters Create Unique Keys for HOLD FORMAT SQL_SCRIPT

KEY information for SQL_SCRIPT files created using HOLD FORMAT SQL_SCRIPT is propagated to the Access File, which improves JOIN optimization.

Example: **Propagating Key Information to the Access File Generated by HOLD FORMAT SQL_SCRIPT**

The following request generates an SQL_SCRIPT file with two keys.

```
TABLE FILE WF_RETAIL_LITE
SUM MIN.COGS_US MAX.GROSS_PROFIT_US
BY BUSINESS_SUB_REGION
BY STATE_PROV_CODE_ISO_3166_2
WHERE BUSINESS_SUB_REGION EQ 'Midwest' OR 'East'
WHERE COUNTRY_NAME EQ 'United States'
ON TABLE HOLD AS RETAILS FORMAT SQL_SCRIPT
END
```

This request produces the following script file, retails.sql.

```
 SELECT
T3."BUSINESS_SUB_REGION" AS "SK001_BUSINESS_SUB_REGION",
T3."STATE_PROV_CODE_ISO_3166_2" AS "SK002_STATE_PROV_CODE_ISO_3166",
 MIN(T1."COGS_US") AS "VB001_MIN_COGS_US",
 MAX(T1."GROSS_PROFIT_US") AS "VB002_MAX_GROSS_PROFIT_US
" FROM
wrd_wf_retail_sales T1,
wrd_wf_retail_customer T2,
wrd_wf_retail_geography T3
 WHERE
(T2."ID_CUSTOMER" = T1."ID_CUSTOMER") AND
(T3."ID_GEOGRAPHY" = T2."ID_GEOGRAPHY") AND
(T3."COUNTRY_NAME" = 'United States') AND
(T3."BUSINESS_SUB_REGION" IN('Midwest', 'East'))
 GROUP BY
T3."BUSINESS_SUB_REGION",
T3."STATE_PROV_CODE_ISO_3166_2"
```

The RETAILS Master File follows.

```
FILENAME=RETAILS, SUFFIX=SQLMSS  , $
  SEGMENT=RETAILS, SEGTYPE=S0, $
    FIELDNAME=BUSINESS_SUB_REGION, ALIAS=SK001_BUSINESS_SUB_REGION,
USAGE=A25V, ACTUAL=A25V,
      MISSING=ON,
      TITLE='Customer,Business,Sub Region', $
    FIELDNAME=STATE_PROV_CODE_ISO_3166_2,
ALIAS=SK002_STATE_PROV_CODE_ISO_3166, USAGE=A5V, ACTUAL=A5V,
      MISSING=ON,
      TITLE='Customer,State,Province,ISO-3166-2,Code', $
    FIELDNAME=COGS_US, ALIAS=VB001_MIN_COGS_US, USAGE=D20.2M, ACTUAL=D8,
      MISSING=ON,
      TITLE='Cost of Goods', $
    FIELDNAME=GROSS_PROFIT_US, ALIAS=VB002_MAX_GROSS_PROFIT_US,
USAGE=D20.2M, ACTUAL=D8,
      MISSING=ON,
      TITLE='Gross Profit', $
```

The RETAILS Access File contains the key information.

```
 SEGNAME=RETAILS,
   CONNECTION=wfretail,
   DATASET=RETAILS.SQL,
   KEY=BUSINESS_SUB_REGION/STATE_PROV_CODE_ISO_3166_2,
   SUBQUERY=Y, $
```

Enhancement to SQL Adapter Native Messaging Interface

In prior releases, the messages returned by an SQL adapter were displayed as one long string, making them difficult to read and understand. Starting in this release, native SQL messages will be presented in readable blocks, each as a FOC1500 message on a separate line. For example:

```
(FOC1400) SQLCODE IS -1 (HEX: FFFFFFFF) XOPEN: 42000
(FOC1500)  :  Microsoft SQL Server Native Client 10.0: [42000] Syntax
error,
(FOC1500)  :  permission violation, or other nonspecific error
(FOC1406) SQL OPEN CURSOR ERROR.  :  __WF_RETAIL_WF_RETAIL_SALES
```

Improved Messaging for Environmental Problems

Messages that the SQL Adapters return to edaprint in case of a non-existent or incorrect path have been improved.

❑ Each environmental path is now clearly printed in edaprint.

❑ Those that do not exist are marked as follows.

```
----NOT FOUND
```

Random Data Sampling in SQL

Certain SQL Adapters such as Microsoft SQL Server, Oracle (ODBC and JDBC), and SAP HANA support random data sampling. For SAP HANA, sampling is only supported for column-based tables. A report can return a random sample of data from these RDBMSs using the following settings.

```
ENGINE engine SET TABLESAMPLING_TYPE {OFF|ROW|BLOCK}
ENGINE INT SET TABLESAMPLING_PERCENTAGE n
```

where:

engine

Specifies the adapter.

OFF

Turns off table sampling.

ROW

Uses row-based random sampling. This is the default value.

BLOCK

Uses page-based random sampling.

n

> Is a number between 1 and 99 that specifies the percentage of records to be returned. The value blank, which is the default, indicates that sampling is not in effect.

For example, the following settings for SAP HANA return about 5% of the requested answer set.

```
ENGINE INT SET TABLESAMPLING_PERCENTAGE 5
ENGINE SQLHANA SET TABLESAMPLING_TYPE ROW
```

Consider the following request.

```
TABLE FILE filenameWRITE D
END
```

The following SQL is generated as a result of these settings.

```
SELECT
T1."D",
SUM(T1."D")
FROMtablename T1 TABLESAMPLE BERNOULLI(05)
GROUP BY
T1."D"
ORDER BY
T1."D";
```

Using BLOCK instead of ROW will generate native TABLESAMPLE SYSTEM(n) instead of BERNOULLI(n).

Optimization of Expressions on Partial Dates

Partial date formats such as YY, Q, D, and M, which are actually integer values, can now be optimized when used in expressions.

Adapter for Apache Drill

Apache Drill is a query engine for data managed by Hadoop in HDFS or Mapr-FS, a variety of NoSQL databases including HBase and MapR-DB, and MongoDB, and other data sources. Drill can use Hive metadata or derive metadata from self-describing data files.

Adapter for Db2

This section provides detailed descriptions of new features for the Adapter for Db2.

Change to Multi-Row Inserts on z/OS

Db2 on z/OS changed the default behavior for multiple-row inserts from non-atomic to atomic. This feature resets the default behavior of the Adapter for Db2 back to non-atomic. Non-atomic maximizes the number of valid rows that are added to a table when a non-fatal error (such as duplicate insert) occurs.

Support for TIMESTAMP for CDC_START on z/OS

Db2 version 10 now supports the Timestamp value of a START parameter in a CDC synonym.

Conversion to ANSI Date, Time, and Timestamp Literals

When the Adapter for Db2 converts a request that contains a date, time, or timestamp literal to SQL, it converts the literal to ANSI standard format in the generated SQL.

For example, consider the following WHERE phrase:

```
WHERE DATECONST1 EQ '19010228'
```

The adapter will convert the WHERE phrase to the following predicate in the generated SQL:

```
WHERE
(T1."DATECONST1" = DATE '1901-02-28')
```

Support DECFLOAT Data Type as MATH and XMATH

The new Db2 data types MATH and XMATH support the necessary precision for compatible decimal computation. The Db2 data type DECFLOAT(16) can be mapped as ACTUAL format MATH or FLOAT, and the Db2 DECFLOAT(34) data type can be mapped as ACTUAL format XMATH or FLOAT using the following settings.

```
SQL DB2 SET CONV_DECFLOAT16 MATH
SQL DB2 SET CONV_DECFLOAT16 FLOAT
SQL DB2 SET CONV_DECFLOAT34 XMATH
SQL DB2 SET CONV_DECFLOAT34 FLOAT
```

The default precision is 18 and the default scale is 2 for the MATH data type. You can change these defaults using the following commands, where *p* is the precision and *s* is the scale.

```
SQL DB2 SET CONV_DECFM_PREC p
SQL DB2 SET CONV_DECFM_SCALE s
```

The default precision is 34 and the default scale is 2 for the XMATH data type. You can change these defaults using the following commands, where *p* is the precision and *s* is the scale.

```
SQL DB2 SET CONV_DECFX_PREC p
SQL DB2 SET CONV_DECFX_SCALE s
```

Adapter for C9 INC

This section provides detailed descriptions of new features for the Adapter for C9 INC.

New Setting Available for Temporal Lower Boundary Date

The TREND_LOW_BOUNDARY = YYYY-MM-DD setting provides a lower boundary for the temporal trending period that will be used when the lower boundary is not specified by a TABLE query FROM-TO clause.

The default c9 value is 1970-01-01. Historical data filtered by the following expression may be excessive and cause performance problems.

```
WHERE DAILY/MONTHLY/QUARTERLY/YEARLY_TREND FROM '1970-01-01' TO
CURRENT_DATE
```

This setting will relieve such problems.

Adapter for Cloudera Impala

The Adapter for Cloudera Impala provides for analysis of both structured and complex data. Impala provides a JDBC driver and the Hive Query Language, a SQL-like interface with a real time query capability that shares the metadata layer and query language with Hive.

Adapter for EXASol ODBC

The Adapter for EXASol ODBC is new in this release and can be found under SQL Adapters on the Web Console. The adapter provides read/write access to data stored in an EXASOL in-memory database is available on Windows and RH Linux. The adapter uses the EXASolution ODBC driver API.

Adapter for EXASol ODBC: Extended Bulk Load

An extended bulk load option is available that uses the IMPORT command for faster loading.

Adapter for Google BigQuery

The Adapter for Google BigQuery is new in this release and can be found under SQL Adapters on the Web Console. The adapter is used to load data into the Google BigQuery environment and report against the information that is residing in the Google BigQuery environment. BigQuery provides a REST-based API that requires all requests to be authorized by an authenticated user or a service account.

Adapter for Hive

This section provides detailed descriptions of new features for the Adapter for Hive.

Synonym Creation for SQL Strings

The adapter supports Create Synonym for an External SQL Script.

Insert/Update for ORC Files

As of Hive 0.14, the UPDATE operation is supported for data stored as Optimized Row Columnar (ORC) format. While not designed for OLTP, this does provide an option for dimension tables and for correcting data.

DataMigrator and MODIFY as well as SQL Pass through can take advantage of this capability.

When the Hive metadata is created it must contain these additional parameters:

```
CLUSTERED BY (column [,column..]) INTO n BUCKETS
STORED AS ORC TBLPROPERTIES ('transactional'='true')
```

Where the number of buckets and one more column names that are used to cluster the data are specified.

Note that DataMigrator currently requires a key column to be identified to perform update operations. While Hive does not identify columns as keys, since bucketed columns cannot be updated, they should be so identified. Before creating a data flow to perform updates, edit the synonym for the target table and select the Key Component checkbox for the bucketed columns and any others required to uniquely identify the row.

Adapter for i Access

This section provides detailed descriptions of new features for the Adapter for i Access.

JDBC Adapter Configuration Available

A new SQLIIA JDBC-based adapter is available to enable access to the IBM i platform from UNIX, Windows, and Linux.

Adapter for Informix

This section provides detailed descriptions of new features for the Adapter for Informix.

Adapter for Informix Supports Extended Bulk Load

DataMigrator with a target table in Informix supports Extended Bulk Load using the native DBLOAD utility.

Adapter for Jethro

Jethro is an acceleration engine that makes real-time Business Intelligence work on Big Data. The adapter is available for ODBC (on Windows only) and JDBC (on Linux/Unix/Windows).

Adapter for MariaDB

The Adapter for MariaDB is new in this release and can be found under SQL Adapter on the Web Console. The adapter provides read/write access to data stored in the open source MariaDB database using the MariaDB Connector/J.

Adapter for MariaDB: Change Data Capture (CDC) Support

DataMigrator supports Change Data Capture (CDC) for MariaDB with Load Type IUD.

Adapter for Microsoft SQL Server

The following features are supported for Microsoft SQL Server in this release.

Adapter for Microsoft SQL Server: Support for Computed Columns as R/Only

Adapters for MS SQL (SQLMSS and MSODBC) now map SQL Server computed columns as read-only, with the FIELDTYPE=R attribute.

JDBC and ODBC Adapters for Microsoft SQL Server Support Version 2016

ODBC and JDBC Adapters for Microsoft SQL Server support the recently released Microsoft SQL Server version 2016, ODBC driver version 13, and JDBC driver version 6.

ODBC Adapter for Microsoft SQL Server Supported on Red Hat Linux

ODBC based access to MS SQL Server is provided from Linux Red Hat 6 on the Intel x64 platform. Performance savings for large answer set retrieval can reach 50% compared to JDBC access from Linux.

ODBC Adapter for Microsoft SQL Server Support for Extended Bulk Load

The Adapter for MSODBC Supports extended bulk loading via MS Bulk Copy utility on Windows and Linux.

ODBC Adapter for Microsoft SQL Server Supports Change Data Capture for NVARCHAR(MAX) Fields

When a column has the data type NVARCHAR(MAX), the Synonym Editor now creates the synonym with USAGE and ACTUAL formats A32765V when the Synonym Candidates are restricted to *Table Log Records*.

Note: The server must be configured for Unicode to properly report from National Fields.

If the length of the data is longer than 32765, the following message is generated:

```
(FOC1362) COLUMN name IS TRUNCATED IF DATA LENGTH EXCEEDS 32765
```

Adapter for MySQL

This section provides detailed descriptions of new features for the Adapter for MySQL.

Change Data Capture (CDC) Support

The Adapter for MySQL now supports Change Data Capture (CDC).

Adapter for Netezza

This section provides descriptions of new features for the Adapter for Netezza.

Adapter for Netezza: Support for Bulk Load

The Adapter for Netezza supports extended bulk loading using the nzload utility.

Adapter for ODBC

This section provides descriptions of new features for the generic ODBC Adapter.

Adapter for ODBC: Support for Wide API

The Generic ODBC Adapter has been upgraded to utilize the wide ODBC API.

Adapter for Oracle

This section provides detailed descriptions of new features for the Adapter for Oracle.

Support for Power Linux LE With Instant Client

The Adapter for Oracle is now supported on IBM Power Linux Little Endian systems using the Oracle Instant Client Basic package.

New Setting to Map FLOAT Data Type as DECIMAL

The following new Adapter for Oracle setting maps the Oracle FLOAT and FLOAT(126) data types to Float or to Decimal.

```
ENGINE SQLORA SET ORAFLOAT [FLOAT|DECIMAL[p s] ]
```

where:

FLOAT

> Maps the Oracle FLOAT and FLOAT(126) data types to USAGE=D20.2, ACTUAL=D8. This is the default value

DECIMAL[*p s*]

> Maps the Oracle FLOAT and FLOAT(126) data types to Decimal with precision = *p* and scale = *s*. If precision and scale values are omitted, the precision defaults to 33 and the scale to 2.

This setting is expected to be used on case-by-case basis after consulting with Information Builders Technical Support Services. It compensates for the Oracle proprietary implementation of FLOAT and FLOAT(126) data types that deviate from the IEEE 754 standard.

Note that Oracle BINARY_FLOAT and BINARY_DOUBLE data types are not affected by the setting since these types conform to the IEEE 754 standard.

Connection to Database Running on Amazon RDS

The Adapter for Oracle can access Amazon RDS running an Oracle DB instance. This is implemented by using a long connection string, such as the following, instead of a TNS alias.

```
(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=dns_of_db_instance)
(PORT=listener_port))(CONNECT_DATA=(SID=database_name)))
```

where:

dns_of_db_instance

> Is the DNS of the database instance.

listener_port

> Is the Oracle TCP listener port number.

database_name

   Is the database name.

Support for Extended Bulk Load

The Adapter for Oracle Supports Extended Bulk Load based on the Direct Path Load API.

Adapter for Oracle Reads XMLType Data Type Using DB_EXPR

The Oracle XMLType data type can be mapped with USAGE=TX50L, ACTUAL=TX. The Access File then specifies attributes needed for retrieving the data using the DB_EXPR function.

The following Master File declares a field named *xmltypefield* whose data type is XMLType:

```
FILENAME=ORAXML_SRZ, SUFFIX=SQLORA , $
SEGMENT=ORAXML_SRZ, SEGTYPE=S0, $
FIELDNAME=I, ALIAS=I, USAGE=I11, ACTUAL=I4,
MISSING=ON, $
FIELDNAME=xmltypefield, ALIAS=X, USAGE=TX50L, ACTUAL=TX,
MISSING=ON, $
```

The following Access File specifies the attributes for reading the XMLType field:

```
SEGNAME = segname, TABLENAME = tablename,$
FIELD=xmltypefield,
SQL_FLD_OBJ_TYPE=OPAQUE,
SQL_FLD_OBJ_PROP=,
SQL_FLD_OBJ_EXPR='DB_EXPR(XMLSERIALIZE(DOCUMENT "xmltypefield"))',$
```

where:

```
SQL_FLD_OBJ_TYPE=OPAQUE
```

   Indicates that the field can be processed only through DB_EXPR.

```
SQL_FLD_OBJ_EXPR='DB_EXPR(XMLSERIALIZE(DOCUMENT "xmltypefield"))'
```

   Is the Oracle SQL Expression that reads the XML document stored in the field.

Example: **Using an Oracle XMLType Field in a Request**

The following request retrieves the XML document stored in column XMLTYPEFIELD for id=112.

```
 TABLE FILE ORAXML_SRZ
PRINT XMLTYPEFIELD
WHERE I EQ 112
END
```

The following SQL is generated and passed to Oracle.

```
SELECT
T1."I",
(XMLSERIALIZE(DOCUMENT T1."XMLTYPEFIELD"))
FROM
PODOC T1
WHERE
(T1."I" = 112);
```

Adapter for Oracle: Support for Long IN-list

The Adapter for Oracle now splits a long IN-list generated, for example, when BY HIERARCHY is used in reports. This enables it to overcome the Oracle limit of 1000 elements and pass optimized SQL to the DBMS.

Adapter for Apache Phoenix for HBase

Apache Phoenix provides SQL read/write access to Apache HBase (and MapR-DB) a NoSQL database distributed with Hadoop.

For full functionality this adapter requires Phoenix release 4.5.0 or later.

Adapter for SAP HANA

The following features have been added for the Adapter for SAP HANA.

Optimization of Simplified Functions POSITION and TOKEN

Simplified functions POSITION and TOKEN are optimized by the Adapter for SAP HANA.

Support for NCLOB/TEXT Data Types

The Adapter for SAP HANA supports the TEXT data type in HANA column mode as format NCLOB.

Adapter for Sybase

This section provides detailed descriptions of new features for the Adapter for Sybase.

Adapter for Sybase IQ Support for Unicode Extended Bulk Load

The Adapter for Sybase IQ supports Unicode Extended Bulk Load.

Adapter for Teradata

This section provides detailed descriptions of new features for the Adapter for Teradata.

Support for Wide ODBC API

A new interface for Teradata is introduced that is based on the wide ODBC API. This interface supports Unicode and offers better performance on some platforms (for example, Windows and Linux x64/x86) compared to the Teradata ODBC interface that is not utilizing the wide API. This wide ODBC API interface is supported with TTU v.15.0 or higher.

READONLY Fields in Extended Bulk Load

Loading into Teradata using Extended Bulk Load is now supported even when the server metadata contains READONLY fields. Such fields will be skipped and remained unchanged during loading.

Distinguishing Between Macros and Stored Procedures

The following Access File attribute has been introduced to identify whether the synonym represents a Teradata Macro or Stored Procedure.

```
STPTYPE = {MACRO|SP}
```

Support for Version 15.10

The Teradata CLI and ODBC adapters support Read/Write access to Teradata Version 15.10.

ERP Adapters

This section describes new features for ERP adapters.

Adapter for Microsoft Dynamics CRM

The Microsoft Dynamics CRM Online Adapter is new in this release and can be found under the ERP adapters. It allows reporting against the Microsoft Dynamics CRM Online environment, which is a customer relationship management software package that works in the Cloud. It enables companies to manage their prospect and customer account in a centralized way. The information that can reported against includes account, account leads, campaign activity, contacts, contact orders, and workflow.

Adapter for SAP/R3

The following have been added for the Adapter for SAP/R3.

Enhanced Function Module Functionality

To prevent and avoid the malicious injection of ABAP code in the context of a WebFOCUS query, function modules provided by Information Builders (DYNAMIC_RUN, REP_CREATE,REP_GET_B_D, REP_RUN) are enhanced to perform whitelisting of the dynamically generated ABAP4 code, by default. (See the SEC_CHK function module for the list of permitted commands).

Any command not whitelisted will be denied execution.

In addition, the function modules provided by Information Builders are enhanced with user exits by inserting calls to customer defined function modules on start (USR_EXT_ENT*), and exit (USR_EXT_EXT*). These user exits will be called with the same set of parameters as the original calling function module (IMPORT/TABLES only). A dummy version is supplied by Information Builders.

* A customer can modify these user exit function modules and implement all additions and authorizations (SAP authority checks) that are required.

GIS Adapters

This section provides detailed descriptions of new features for GIS adapters.

Adapter for Esri ArcGIS

The Adapter for Esri ArcGIS provides access to the Esri cloud for the purposes of drawing maps and demographic layers, and also providing the following geometry functions that retrieve geometry data and geocode addresses:

❏ **GIS_DISTANCE.** Calculates the distance between two geometry points.

❏ **GIS_DRIVE_ROUTE.** Returns the driving route between two geometry points.

❏ **GIS_GEOCODE_ADDR.** Returns the geometry point for a complete address.

❏ **GIS_GEOCODE_ADDR_CITY.** Returns the geometry point for address, city, and state.

❏ **GIS_GEOCODE_ADDR_POSTAL.** Returns the geometry point for address, postal_code.

❏ **GIS_GEOMETRY.** Builds/converts a JSON geometry object given a geotype, WKID (Well-Known ID) spatial reference, and a initial JSON geometry.

❏ **GIS_IN_POLYGON.** Given a geometry point and a polygon definition, returns the value 1 (TRUE), if the point is in the polygon or 0 (FALSE), if is not.

❏ **GIS_LINE.** Given two geometry points or lines, GIS_LINE builds a JSON line defining a geometry line.

❏ **GIS_POINT.** Given a WKID (Well-Known ID) spatial reference, longitude, and latitude, returns a JSON point defining a geometry object.

❏ **GIS_SERVICE_AREA.** Calculates the geometry area with access boundaries within the given time or distance from the provided geometry point.

❏ **GIS_SERV_AREA_XY.** Calculates the geometry area with access boundaries within the given time or distance from the provided coordinates and WKID spatial reference.

For detailed information about the geography functions, see BAD XREF HERE "Reporting Language Enhancements

Unified Definition for ArcGIS Server URLs and Geographic Roles

The server comes with a file named geo_services.xml that configures all ArcGIS geographic services that are available out of the box when the server is installed.

In order to correctly retrieve and use location data in a request, the geographic roles for the fields that represent locations must be accurately defined in the request or the metadata. Geographic roles may be part of a hierarchy. For example, a city may be part of a state, and the state part of a country. The hierarchical relationships are needed in order to identify and retrieve the correct location data.

Hierarchy definitions also provide WebFOCUS with the information needed to perform AutoDrilling from a geographic role at a higher level of the geographic hierarchy to a geographic role at a lower level of the geographic hierarchy.

When you use the Web Console Data Assist tool to assign a geographic role to a field, the hierarchies display their member roles within the appropriate contexts. For example, the following image shows the hierarchies available by default, with the World hierarchy open to its first level of member roles.
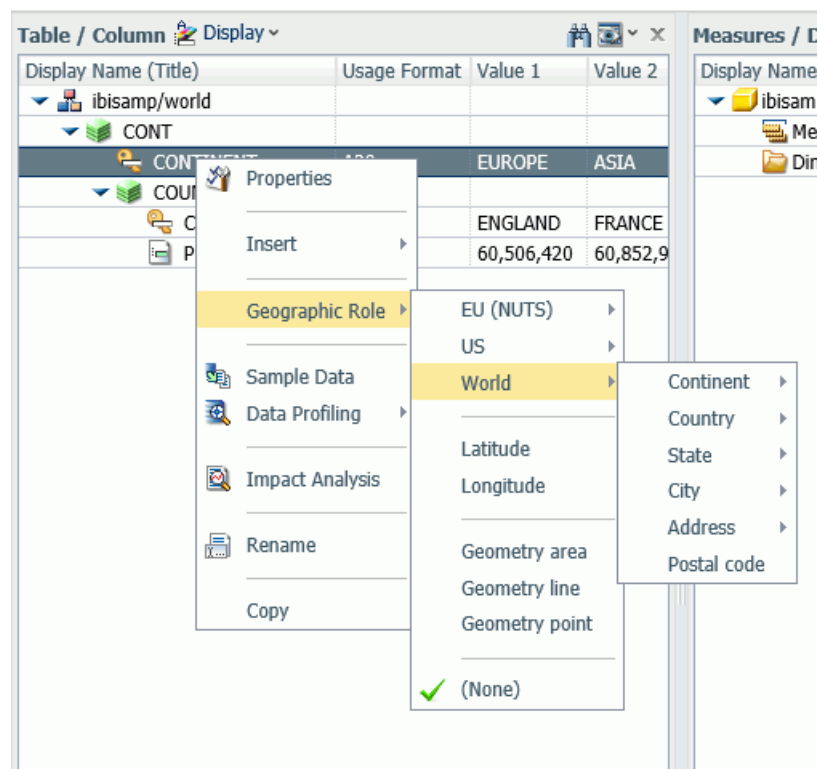
Note that, by default, the available hierarchies are the EU hierarchy, the US hierarchy, and the World hierarchy.

Customers with Enterprise Data often have map layers that represent their territories, events or logistical information. These are published as Map Services to either a subscription based in the Esri Cloud (ArcGIS.com) or on an internal portal. In order for these customized geographic roles to be available through the server, they must be added to the geo_services.xml file.

Configuring Geographic Roles

The geographic configuration file, geo_services.xml, is located in the catalog directory under the server home directory:

```
_edahome/catalog/
```

The server builds the calls needed to retrieve geographic roles dynamically using this configuration file. Each role definition in the configuration file, when used in a WebFOCUS request, generates metadata and a request that is sent to Esri.

A geographic role can be part of a hierarchy. For example, the World geographic role is at the top of a hierarchy that contains continents, countries, states, and cities. These hierarchies are also described in the geo_services.xml file.

To add a custom geographic role, you must add the necessary parameters for the geography to this file.

Following standard xml syntax rules, each element is enclosed in element start and end tags (<elementname>, </elementname>), and attribute values are enclosed in double quotation marks (").

Reference: Geographic Role Definitions

A geographic role is stored as *geo_role* element in the geo_roles object of the geo_services.xml file. A geographic role must be defined with:

❑ An ID that will identify the role in the configuration file.

❑ A format and length for the data to be returned.

❑ A role name.

❑ A display title for the role name (to appear as a selection in the front-end tools).

❑ An optional role format (if the role can have multiple formats, such as a name and an abbreviation).

❑ A display title for the format.

❑ A role type (GEOGRAPHY for polygons or GEOMETRY for points).

❑ An optional vocabulary rule element containing vocabulary elements for associating the role with a field in the metadata.

The following attributes define a geographic role.

id

Is an alphanumeric uppercase value, up to 50 characters, used to identify the geographic role.

type

Is the data type for the ID. Can be one of the following.

❏ **"alpha"** for alphanumeric data, formats An or In.

❏ **"integer"** for integer numeric data, format In.

❏ **"numeric"** for fractional numeric data, formats Pn.m, Dn.m, or Fn.m.

❏ **"text"** for text data, format TXn.

value_size

Is the optional number of characters in USAGE format length (any, if not set).

role_name

Is the name of the geographic role.

role_name_title

Is the title of the geographic role, to be displayed in the tools for selection.

role_format

Is an optional format for the geographic role, useful when the role can be referenced using multiple formats, such as a name, an ISO code, and an abbreviation.

role_format_title

Is an optional title for the format of the geographic role. It will be shown in parentheses along with the role title in the tools, for example, State (Abbreviation).

geo_type

Is one of the following predefined role types.

❏ **"geography"**, for geographic objects such as country or state.

❏ **"geometry"**, for geometry objects such as geometry point and geometry area.

❏ **"coordinate"**, for coordinates such as latitude and longitude.

vocabulary_rules

Is an element that consists of a group of vocabulary elements that explicitly describe column names for the geographic role. These rules will be used to select the best geographic data for the role.

Elements in a rule are connected by the Boolean logic operation OR (only one needs to be satisfied). Each vocabulary element contains words enclosed with special characters. Words in the rule element are connected by the Boolean logic operation AND (all need to be satisfied).

A word may be prefixed and/or suffixed with the percent character (%), which is a place holder for any sequence of characters. If an element contains more than one word, each word has to be prefixed by the character plus (+) or minus (-). Plus indicates that the word must be found in the column name. Minus indicates that word *must not* be found in the column name.

Example: ## Sample Geographic Role Definitions

The following defines the State Abbreviation geographic role. The role ID is USSTATE_ABBR. The role name is USSTATE with a role format of ABBR. The titles that show in the tools are US state (Abbreviation). The format is A2, and the vocabulary rules specify that the characters *state* must be present, but the characters *iso*, *capital*, and *population* must not be present. The geo type is geography, indicating that the returned data will be a geographic area.

```
<geo_role
id="USSTATE_ABBR"
 value_size="2"
 type="alpha"
role_name="USSTATE"
role_name_title="US state"
role_format="ABBR"
role_format_title="Abbreviation"
 geo_type="geography">
<vocabulary_rules>
<vocabulary>+%state%-%iso%-%capital%-%population%</vocabulary>
</vocabulary_rules>
</geo_role>
```

The following is a role definition for latitude values. The role ID is LATITUDE. The role name is also LATITUDE. Its format is numeric. The title that displays in the tools is Latitude. The geo type is geometry, indicating that the returned data will be points or areas described using points. The vocabulary rules specify that the characters *latitude* must be present.

```
<geo_role
 id="LATITUDE"
 type="numeric"
 role_name="LATITUDE"
role_name_title="Latitude"
 geo_type="geometry">
 <vocabulary_rules>
  <vocabulary>%latitude%</vocabulary>
 </vocabulary_rules>
</geo_role>
```

The following is the definition for the city role. The ID is CITY. The role name is also CITY. Its format is NAME. The title that displays in the tools is City (Name). The definition has a set of vocabulary elements. Only one of the elements in the list must be true. Therefore, the characters *city*, or *town*, or *country* plus *capital*, or *state* plus *capital* must be present.

```
 <geo_role
 id="CITY"
type="alpha"
role_name="CITY"
role_name_title="City"
role_format="NAME"
role_format_title="Name"
 geo_type="geography">
  <vocabulary_rules>
   <vocabulary>+%city%-%population% </vocabulary>
   <vocabulary>+%town%-%population% </vocabulary>
   <vocabulary>+%country%+%capital%-%population% </vocabulary>
   <vocabulary>+%state%+%capital%-%population% </vocabulary>
  </vocabulary_rules>
 </geo_role>
```

Reference: **Geographic Hierarchy Definitions**

Some geographic roles exist as part of a hierarchy, and the data for the hierarchical roles are stored at the same map services endpoint (URL). Hierarchical role relationships are stored as *hier* elements in the geo_services.xml file.

Each hierarchy definition in geo_services.xml has the name of the hierarchy (attribute ID) and a group of LEV elements with the attributes level, geo_role, and, optionally, value. Not all defined roles can be used in hierarchies. The same role can be included in more than one hierarchy and may be on different hierarchical levels in each. However, the same role cannot be used more than once in the same hierarchy. Multiple geographic roles can be assigned to the same hierarchical level in a hierarchy.

Geographic hierarchies are defined with the following attributes:

id

> Is a name of up to 50 alphanumeric characters used to identify the hierarchy.

level

> Is a natural number (integer, starting with 1 for the top level) that specifies the level of the role within the hierarchy.

geo_role

> Is the ID attribute of a geographic role (geo_role element).

value

> Is an alphanumeric value, up to 50 characters, predefined for this geo role in this hierarchy.

Example: Sample Geographic Hierarchy Definition

The following element defines the world hierarchy. The top level is CONTINENT, both the Name role and the ISO code role. Level 2 has four COUNTRY geographic roles, corresponding to four different country formats. Level 3 contains three state formats, level 4 contains the city name, and level 5 contains two address formats and the postal code.

```
<hier id="World">
    <lev level="1" geo_role="CONTINENT"/>
    <lev level="1" geo_role="CONTINENT_ISO2"/>
    <lev level="2" geo_role="COUNTRY"/>
    <lev level="2" geo_role="COUNTRY_FIPS"/>
    <lev level="2" geo_role="COUNTRY_ISO2"/>
    <lev level="2" geo_role="COUNTRY_ISO3"/>
    <lev level="3" geo_role="STATE"/>
    <lev level="3" geo_role="STATE_ISO_SUB"/>
    <lev level="3" geo_role="STATE_FIPS"/>
    <lev level="4" geo_role="CITY"/>
    <lev level="5" geo_role="ADDRESS_FULL"/>
    <lev level="5" geo_role="ADDRESS_LINE"/>
    <lev level="5" geo_role="POSTAL-CODE"/>
</hier>
```

Reference: Adding the Federal Reserve Districts Geographic Role

These steps describe how to add the Federal Reserve Districts geographic role to the geo_services.xml file.

1. Open the geo_services.xml file. The default location on Windows is:

   ```
   C:\ibi\srvnn\home\catalog\geo_services.xml
   ```

   where *nn* is your release of the server. For example, 77 for Release 7707.

2. Add the role to the end of the GEO_ROLES object:.

```
<geo_role id="FED-DIST" value_size="50" type="alpha" role_name="FED-
DIST" role_name_title="FED District" role_format="FR_Distric"
role_format_title="FED District Name" geo_type="geography">
   <vocabulary_rules>
    <vocabulary>+%FR_Distric%</vocabulary>
   </vocabulary_rules>
</geo_role>
```

The ID is FED-DIST. The role name is also FED-DIST. Its format is FR_Distric. The title that displays in the tools is FED District. The definition has a vocabulary rule. The characters *FR_Distric* must be present.

3. Add this role to the US Hierarchy:

```
<hier id="US">
   <lev level="1" value="United States" geo_role="COUNTRY"/>
   <lev level="1" value="US" geo_role="COUNTRY_ISO2/>
   <lev level="1" value="USA" geo_role="COUNTRY_ISO3"/>
   <lev level="2" geo_role="USSTATE"/>
   <lev level="2" geo_role="USSTATE_ABBR"/>
   <lev level="2" geo_role="USSTATE_FIPS"/>
   <lev level="3" geo_role="USCOUNTY"/>
   <lev level="3" geo_role="USCOUNTY_FIPS"/>
   <lev level="4" geo_role="USCITY"/>
   <lev level="4" geo_role="USCITY_FIPS"/>
   <lev level="5" geo_role="ADDRESS_FULL"/>
   <lev level="5" geo_role="ADDRESS_LINE"/>
   <lev level="5" geo_role="ZIP3"/>
   <lev level="5" geo_role="ZIP5"/>
   <lev level="6" geo_role="FED-DIST"/>
   </hier>
```

4. Add the URI to the map server layer for this role at the end of the URIS object:.

```
<uri description="FedReserve Districts">
   <returned_geometry>GEOMETRY_AREA </returned_geometry>
   <returned_georole>FED-DIST</returned_georole>
   <url type="esri" authorization="none" synonym="">
http://services7.arcgis.com/L95Wwv9OjRQ0tjAs/arcgis/rest/services/
FRDISTRICTS/FeatureServer/0</url>
   <parameters>
    <parm order="1" parm_name="FR_Distric" parm_georole="FED-DIST"/>
   </parameters>
   </uri>
```

This role will now be available to use in a request and will display in the tools.

OLAP Adapters

This section provides detailed descriptions of new features for OLAP adapters.

Adapter for Essbase

The Adapter for Essbase now supports Essbase 11.1.2.3 and 11.1.2.4 on the Windows 64-bit platform.

Adapter for Microsoft SQL Server Analysis Services (SSAS)

You can use the DB_EXPR function to calculate temporary measures and use currency and percent display options for measures.

Creating Temporary Calculated Measures Using DB_EXPR

You can use the DB_EXPR function to generate a query-scope calculated measure as an MDX expression. The result of that expression must be type value. In the calculated measure expression, you can use any MDX function.

You are responsible for how the expression will work in the context of the whole generated MDX query. For example, note that if the expression references the [Calendar] hierarchy, the result will depend on which (if any) level of that hierarchy is referenced in a BY clause of the TABLE request. If the level is not taken into account, the query may produce unexpected results or errors.

Example: Using MDX Functions in a Calculated Measure

The following request references three MDX functions to define the ISA_YTD measure, one member type function (CURRENTMEMBER), and two value type functions (Sum, Ytd).

```
DEFINE FILE ADVENTURE_WORKS_MIXED_CASE
ISA_YTD/D20.2 WITH Internet_Sales_Amount =
DB_EXPR(Sum(Ytd( [Date].[Calendar].CURRENTMEMBER ),
[Measures].[Internet Sales Amount]));
END
TABLE FILE ADVENTURE_WORKS_MIXED_CASE
SUM Internet_Sales_Amount
ISA_YTD
BY Fiscal_Year NOPRINT
BY Fiscal_Quarter
ON TABLE SET PAGE NOPAGE
END
```

The following MDX request is generated, which includes the calls to the MDX functions.

```
WITH
MEMBER [Measures].[ISA_YTD] as '
Sum(Ytd( [Date].[Calendar].CURRENTMEMBER ),
[Measures].[Internet Sales Amount])'
SET H24 as '
[Date].[Calendar].[Calendar Quarter].ALLMEMBERS'
SET H33 as '
[Date].[Fiscal].[Fiscal Year].ALLMEMBERS'
SELECT {
[Measures].[Internet Sales Amount],
[Measures].[ISA_YTD]}
ON AXIS(0),
NON EMPTY CROSSJOIN(H24,
H33)
DIMENSION PROPERTIES
MEMBER_CAPTION
,[Date].[Calendar].[Calendar Quarter].[Fiscal Quarter] ON AXIS(1)
FROM [Adventure Works]
```

The output is shown in the following image.

Fiscal Quarter	Internet Sales Amount	ISA_YTD
Q1 FY 2002	$1,453,522.89	1,453,522.89
Q2 FY 2002	$1,812,850.77	3,266,373.66
Q3 FY 2002	$1,791,698.45	1,791,698.45
Q4 FY 2002	$2,014,012.13	3,805,710.59
Q1 FY 2003	$1,396,833.62	5,202,544.20
Q2 FY 2003	$1,327,799.32	6,530,343.53
Q3 FY 2003	$1,413,530.30	1,413,530.30
Q4 FY 2003	$1,623,971.06	3,037,501.36
Q1 FY 2004	$2,744,340.48	5,781,841.84
Q2 FY 2004	$4,009,218.46	9,791,060.30
Q3 FY 2004	$4,283,629.96	4,283,629.96
Q4 FY 2004	$5,436,429.15	9,720,059.11
Q1 FY 2005	$50,840.63	9,770,899.74

The following request references three MDX functions to define the measure I_S_A_4_MONTHS_ROLLING_AVERAGE, two member type functions (CURRENTMEMBER and Lag), a range (:), and one value type function (Avg).

```
DEFINE FILE ADVENTURE_WORKS_MIXED_CASE
I_S_A_4_MONTHS_ROLLING_AVERAGE/D20.2M
WITH Internet_Sales_Amount =
DB_EXPR(Avg({ [Date].[Calendar].CURRENTMEMBER.Lag(3)
: [Date].[Calendar].CURRENTMEMBER },
[Measures].[Internet Sales Amount]));
END
TABLE FILE ADVENTURE_WORKS_MIXED_CASE
SUM Internet_Sales_Amount
I_S_A_4_MONTHS_ROLLING_AVERAGE AS 'Rolling Average'
BY Fiscal_Year NOPRINT
BY Fiscal_Quarter
ON TABLE SET PAGE NOPAGE
END
```

The following MDX request is generated, which includes the calls to the MDX functions.

```
WITH
MEMBER [Measures].[I_S_A_4_MONTHS_ROLLING_AVERAGE] as '
Avg({ [Date].[Calendar].CURRENTMEMBER.Lag(3)
: [Date].
[Calendar].CURRENTMEMBER },
[Measures].[Internet Sales Amount])'
SET H24 as '
[Date].[Calendar].[Calendar Quarter].ALLMEMBERS'
SET H33 as '
[Date].[Fiscal].[Fiscal Year].ALLMEMBERS'
SELECT {
[Measures].[Internet Sales Amount],
[Measures].[I_S_A_4_MONTHS_ROLLING_AVERAGE]}
ON AXIS(0),
NON EMPTY CROSSJOIN(H24,
H33)
DIMENSION PROPERTIES
MEMBER_CAPTION
,[Date].[Calendar].[Calendar Quarter].[Fiscal Quarter] ON AXIS(1)
FROM [Adventure Works]
```

The output is shown in the following image.

Fiscal Quarter	Internet Sales Amount	Rolling Average
Q1 FY 2002	$1,453,522.89	$1,453,522.89
Q2 FY 2002	$1,812,850.77	$1,633,186.83
Q3 FY 2002	$1,791,698.45	$1,686,024.04
Q4 FY 2002	$2,014,012.13	$1,768,021.06
Q1 FY 2003	$1,396,833.62	$1,753,848.74
Q2 FY 2003	$1,327,799.32	$1,632,585.88
Q3 FY 2003	$1,413,530.30	$1,538,043.84
Q4 FY 2003	$1,623,971.06	$1,440,533.57
Q1 FY 2004	$2,744,340.48	$1,777,410.29
Q2 FY 2004	$4,009,218.46	$2,447,765.07
Q3 FY 2004	$4,283,629.96	$3,165,289.99
Q4 FY 2004	$5,436,429.15	$4,118,404.51
Q1 FY 2005	$50,840.63	$3,445,029.55

Support for Display Options M, p, and %

The following display options are now supported and are used when generating synonyms for the sample data sources provided with SQL Server Analysis Services.

❏ **M**, which places a floating currency symbol to the left of a measure.

❏ **p**, which converts a measure to a percent by multiplying it by 100, and then displays it with a percent symbol on the right.

❏ **%**, which does no conversion, but displays the existing measure with a percent symbol on the right.

Example: **Using the Display Options M, p, and %**

The following request prints INTERNET_SALES_AMOUNT twice, first with no currency symbol, and then with a currency symbol (M option). It prints GROSS_PROFIT_MARGIN three times, first as a number, then as a percent (p option), and last as a number with a percent symbol (% option).

```
TABLE FILE ADVENTURE_WORKS_UPPER_CASE
PRINT
INTERNET_SALES_AMOUNT/P20.2 AS 'P20.2'
INTERNET_SALES_AMOUNT/P20.2M AS 'P20.2M'
GROSS_PROFIT_MARGIN/F10.4 AS 'F10.4'
GROSS_PROFIT_MARGIN/F10.2p AS 'F10.2p'
GROSS_PROFIT_MARGIN/F10.4% AS 'F10.4%'
BY COUNTRY
ON TABLE SET PAGE NOPAGE
ON TABLE SET STYLE *
GRID=OFF,$
ENDSTYLE
END
```

The output is shown in the following image.

Country	P20.2	P20.2M	F10.4	F10.2p	F10.4%
Australia	9061000.58	$9,061,000.58	.1143	11.43%	.1143%
Canada	1977844.86	$1,977,844.86	.1143	11.43%	.1143%
France	2644017.71	$2,644,017.71	.1143	11.43%	.1143%
Germany	2894312.34	$2,894,312.34	.1143	11.43%	.1143%
United Kingdom	3391712.21	$3,391,712.21	.1143	11.43%	.1143%
United States	9389789.51	$9,389,789.51	.1143	11.43%	.1143%

Data Analysis Expression (DAX) Passthrough

A sample DAX query can be executed using the existing MDX Passthru mechanism. The recommended way is to place a DAX query into a file with extension .sql and create a synonym for it. The synonym can be further edited for attributes such as proper formatting. Reporting is then done against that synonym.

Adapter for TM1

The Adapter for TM1 is a special configuration of the Adapter for SQL Server Analysis Services. Configure the Adapter for TM1 by selecting *TM1OLAP Provider* on the *Change Settings for SQL Server Analysis Services* page of the Web Console. You must also provide the default database and, possibly, additional connection string parameters on the *Change Connect Parameters for SQL Server Analysis Services* Web Console page. The Adapter for TM1 supports Cognos Access Manager (CAM) authentication and Integrated Login.

CAM Authentication Support

To configure Cognos Access Manager (CAM) authentication, you must add the CAMNamespace parameter to the connection string.

You can configure this parameter on the Web Console. To configure the Adapter for TM1, use the Add Connection page for the Adapter for SQL Server Analysis Services, as shown in the following image.

For TM1, the catalog to be accessed must be part of the connection string. Enter the catalog name in the *Default Database* text box in order to add it to the connection string.

Enter the CAMNamespace parameter in the *Additional connection string keywords* text box. It will be added to the connection string as the ProviderString parameter when you press *Configure*. For example, if you enter CAMNamespace=NTLM_NAMESPACE, a connection string similar to the following is generated in the edasprof.prf server profile:

```
ENGINE SSAS SET CONNECTION_ATTRIBUTES CON1
SQL2012x64-02/user1,pwd1;SData:CAMNamespace=NTLM_NAMESPACE
```

The ENGINE SSAS SET PROVIDER TM1OLAP command must be in effect when using the Adapter for TM1. This command can be issued in edasprof.prf or in a FOCEXEC.

Integrated Login Support

Integrated Login enables you to use Microsoft Windows network authentication to control access to IBM Cognos TM1 data.

In this security model, user and group Microsoft Windows login information has to be moved into the Cognos TM1 database. Integrated Login matches the domain-qualified name you use to sign in to Microsoft Windows with a name stored in the internal database.

Integrated Login is supported on Microsoft Windows only.

You can configure Integrated Login in the Web Console, using the Add Connection page of the Adapter for SQL Server Analysis Services. When you configure the Adapter for TM1, select a trusted connection, as shown in the following image.

The connection string must specify the name of the TM1 catalog to be accessed. Enter the catalog name in the *Default Database* text box. A connection string similar to the following will be generated in the edasprof.prf server profile.

```
ENGINE SSAS SET CONNECTION_ATTRIBUTES CON1
SQL2012x64-02/,;SData
```

Since the connection is configured as trusted, no user ID or password is included in the connection string. The Integrated SSPI login causes the credentials from the Windows login to be used to access TM1.

The ENGINE SSAS SET PROVIDER TM1OLAP command must be in effect when using the Adapter for TM1. This command can be issued in the Server Profile or in a FOCUS procedure.

DBMS Adapters

This section provides detailed descriptions of new features for the DBMS adapters.

Adapter for Salesforce JOIN Support

Child-to-parent retrieval (reversed join) queries are now enabled for custom objects. This feature adds support for queries with multiple objects.

Procedures Adapters

This section provides detailed descriptions of new features for the Procedures adapters.

Adapter for REST

This section provides detailed descriptions of new features for the Adapter for REST.

Adapter for REST/WS: Pass Name:Value Pairs in the HTTP Header

Name:Value pairs can now be passed in the HTTP Header of a SOAP/REST request.

For a SOAP request, add the following attributes in the Access File.

```
FIELD=fieldname, PARAMSTYLE=header,
```

Note that the field belongs to the root segment, but *not* in the header group (unlike with the REST adapter). The fields in the header group will go to the SOAP header, not the HTTP header.

For the REST adapter, the fields in the header group, if specified as PARAMSTYLE=*header*, go to the HTTP header, otherwise they are added to the URL.

The field to be placed in the HTTP header should be positioned within the header group of the root segment.

The following Access File record indicates the header group.

```
HEADER=groupname
```

The following declaration indicates the field whose value is to be placed in the HTTP header.

```
FIELD=fieldname, PARAMSTYLE=header, $
```

In the Master File, identify the value to be placed in the header for the field.

For example, consider the following Access File.

```
SEGNAME=M6ILO,
........
HEADER=GRHEADER,
.........$
FIELD=TOKEN, PARAMSTYLE=header, $
```

The Master File should contain the following attributes.

```
GROUP=GRHEADER, ELEMENTS=1, ACCESS_PROPERTY=(INTERNAL),
TITLE='GRHEADER', $
FIELDNAME=TOKEN, ALIAS=token, USAGE=A80, ACTUAL=A80,XDEFAULT='oxxxxx', $
```

This causes the following to be placed in the HTTP header.

```
token: oxxxxx
```

Adapter for REST: Support for GZIP Response Format

The Adapter for REST now supports responses in GZIP Format.

Adapter for REST: Support for Requests not Containing Service URL Extension

Support has been added for REST Web Services calls that do not have a service URL extension.

Adapter for REST: Support for Token as Attribute in Chained Authentication

Support has been added for retrieving a token from a Chained Authentication request when it resides as an attribute or as a child segment with multiple entries,

Adapter for REST/WS: Type Needed for Elements when OBJ_TYPES=NO

In the Web Services adapter, xsi:type will be sent for specific elements in the SOAP request based on the defined FIELDNAMES in the Access file, even though sending xsi:types is turned off in the Access file (OBJ_TYPES=NO).

Adapter for REST/WS: Support for Attribute Referencing

Create Synonym for the Web Services adapter now supports attribute referencing.

Adapter for RStat Predictive Analytics

The Adapter for RStat Predictive Analytics is new in this release and can be found under Procedure Adapters on the Web Console. The adapter allows RStat models to be deployed from the Reporting Server Console, it addition to model deployment from App Studio. A Master File and Access File are also created for the deployed model, enabling access through a Master File Join or the function DB_LOOKUP().

Adapter for Web Services

The following features were added for the Adapter for Web Services.

Microsoft Dynamics AX 2012 Integration

Microsoft Dynamics AX 2012 is an ERP system. It offers complete functionality for accounting, inventory control, warehouse management, transportation management, demand and supply chain planning, material requirements planning, production management, quality assurance, product lifecycle management, and asset management.

Using the Web Service adapter, reports can be created to report against the data within the Dynamics AX environment while respecting its security.

Sequential and Indexed Adapters

This section provides detailed descriptions of new features for the Sequential and Indexed adapters.

Reading Virtual Fields Through the File Listener

When using the File Listener with a pick up mode of MONITOR there are virtual fields available that in previous releases were only available with pickup strategy MONITOR, (which does not actually read the files). They are now also available when reading the file with pickup strategy IMMEDIATE.

Special Characters Supported With Upload Wizard

Upload Wizard now allows the special characters dot (.) and slash (/) when you explicitly redefine the target DBMS table name, in order to support multi-part schema/owner based names. The library specification (for example, mylib/mytable or mylib.mytable) separator is changed to an underscore (for example, mylib_mytable).

Adapter for Excel (via Direct Retrieval)

This section provides detailed descriptions of new features for the Adapter for Excel (via direct retrieval).

File Listener for Excel Worksheet

The File Listener component of DataMigrator can process Microsoft Excel workbooks that are delivered to a specified directory.

In addition to the synonym for the workbook as Excel (via direct read), this requires a synonym for a flat file with the normal file listener parameters specified. An additional segment contains a copy of the synonym for the Excel workbook.

Adapters for DFIX and Excel (via Direct Retrieval)

This section provides descriptions of features for the Adapters for DFIX and Excel (via direct retrieval).

Date and Date-Time Recognition With Patterns

Previously, when creating a synonym for a Delimited Flat File or Excel workbook using the direct read adapter, columns with timestamp or date-time values were created as alphanumeric fields.

Now such columns are recognized, and the synonym is created with appropriate USAGE and ACTUAL formats.

Adapters for Flat and Delimited Flat Files

The following features have been added for the Adapters for flat files and delimited flat files.

Adapter for DFIX: Respecting Server CDN option

The CDN parameter can be set in the server profile, in the Access File for a delimited data source, or in a request. When you upload a delimited file to the server, you can select the CDN option for that file from a drop-down list, and it is placed in the Access File. The supported CDN values are the following.

OFF

The thousands separator is a comma (,), and the decimal separator is a period (.). This is the default value.

ON

The thousands separator is a period (.), and the decimal separator is a comma (,).

SPACE

The thousands separator is a space, and the decimal separator is a comma (,).

QUOTE

The thousands separator is a single quotation mark ('), and the decimal separator is a comma (,).

QUOTEP

The thousands separator is a space, and the decimal separator is a period (.).

Adapter for RMS

The following features have been added for the Adapter for RMS.

Direct 64bit DEC TIMESTAMP Support

The OpenVMS Adapter for RMS now supports the direct read and write of native OpenVMS 64-Bit DEC TIMESTAMP data using H date-time formats for USAGE and ACTUAL formats when the following command is in effect.

```
SET VMSTIMESTAMP = VMS
```

This eliminates the need for the WRTSTIME() and CVTSTIME() subroutines in the writing and displaying of dates stored in this format in MODIFY and other applications.

Any H date is valid, but more commons ones follow.

The following displays as 2004/12/01 15:18:17.610.

```
...,USAGE=HYYMDs,ACTUAL=HYYMDs, ...
```

The following displays as 2004/12/01 15:18:17.

```
...,USAGE=HYYMDS,ACTUAL=HYYMDS, ...
```

The following displays as 01-Dec-2004 15:18:17.61.

```
...,USAGE=HDMtYY-2,ACTUAL=HDMtYY-2, ...
```

The format HDMtYY-2 most closely mimics the OpenVMS 64-Bit TIMESTAMP format (as displayed by commands such as DIRECTORY/DATE), except that the month is displayed in mixed case.

If your server application only uses RMS files, SET VMSTIMESTAMP = VMS command should be added to the server EDASPROF.PRF profile (which is in the EDACONF etc directory).

Some SQL examples follow.

```
SQL INTO MYTABLE
VALUES ('123456789','2015-07-08 12:08:07.12') ;
END

SQL UPDATE MYTABLE
SET SOLD_TIMESTAMP='2015-07-07 12:08:07.12'
WHERE ACCT='123456789' ;
END
```

SET INSERTSIZE=n for Insert and Update

Support for the command SQL SET INSERTSIZE=*n* for prepared SQL UPDATE, INSERT, and DELETE statements against non-SQL Data Adapters has been implemented to improve performance.

The feature is only active for prepared SQL logic, such as the following.

```
SQL PREPARE SQLIN FROM
INSERT INTO MYTABLE (FIELD_KEY,FIELD_A) VALUES (?,?)
END
SQL BIND SQLIN USING INTEGER, VARCHAR(10);
END
SQL
EXECUTE SQLIN USING 1, 'One';
END
```

Internally, records will be collected and then executed (under MODIFY) when the INSERTSIZE is reached, or sooner if a COMMIT, PURGE, or different SQL statement is encountered.

The feature is not active for non prepared SQL statements such as INSERT INTO INTO MYTABLE VALUES (1,'One').

SQL requests sent using JLINK applications must also set setAutoCommit(false) on the Java connection to override the java.sql.Connection behavior of sending commits after each transaction.

Update Locking Behavior

The OpenVMS Adapter for RMS now allows the locked record wait period for LOCKMODE=KEEP to be set and, in order to match the behavior when LOCKMODE is not declared for the RMS file, the setting LOCKMODE= REJECT can be invoked. If an explicit wait period is not set for KEEP, the default wait period is 10 seconds, as it was prior to the implementation of this feature.

The syntax is

```
ENGINE RMS SET WAIT_LOCKED n
```

where:

n

Is the number of seconds to wait.

Social Media Adapters

This section provides detailed descriptions of new features for the Social Media adapters.

Adapter for Google Analytics

Enhancements have been made to the filtering capabilities within the Adapter for Google Analytics.

For example.

The following filter returns records where /products is at the beginning of the page path.

```
WHERE PAGEPATH LIKE '/products%'
```

The following filter returns records where /products is at the end of the page path.

```
WHERE PAGEPATH LIKE '%/products'
```

The following filter returns records where /products exists anywhere within the page path.

```
WHERE PAGEPATH LIKE '%/products%'
```

The following filter will not return records where /products is at the beginning of the page path.

```
WHERE PAGEPATH NOT LIKE '/products%'
```

The following filter will not return records where /products is at the end of the page path.

```
WHERE PAGEPATH NOT LIKE '%/products'
```

The following filter will not return records where /products exists anywhere within the page path.

```
WHERE PAGEPATH NOT LIKE '%/products%'
```

The following filter returns records where /products exists anywhere within the page path.

```
WHERE PAGEPATH CONTAINS '/products'
```

The following filter will not return records where /products exists anywhere within the page path.

```
WHERE PAGEPATH OMITS '/products'
```

The following filter returns records where the USERS value is greater or equal to 30 and less than or equal to 800.

```
WHERE USERS FROM 30 TO 800
```

Adapter for Facebook: Enhanced Create Synonym Functionality

Version 2.7 of the Facebook API is now supported.

Social Media Demonstration Application

In WebFOCUS Release 8.2 Version 01M and higher, a social media demonstration ("demo") application is available for deployment, which highlights the capabilities of WebFOCUS Social Media Integration when performing various levels of social media analysis.

The first level of analysis is known as the engagement level, where you analyze if, when, and how much activity took place. As companies mature, they start to focus on not just the activity but the actual conversations themselves.

WebFOCUS Social Media Integration offers techniques such as sentiment and word frequency analysis to help quantify and visualize this textual data to more effectively see trends and patterns in the data.

The second level of analysis is integrating your social data with enterprise data to better understand social impact on business outcomes. The data analysis that is used in this demo was obtained when Walmart was running a very specific campaign around their meat products. Note that the sales data was fabricated to provide better understanding, especially since there was no conclusive access to their real sales data. However, the social data is real.

The WebFOCUS social media demo files are located in the following folder of your WebFOCUS installation:

<drive>:\ibi\WebFOCUS82\samples\social_media_demo

For more information on installing and using the social media demo that is packaged with WebFOCUS, see the *WebFOCUS Social Media Integration Guide*.

XML-Based Adapters

This section provides detailed descriptions of new features for the XML-based adapters.

Adapter for JSON

The following features have been added for the Adapter for JSON.

Adapter for JSON Support for UPDATE

Using DataMigrator, data can be loaded into new JSON targets in a data flow.

Support for ON TABLE HOLD FORMAT JSON

A report can now save output in JSON (Java Script Object Notation) format.

```
ON TABLE HOLD [AS name] FORMAT JSON
```

A JSON file and accompanying synonym are generated.

Ability to Set Encoding in the XML Header for XML Write

Previously, the XML Write Adapter always created the XML file with encoding="UTF-8" in the XML header. Now encoding can be specified in the synonym and is written to the XML header.

Redirection Support for HTTP Status Codes 302, 303, and 307

Support has been added for HTTP calls made from the XML, Web Services, REST and Social Media adapters that require a redirection to a different URI. This support includes HTTP status code responses 302, 303, and 307.

DataMigrator Enhancements

This section describes the new features for DataMigrator.

DataMigrator represents a broad category of tools designed to facilitate and automate the extraction and integration of data. From source extraction through target load, data is transformed through the application of business rules. Once the transformation is complete, the data is loaded into table structures that have been optimized for a particular application.

For more information on any of these new features, see the *DataMigrator User's Guide*.

In this chapter:

❏ Adapters

❏ Calculators

❏ Data and Process Flows

❏ Data Management Console

❏ Data Profiling

❏ Quick Copy

❏ Reporting

❏ Synonym Editor

Adapters

The following section provides descriptions of new features for adapters.

Change Data Capture for MySQL

The DataMigrator support for Change Data Capture now includes the MySQL database.

In order to use CDC with MySQL, you must install Java and MySQL client utilities on the system where the DataMigrator server is installed. Additionally, on that system, you must have the Environment Variable CLASSPATH pointing to the location where the Connector/J is installed.

Connection for [Delimited] Flat File Targets

In prior releases when using DataMigrator to write a Flat File or Delimited Flat file the first configured connection was always used.

There is now an option to select *<local>* for the local file system where the DataMigrator server is running. You can also select a connection that refers to an FTP or SFTP server that has been configured for the server.

Extended Bulk Load Availability

Extended Bulk Load is now available on EXASol, Informix, MS SQL Server, Netezza, ORACLE, and PostgreSQL.

Extended Bulk Load for Hive and Impala

Data can now be loaded to HDFS using Extended Bulk Load. When the Hive or Impala server is remote, FTP is used to move the file to load.

File Attributes from File Listener

There are now virtual fields available when using the File Listener with the MONITOR pick up mode. In previous releases, these fields were only available with a pickup strategy of MONITOR, which does not actually read the files. They are now also available when reading the file with a pickup strategy of IMMEDIATE.

The available virtual fields include:

INSTANCE_FULL

The full path and name of the file. This field cannot be used in conjunction with INSTANCE.

INSTANCE_SIZE

The size of the file in bytes.

INSTANCE_DATE

The date that the file was last modified.

INSTANCE_TIME

The time that the file was last modified.

Additional fields are available for UNIX and Linux systems.

Support SFTP Source from a DM Server on Windows

Unlike Linux, Windows does not include an SFTP client program. However, there are programs available that implement the protocol. You can use an SFTP server as a source or target from a DataMigrator Server running on Windows by installing a SFTP client program, such as PuTTY.

MS SQL Server ODBC Adapter in Linux

The MS SQL Server ODBC adapter is now supported on Linux Red Hat 6 Intel x64 platform, in addition to Windows.

Change Data Capture for MySQL and MariaDB

The DMC now supports Change Data Capture (CDC) for both MySQL and MariaDB adapters with a load type of IUD.

Calculators

The following section provides descriptions of new features for calculators.

Allow a Variable in WHERE Filter for IN

In the Data Management Console, you can now use a variable in a Data Flow with a WHERE filter that contains an IN clause. For example, you could create a WHERE filter such as:

```
PLANT IN (&PLIST)
```

When you run the flow, you could use the following values:

```
'BOS','ATL'
```

These values would be used to return rows with either value.

Notifications for Format Auto Correct

Under certain conditions, when working in the DMC Synonym Editor or a Data Flow calculator, the format of a new field is recalculated based on the expression. A new balloon tip has been added, which informs users that the format has been recalculated.

Enhanced DMTRUNC Function

The simplified function DTRUNC, which returns the first day of a time period (YEAR, MONTH, QUARTER), has been extended to return the first day of a WEEK and the last day of any time period.

Optimization of REPLACE Function

A new, simplified REPLACE function has been introduced. This function has the following syntax:

```
REPLACE ( string , pattern , replacement )
```

The function will replace or remove a substring within a string. The input parameters can have CHAR, VARCHAR, or TEXT as data types. The result is always VARCHAR, with a length that is determined from the input parameters.

Using a Regular Expression in a SQL WHERE Condition

A Regular Expression can now be used in WHERE conditions in a SQL SELECT statement. A Regular Expression, or regexp, is a special sequence of characters that describe a search string. The syntax is:

```
string [NOT] RLIKE regexp
```

Data and Process Flows

The following section provides descriptions of new features for data and process flows.

CMRUN on All Platforms

The CMRUN program, which DataMigrator uses to initiate flows or stored procedures, takes an optional parameter of x=filename. This parameter allows you to store the password in a protected file.

In previous releases, the parameter was a DDNAME and only used on IBM zSeries (MVS).

Now it can be used on any other platform, including Windows and UNIX, where it is specified as a file name in the current directory or as the relative or full path to a file name.

Disallowing Multiple Instances of a Flow

When working with a Process Flow that initiates another data flow, you can now prevent the called flow from starting if another instance of the flow is running, by selecting the *Do not allow multiple instances* check box. This option is available in the Properties pane of a flow object.
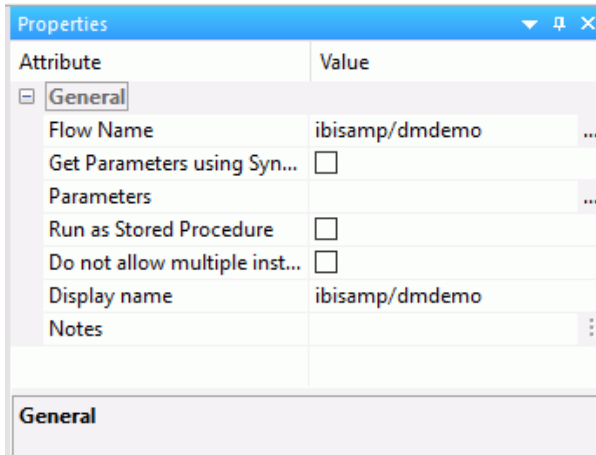
Expand and Collapse Functionality for Objects

In the DMC, when viewing a flow with expanded objects, multiple objects can be selected by pressing the Ctrl key while clicking them.

If there are no objects selected in either a data or process flow, the new Expand All or Collapse All options are available.

Long Names in Flows

In the Data Management Console, if the name of an object is too long to fully display, it is truncated and shown with ellipses. You can see the full name by hovering over the object.

Optimize Load Option to Support MERGE

DataMigrator has a new option that allows for faster loading when a source and target are in the same relational database, resulting in an increase in performance. When working with:

❏ Databases that support the MERGE command, the merge is generated and passed through to the database so that both the extract and load is done in a single SQL statement. This option allows specifying different calculations for insert and update operations. Updates can use values from both the source and target tables. Databases that support a SQL MERGE command include MS SQL Server 2008 and Db2 9.1 (and later).

❏ Insert only operations, an INSERT INTO ... SELECT command is generated and passed through to the relational database.

In either case, because all operations are done in the database, a much faster throughput is possible.

You can enable this option by opening the flow properties of a data flow and selecting the *Optimize Load* checkbox under the Execution section.

Note: Since the operation is done as a single SQL command rather than row-at-a-time processing, some capabilities are not available when this option is selected. These include Record Logging and use of VALIDATE to reject individual rows. Also, a count of the number of rows inserted, updated, or deleted is not available.

The user should consider both modes of operation to determine which is best suited for their application.

Specifying Display Name in Target Properties

Target Properties has a new attribute, Display Name, that allows user specification of the name that appears on the flow. The default is the application name, if enabled in flow properties, and the synonym name.

Updates to Email Functionality

The following new features are available for emails:

❏ **Email File Types for a Process Flow**

Any file type can be attached to a DataMigrator process flow email.

❏ **Email Recipients**

In previous releases, when sending email messages, all recipients appeared in the To line. Now, recipients can also appear on the Cc line, or hidden as Bcc.

❏ **Sending HTML Output on Message Failure**

The Send HTML output as inline message located in the Properties panel of a Process Flow Start object now allows you to send HTML output from a report in an email message on failure, as well as on successful completion.

Updating Values in Target Transformations

You can now update, instead of replace, values in a target table using the On Match Expressions tab that can be found in the Transformations dialog box. For example, you can add the value from an incoming row to the value in the target table instead if replacing it completely.

Data Management Console

The following section provides descriptions of new features for the Data Management Console (DMC).

Downloading Files

A new Download option is available for all files on Application tree in the Data Management Console and Web Console. When a user downloads files, they are saved in the Downloads folder of their computer. In Windows, this location is C:\users*username*\Downloads, by default.

Improvements in Column Name Display Strategy

When the strategy is something other than *Name*, the header label now shows, for example *Display Name (Title)*. This ensures that the column name is clearly displayed. In addition, the field Name can now be displayed even when the display strategy is not *Name*.

Improvements to Text Editor

When using the Text Editor in the DataMigrator Console with a stored procedure (focexec) that has one more lines selected, new shortcut menu options allow for commenting or uncommenting multiples lines at once. The options are *Comment Selection* or *Uncomment Selection*.

Kerberos and Single Sign-On From DMC

A new Single Sign-On capability is now available when connecting from the Data Management Console to a DataMigrator or WebFOCUS Reporting Server on Linux with Kerberos enabled.

The IWA (Integrated Windows Authentication) that is available on the Server Node Configuration dialog box has been replaced with two new options: NTLM (NT Lan Manager) for Windows and Kerberos for use with Linux. When you select either of these options, you do not need to enter a user ID and password. The user ID and password you used to log in to Windows is used.

Once you connect to the DMC, a message appears in the console log indicating the authentication method and user ID that was used.

Using Find in Properties Panes

In the Data Management Console, you can right-click the Properties pane for a synonym or a flow and use the new Find option in the shortcut menu to search for text in the Attributes column.

Data Profiling

The following section provides descriptions of new features for data profiling.

Quick Copy

The following section describes the new feature for the Quick Copy tool.

Quick Copy Allows Delimited Flat File Targets

From the Data Management Console or Web Console, the Quick Copy facility can now be used to create delimited flat files, in addition to loading database tables.

Reporting

The following section provides descriptions of new features for reporting.

Synonym Editor

The following section provides descriptions of new features for the Synonym Editor.

Assigning SCD Columns on a Synonym

Previously, using the DataMigrator capability of loading a Slowly Changing Dimension (SCD) table required identifying the SCD type of each column in the target table. This was done in the Synonym Editor one column at a time.

A new dialog box provides a quicker, simpler way for assigning the SCD types. A new panel shows all the column names and folders for each SCD type. Columns can be assigned to the appropriate type by drag-and-drop.

Identifying Internal Fields

There are new icons in the Synonym Editor Field View that help to identify fields with types Internal and Needs Value. These field types do not allow sample data. The icons help to provide a visual indication that these fields are different.

In addition, the new Access Property column shows these values for fields with these properties. You can access this column by right-clicking the *Name* header in the Synonym Editor, pointing to *Customize*, and clicking *Access Property*.

New Parameterize Value Attribute

The new Parameterize Value dialog box allows you to overwrite the values for the CDC attributes with the existing, corresponding, CDC variables or with new variables.

Pivoting Columns and Rows

It is now simpler to edit a synonym to indicate that data should be pivoted, columns turned into rows or single column turned into multiple columns, for retrieval.

This can be done by either selecting a group of columns or a single character column that contains a delimited list of values or a JSON or XML document. A new dialog box allows specification for how the columns should be pivoted.

Also, data sources that support array structures in a field, such as Hive (for data managed by Hadoop) or MongoDB a synonym can now be created to represent an array so that the individual elements can be accessed.

Archiving Files on a Local Server

When the File Listener processes remotely located files, users can now archive these files on either a local or remote system by using the new ARCHIVE_LOCAL option that is available in the File Listener Attributes.

Chapter 10

Resource Analyzer and Resource Governor Enhancements

This section describes the new features for Resource Analyzer.

Resource Analyzer provides Information Systems (IS) organizations with the ability to manage the growing volume and unpredictable nature of ad hoc data access.

Resource Governor controls monitoring, system configuration parameters, and governing rules. It provides preemptive governing for requests issued to both relational and non-relational data sources.

Together, Resource Analyzer and its partner product, Resource Governor, are designed specifically to help IS organizations analyze and control end user data access.

In this chapter:

❏ New Top n Reports

❏ New Field in SMCOLUMNS Table

❏ Converting Existing Repositories to New Repositories

❏ Vertica Now Supported

❏ Special Characters Now Supported

New Top n Reports

Resource Management has been enhanced with new Top *n* reports. These reports show the usage data for the top number of users, procedures, or data sources specified for the report. The available options for top number are 5, 10, 15, 20, and 25. The default value is 10.

New Field in SMCOLUMNS Table

A new field, called SMDVPROP, has been added to the Resource Management Repository to indicate if a field in the request has a Dimension View property. The value of this new field can be *M* for Measure, *D* for Dimension, or blank if it is not known or not part of a Dimension View. SMDVPROP has a format of A1 and is an attribute of the SMCOLNMS.SMCOLUMN table.

Converting Existing Repositories to New Repositories

A Repository conversion process has been added to allow FOCUS repository to be converted to an SQL adapter repository. This feature also allows an existing SQL repository to be converted to a new SQL adapter connection or to the same SQL adapter connection using a new owner name. The new SQL adapter connection can be any of the SQL adapters that are certified for Resource Management repository usage.

Vertica Now Supported

Vertica has been added to the list of supported environments that can be selected for the Resource Management Repository.

Special Characters Now Supported

The Add to Monitor page for Relational Data Sources has been enhanced to support: *{}>< \/:!|-=!@#^%+?$~ and blank special characters in the data source name. Any data source with special characters will be quoted using the RDBMS quoted identifier character. The data source will be stored as a 2 part name, owner.table, and monitored using uppercase characters, except for any quoted special characters.

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