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FUSION MIDDLEWARE
BUSINESS ACTIVITY
MONITORING

DASHBOARD VISUALIZATIONS IN ORACLE BAM
12.1.3

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Introduction

This whitepaper provides information on Oracle BAM Visualizations, and distinguishes and illustrates new features in Oracle BAM 12c.

As executives and operations managers, you need a real time capability to analyze business process to keep up with competitive business needs. Oracle BAM 12c helps you analyze emerging business information, compute business-level complex aggregates and thresholds, identify patterns, and correlate events from various business roles.

As managers, visibility into key business metrics empowers you by improving the efficiency of your business processes in a step-by-step approach to process optimizations. Oracle BAM 12c provides an easy-to-use, intuitive way for composing the dashboards addressing various business information needs. These dashboards based on Oracle ADF technology also support real-time channels allowing you to monitor changes in state in real time. These visualizations span from the traditional bar, area, line, pie charts and tables, to advanced visualizations like tree maps, watch lists, scatters, bubble graphs, and so on.

The Oracle Business Activity Monitoring Composer application is a web-based tool for creating and delivering dashboards. Once created, dashboards can be viewed in Oracle BAM Composer and can be used inside web portals through dashboard URLs. From Oracle BAM Composer, you can create data objects to hold incoming data to Oracle BAM. You can make use of projects to hold together relevant business artifacts like business queries, KPIs, visualizations, alerts, dashboards, and so on. These artifacts are integral to dashboards. You can also use folders to further categorize each type of artifact and create alerts that trigger based on corresponding business conditions, to carry out an intended action. You can choose to have either real-time dashboards with live data updating on screen, or point-in-time dashboards.

In Oracle BAM 12c, you can utilize advanced analytics capabilities and optimize business solutions.

What's New in Oracle BAM 12c

Oracle BAM 12c is a complete solution for building interactive, real time dashboards and proactive alerts, for monitoring business processes and services. There are some enhanced capabilities in this product release, and they are as follows.

- ✓ **Multiple browser support**

Oracle BAM Composer uses the Oracle ADF technology which is compatible with all major browsers including Mozilla Firefox, Google Chrome, and Microsoft Internet Explorer, unlike previous releases which only supported Microsoft IE.

- ✓ **Rich set of visualizations**

With Oracle ADF, Oracle BAM 12c is able to support a new set of visualizations including tree maps, horizontal bar graphs, scatter, polar, bubble graphs, watch lists, pivot tables, and geo maps (preview). Commonly used visualizations have been enriched with multiple new subtypes, giving you advanced control over data reading.

- ✓ **Ability to turn active data on/off at run-time**

With the slice and dice feature in BAM Dashboards, you have the ability to switch active data on or off at run time, while running the dashboard. You can also avail design time support for active data.

- ✓ **Sharing of business queries and business visualizations**

With the introduction of business queries inside projects, you can create a query once and share it on multiple business views that support the given query type. Business visualizations are separated out of reports, thereby giving you the option of using them in more than one dashboard at a time. This means you can reuse commonly required queries and visualizations across multiple dashboards.

- ✓ **Improved run-time analytics capabilities**

The slice and dice feature enables you to carry out advanced analytics operations at run time. These advanced operations include changing the group by dimensions of group query, applying filter conditions on the underlying query inside business visualizations, and so on.

Visualizations Use Case Scenario

Consider a scenario where you are monitoring product sales efficiency for a company. Your primary goal is that you must monitor sales cost profits. To monitor sales costs and associated profits, you create a SalesCostProfit analysis dashboard that satisfies common business needs like analyzing sales data to identify trends, gauge sales performance, and study sales costs.

These graphical reports allow sales teams to access minute-to-minute information to achieve projected targets and resolve operational challenges. The SalesCostProfit analysis dashboard shows you a snapshot of sales activity. You can analyze metrics like overall sales against the incurred cost, key loss or profit-making transactions, geographical sales tracking, and so on. This process mandates that you make the following considerations.

Key focus

- ✓ Transparency in business process as every valuable information visible on screen
- ✓ Snapshot of health of sales process
- ✓ Capability to do analysis of sales process in exceptional situations

Key KPIs and metrics

- ✓ Overall Sales / Costs
- ✓ Sales categorization by Region, Product category
- ✓ Profitability metrics

Distribution

- ✓ Sales executives

Based on your user role, you can open BAM dashboards from various locations in BAM Composer. As an administrator, you can open it directly from the designer mode, either by

selecting the dashboard node in the navigator and then clicking on 'open folder' icon or by selecting 'open action' by right-clicking the dashboard node selected in navigator. If you are not an administrator, you can open it from the viewer page.

You can access dashboards using the list mode or carousel view mode. You can view most recently visited and favorites dashboards with a single click. To favorite a dashboard, use the settings provided in the navigator panel on the right. You can also configure automatic launching for a dashboard when you start the application.
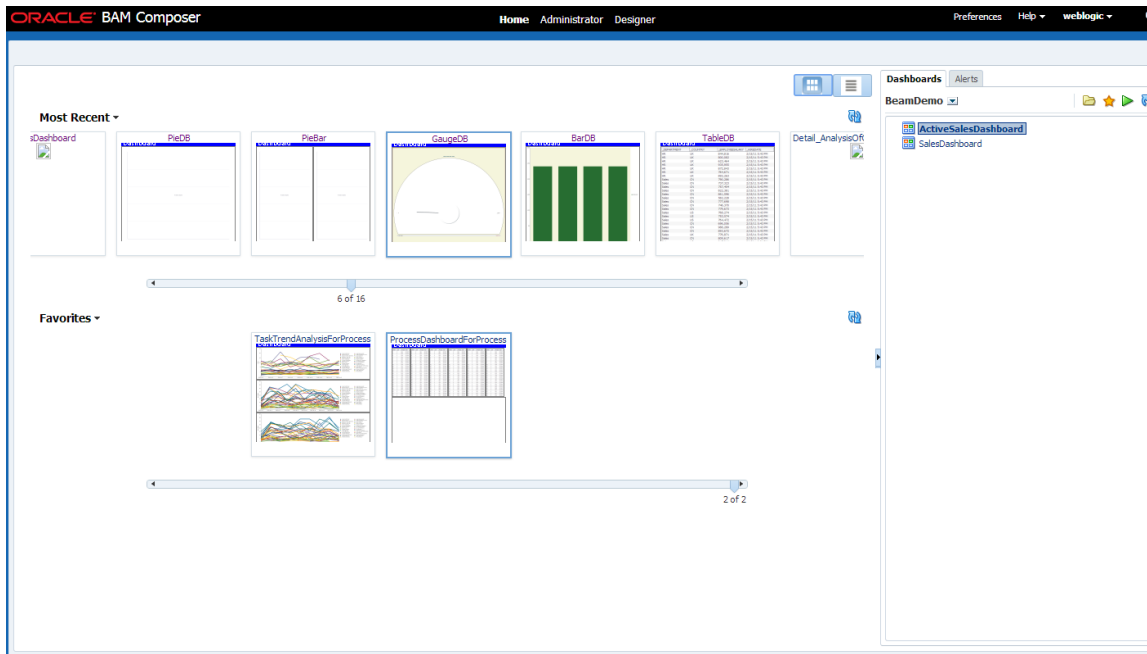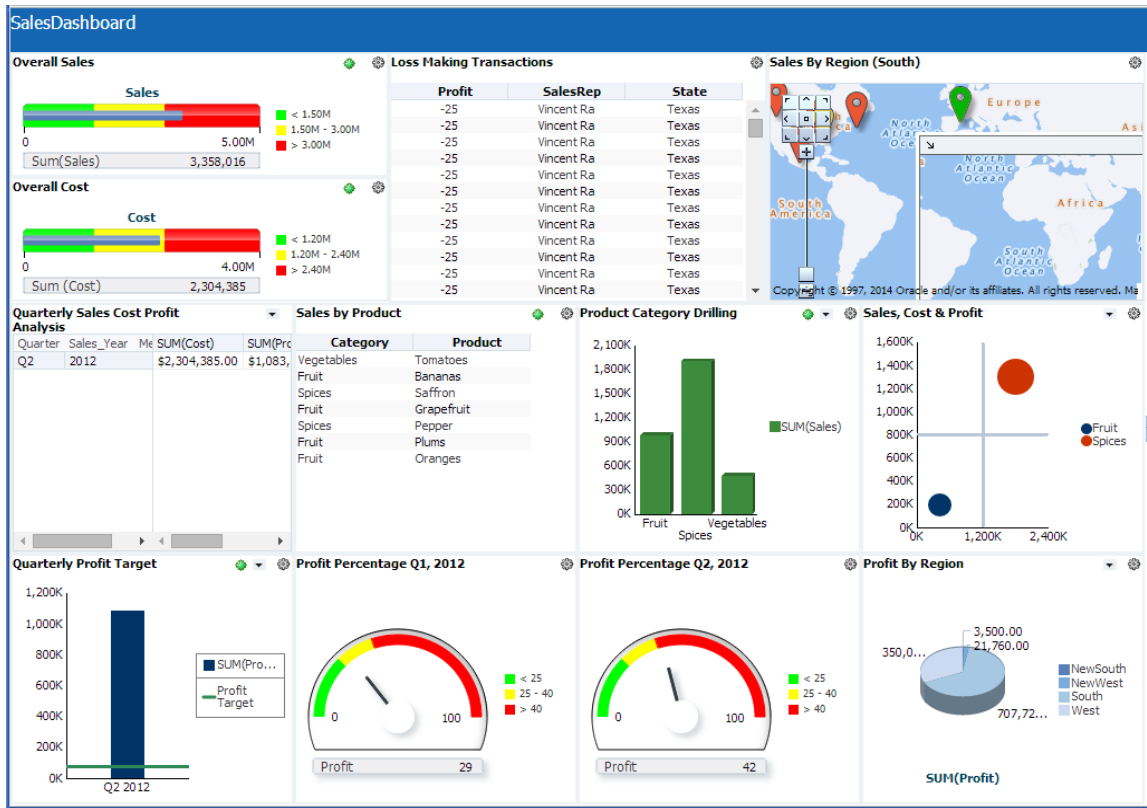

Figure 1 – Oracle BAM Composer Home Page

Figure 2 – BAM Sales Dashboard Demonstrating Visualization Types and Metrics
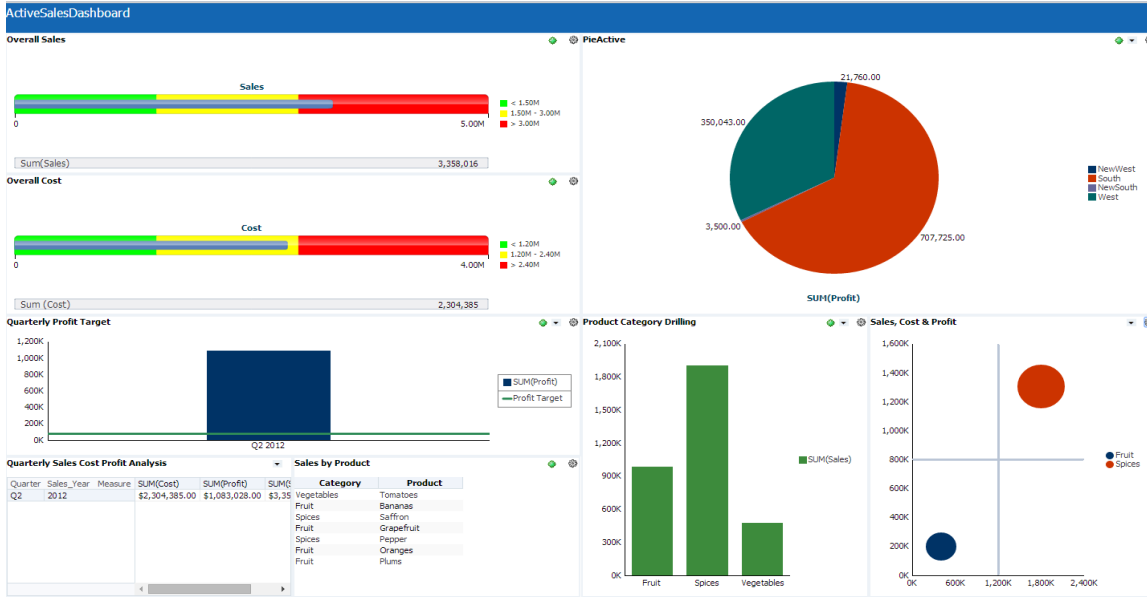

Figure 3 – Active Visualizations in ActiveSalesDashboard

Understanding Visualization Types

This section lists and details some visualization types and elaborates on their business usability.

Visualizing and Comparing Overall Sales and Overall Costs

Overall Sales and Overall Costs are 'Status Meter' views which are gauge views. A Status Meter indicates the current value in a horizontal marked gauge with color-coded low, medium, and high ranges. Figure 2 and Figure 3 help visualize the overall sales (sum of sales) vs. overall cost (sum of cost) values by using graph queries GaugeSalesQuery and GaugeCostQuery respectively. These queries do not use any grouping dimensions.

You can define threshold values for ranges using the properties editor. You can apply different property values for each visualization to alter views, based on your preferences. Once configured, the views reflect these threshold values and color-coded value ranges (low, medium, and high) as shown in Figure 4. You can access the properties editor using the "Properties" link in the business view editor.
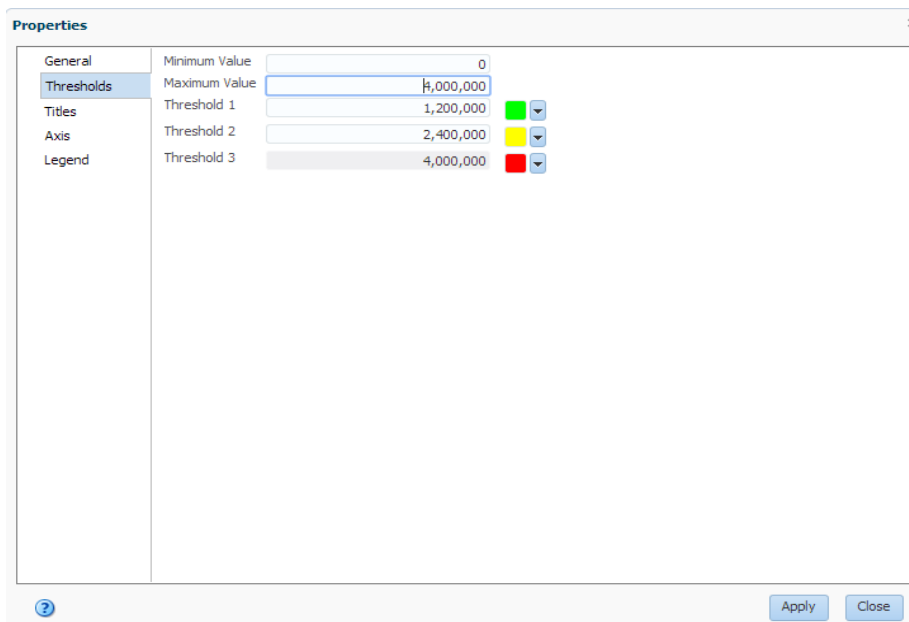

Figure 4 – Using the Properties Editor to Set Threshold Values

Visualizing Key Loss Making Transactions and Associated Details

The Key Loss Making Transactions view is a list view displaying the actual loss occurred for a salesperson and the corresponding state. TableQuery (a Flat Query) provides these details with a filter condition specifying the criteria "profit less than zero".

With Flat, Group, and Tree Model queries, you can define the filter conditions to restrict the data appearing in the result. For example, **Error! Reference source not found.** shows a flat query with a filter condition applied. You can have more than one filter condition following and/or combinations.
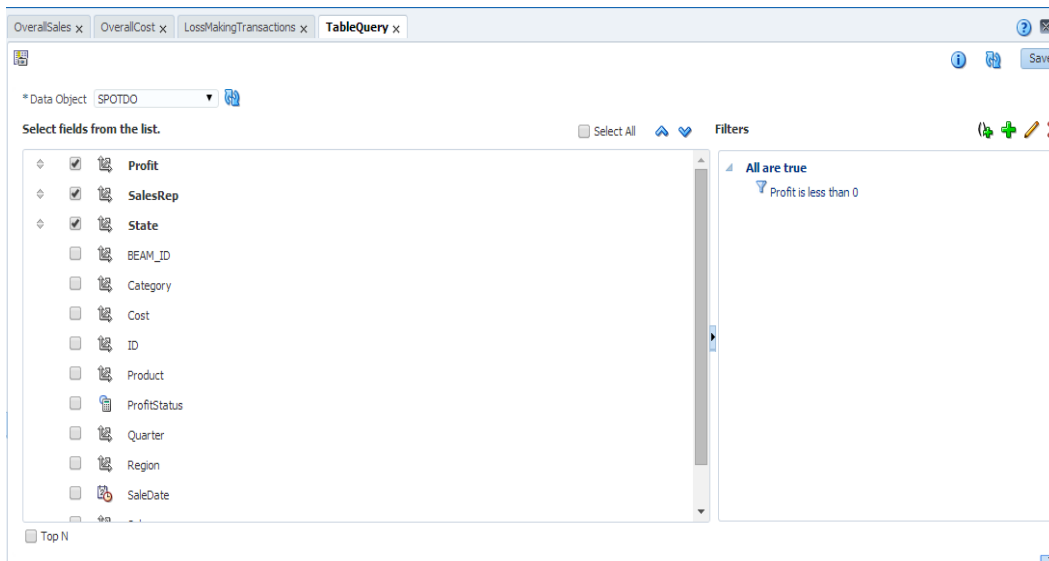
Figure 5 – TableQuery with Filter Conditions

Monitor sales data over geographies

A Geo Map view displays values of a 'Measure' by location. In most views, numeric data fields called 'Measures' are grouped by non-numeric data fields called 'Dimensions'. For example, 'Sales', a measure, can be grouped by 'Country', a dimension. An 'Aggregation' is a computation based on multiple values in a data field, such as a sum or an average.

The Sales by Region view displays sales figures spread over various geographical regions. It uses a flat query consisting of Address, CountryCode, Longitude, and Latitude information of the location to be displayed in the map, along with the measure that needs to be shown for each location.
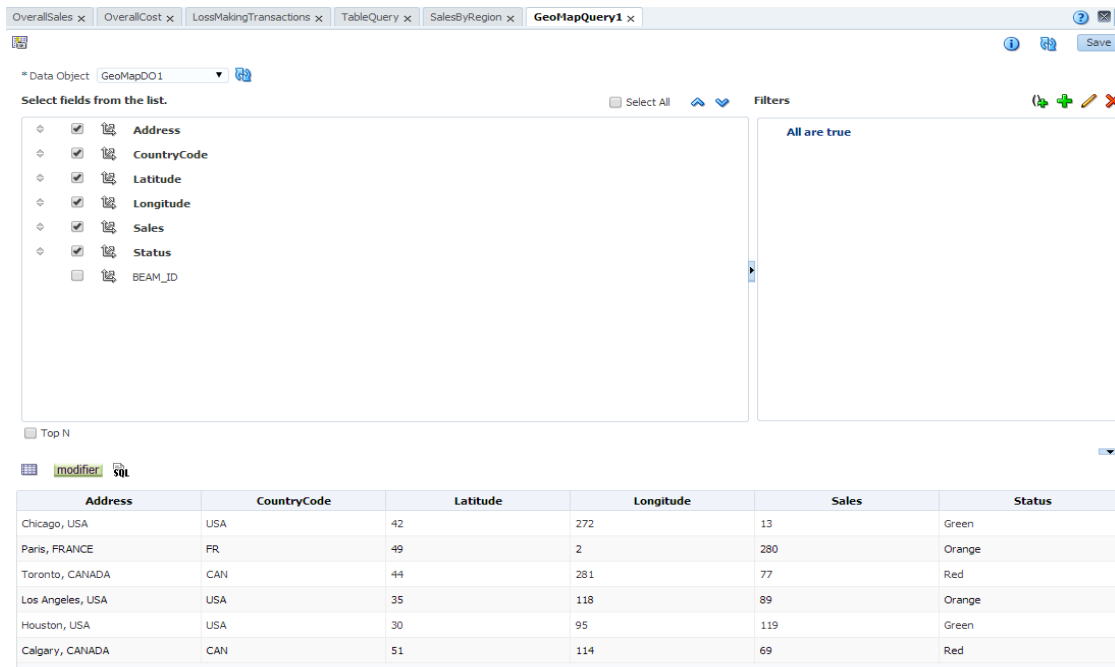
Figure 6 – Geo Map Query with Address and Measure Selection

While defining the geo map view, you can choose to represent location on a map by using either Address information (Address and Country code) or Location information (Latitude and Longitude), by unselecting or selecting Use Addresses, as shown in Figure 7. Map data is the actual measure to be displayed for a location. You can click on the location to see the measure's value.

Figure 7 – Geo Map Location Specification

To visually distinguish between the measure values, you can configure the status in the properties section. Different threshold values can be defined by different color codes.

Figure 8 – Geo Map Status Configuration

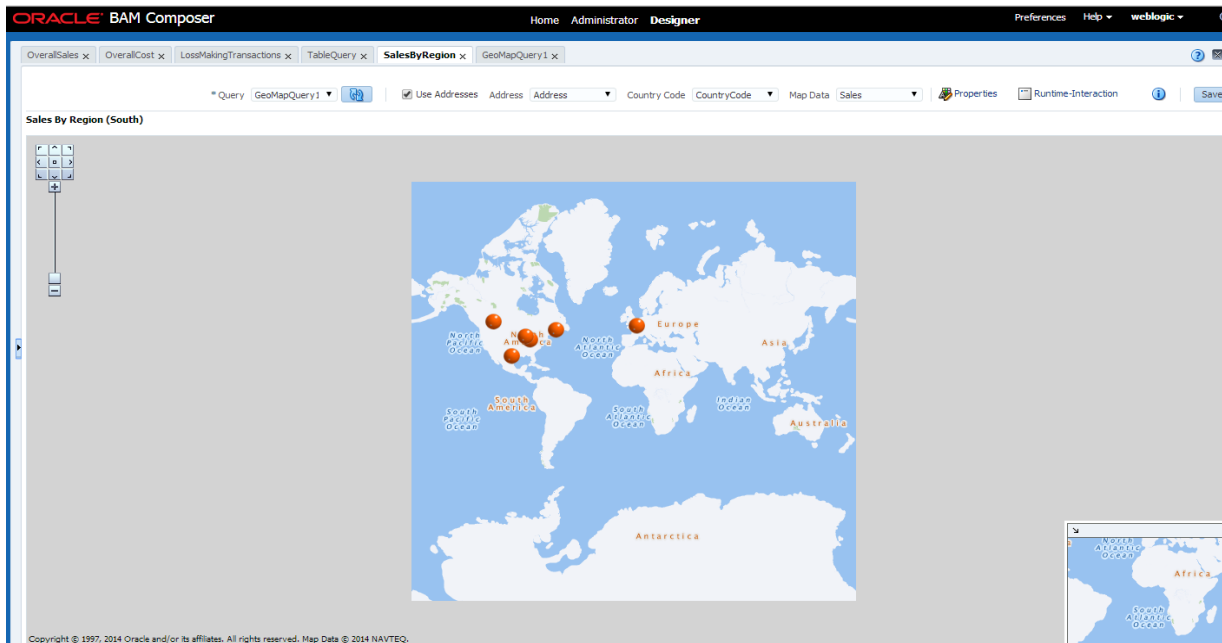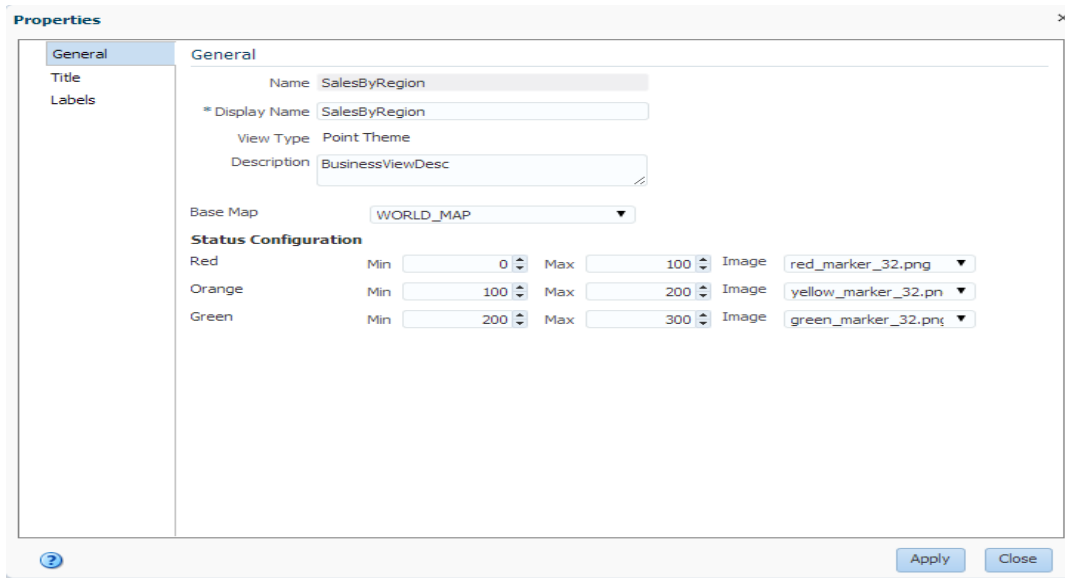Geo Maps is a preview feature. The default installation of Oracle BAM contains tools that help create this feature. To activate Geo Maps, set the value of the EnablePreviewFeature property to 'true'.

Analyzing Quarterly Sales Profit Costs

Quarterly Sales Profit Cost Analysis is a 'Pivot Table' showing aggregated Sales, Cost, and Profit analyses, grouped by one quarter of the year. By default, the dimensions in the Business Query are laid out as rows, measures, and columns in the Pivot Table but you can change this layout. You can rearrange rows and columns to visualize data in various forms. You can also define category level aggregates at the query dimension level and define the position to show category aggregates, as shown in Figure 9.

You can provide different sorting rules based on the dimensions in the query. By default, all dimensions in the query appear as rows in the Pivot Table.

The Pivot Table allows you to visualize data aggregates at various category and subcategory levels and from multiple dimensions by allowing you to move rows to columns and vice-versa.
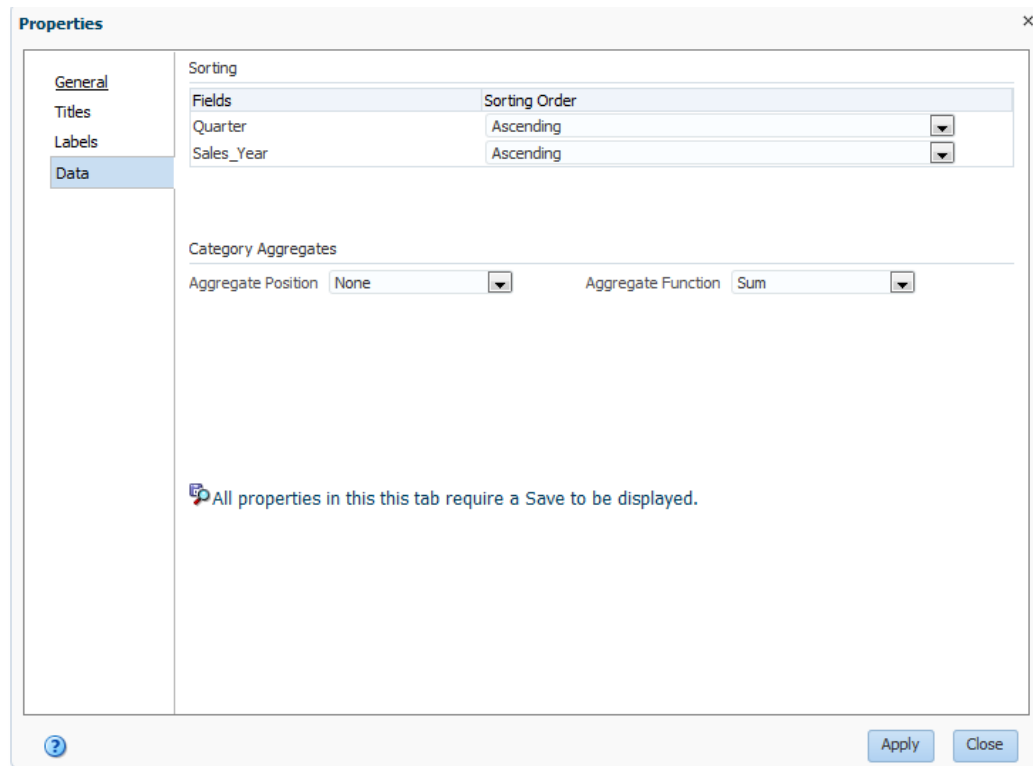
Figure 9 – Defining Category Aggregates

Summarized results with capability to dig deeper into it

ProductCategoryView is a bar graph representing the summarized result for an overall sales group by Category. You can drill into the results using a hierarchy you predefine in a data object like Category → Product. For instance, consider that you want to measure the sum of sales grouped by Category, in a retail grocery chain. The bar graph details results for Vegetables, Fruits, and so on. You can click on the bar corresponding to any of the categories to get a drilled down summary of sales for specific Products. When there are no more levels to drill down to, a table with user-specified data for all selected rows is shown. At any time, to move up the hierarchy or to go to the initial position, right click and select the appropriate level option.

You can configure hierarchical drilling using business view editor's runtime interaction section. Three types of drilling mechanisms are supported – Drill Hierarchy (Hierarchical Drilling), Drill to Detail (aka Drill Through) and Drill Across. You can enable or disable the first two using the setting provided in the configuration palette. For hierarchical drilling, you must set the hierarchy as part of the data objects definition.

The Drill to Details mechanism shows the resultant data in a tabular format. For instance, consider a bar graph showing data for the group "sum (salary)" for the Department category with four bars in it for each department. You can drill through to specific data object rows that constitute the different bars in the graph by using the Drill to Details mechanism.

Drill Across enables you to create a master detail by linking two dashboards. The source view placed in one dashboard can be linked to another view placed in a target dashboard. If you enable parameter passing, the target view accepts the parameter value sent from the source view and displays the filtered result. To drill across, you have to configure the drill path providing the

dashboard linkage, parameter mapping, and so on. In the dashboard, you can right click on a view for which drill across is configured, to select the drill path and perform the drill across operation.
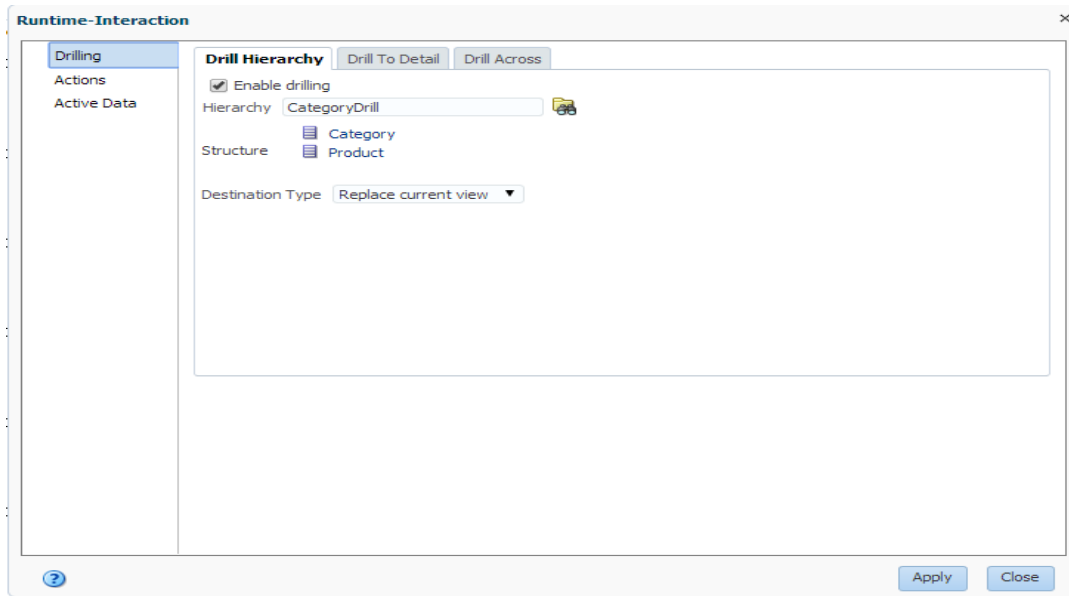
Figure 10 – Setting Up Drilling Configurations

Visualizing data in multiple dimensions

A 'Bubble Graph' is a chart that displays three dimensions or series of data. Sales Cost and Profit uses this type of view. The group query needs to have three measures selected in it. The view displays three measures – sum (Sales), sum (Cost), and sum (Profit) along x, y and z axes respectively. In the business view editor, you can specify measures against corresponding axes.

Figure 11 – The Bubble Graph used by the Sales, Cost, and Profit View

Using Target lines

All graph views like Quarterly Target Profit provide an option to specify a target line to measure performance against a fixed value. This property can be configured using the target se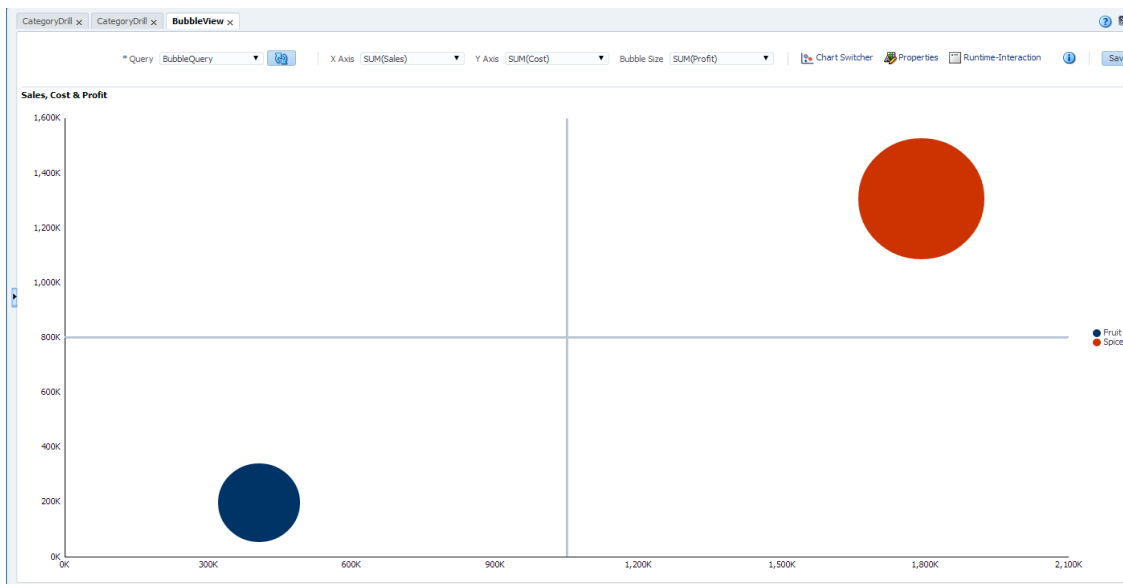ction of the business view properties editor. You can specify a fixed target value, a text that appears with target line, target line style, color, and so on. You can also configure various axis-related properties using other sections in the editor.
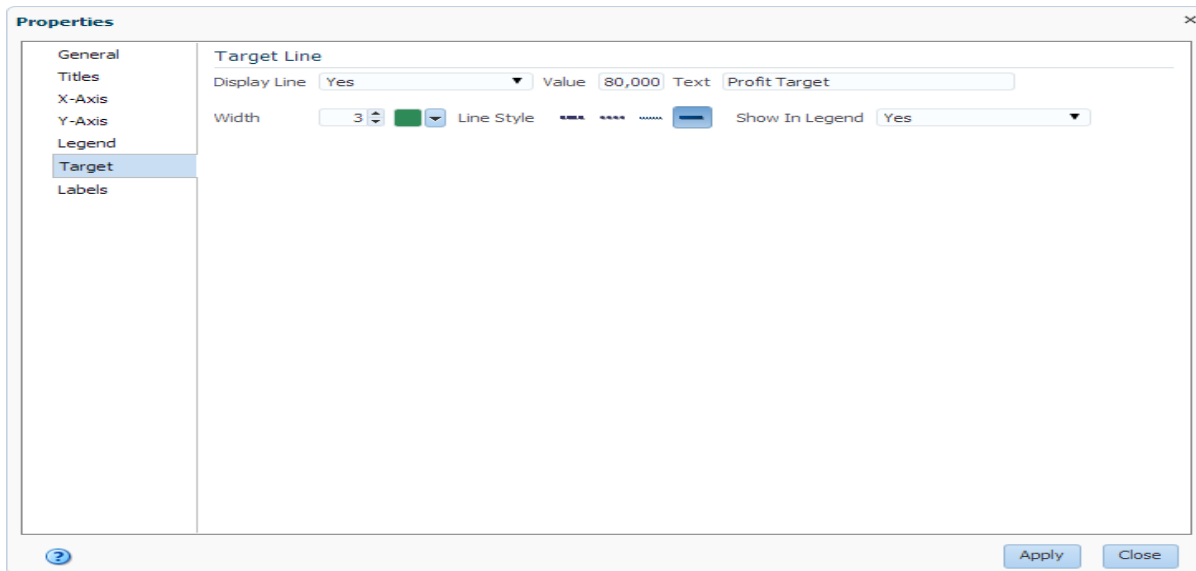
Figure 12 – Configuring Target Lines

Monitoring active data

Active Data continuously aggregates data or displays a segment of data within a defined time window. Older data is periodically removed from the view and newer data is added. To display incoming data in real time, you can render BAM visualizations "Active". This can be done both at design time as well as at run time. In the business view editor, you can use the runtime interaction section to enable settings for active data. At run time, you can use the slice and dice feature of a business view to make a visualization 'Active'. An 'Active' visualization is shown with a green indicator in the title bar, as shown in Figure 13.

Figure 13 – An Active Visualization Updating in Real Time

Figure 14 – Design Time Active Data Configuration
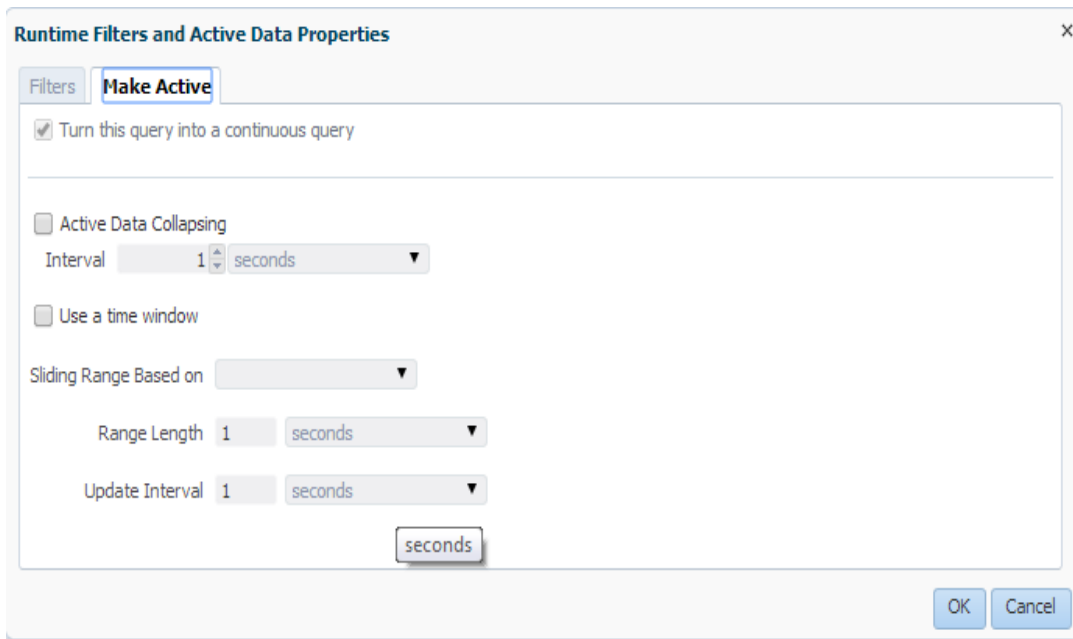
Figure 15 – Runtime Active Data Configuration

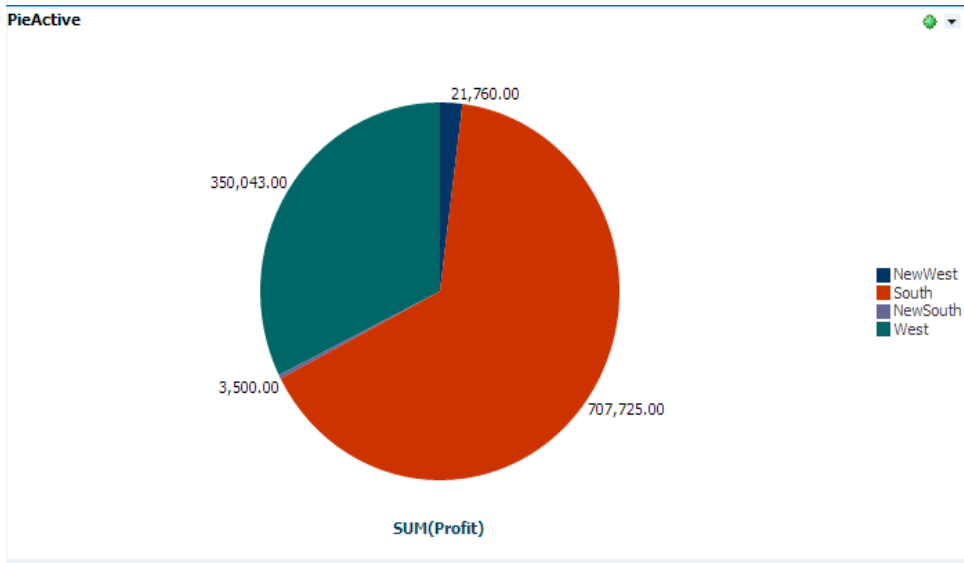You can turn active data on or off. You can also use the Active Data Collapsing feature which indicates how often the active data should be aggregated and updated in the view. The 'Use a Time Window' option allows you to define a time period and a frequency at which data is updated. For example, you could update the number of calls completed in the last hour, every ten minutes.

Using advanced analytics

Oracle BAM 12c supports the slice and dice feature which helps perform runtime analytics. At run time, you can change the 'group by dimensions' setting used inside a group query. You must click on a drop down placed in the view's title bar to make use of this option. A dialog box showing all the dimensions provided in the underlying data object are shown and you can select or deselect to apply them at run time.
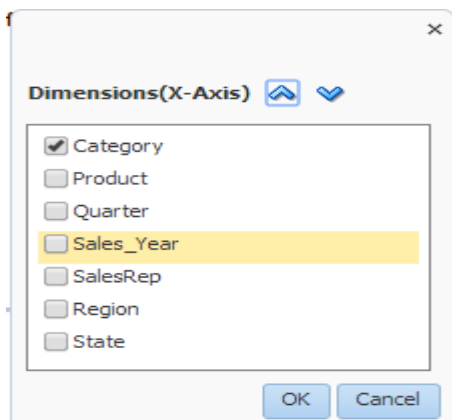
Figure 16 – Changing Group Dimension Dialo0067

You can also modify the filter condition at runtime to see filtered data. Using the gear icon placed in view title bar, you can open the dialog to alter filter conditions.
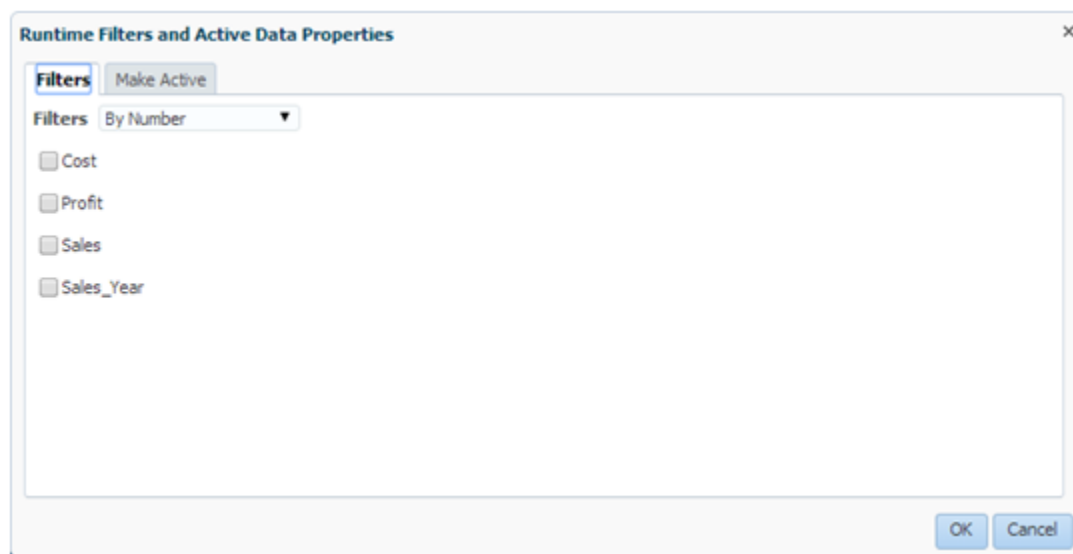
Figure 17 – Applying Filters at Runtime Using Slice and Dice Features

Understanding the Oracle BAM 12c Visualization Deep Dive

Oracle BAM Visualization components provide extensive graphical and tabular capabilities for visually displaying and analyzing data. A business view, usually referred to as 'View' is a visual representation of data fetched by a business query or one or more KPIs.

New Visualizations

Using Oracle ADF, advanced visualizations including tree maps, horizontal graphs, pivot tables, watch lists, scatter/polar graphs, bubble graphs, and so on, are now supported in Oracle BAM 12c.

✓ **Tree maps**

These views are used to display hierarchical data across two dimensions, represented by the size and color of the tree map nodes. The Tree Map is used to present data values in a way that makes comparison easy, using two dimensions: (relative) size and color. The Tree Map uses nodes (color-coded rectangles) with sizes relative to the numerical value associated with them. Each node contains information pertaining to the next level of hierarchy and their sizing is proportional to the sum of the values of the child node. All areas can be colored automatically or according to rules you specify.

Figure 18 – Example Tree Map Visualization

- ✓ **Pivot Table**

This visualization displays a grid of data with rows and columns. Like spreadsheets, this component provides the option of automatically generating subtotals and totals for grid data. The pivot table lets you pivot or move data labels and the associated data layer from one row or column edge to another to obtain different views of your data, supporting interactive analysis.
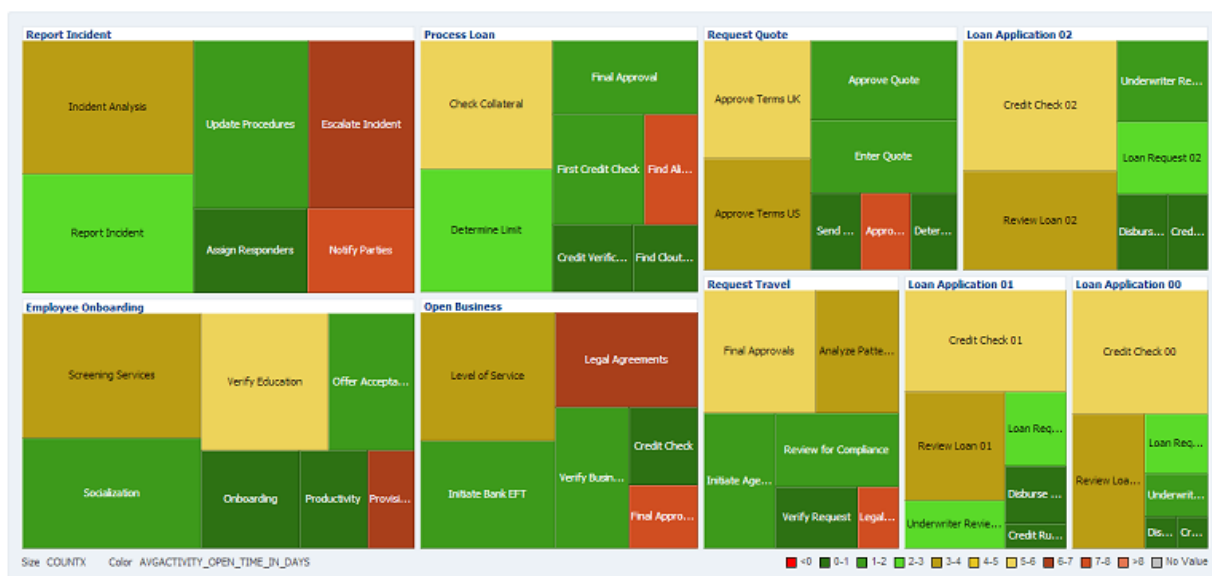
- ✓ **Scatter Graph**

In Scatter Graphs, data is represented data marker locations. It is used to show some correlation between two different kinds of data values such as sales and costs for top products. Scatter graphs are especially useful when you want to study general relationships among a number of items.

- ✓ **Bubble Graph**

Bubble graphs can facilitate the understanding of social, economical, medical, and other scientific relationships. Use a bubble graph when you want specific values to be more visually represented in your chart by different bubble sizes. For more information, see Visualizing data in multiple dimensions.

- ✓ **KPI Watch List**

A KPI Watch List displays the information for one or more key performance indicators (KPIs). Information represented can be KPI names or other KPI values. For example, 'Risks' lists the color-coded status of risk indicators associated with each KPI, 'Actual' shows the most recent KPI value, and 'Today' shows a line graph of the last ten KPI values. Older KPI values are on the left and newer values are on the right. 'Target' shows a horizontal bar that compares the current KPI value to a target value.

Figure 19 – Example KPI Watchlist

✓ **Geomap**

A Geo Map view displays values of a measure by location. The following Geo Map view types are available in Oracle BAM:

➢ A Point Theme, which represents static locations as points on a map. It displays data from a Flat SQL Query that must include address and country code fields or latitude and longitude fields, and one measure.

➢ A Color Theme, which represents geographical regions as colors on a map. It displays data from a Flat SQL Query that must include a location field and one measure.

➢ A GPS Theme, which represents mobile locations tracked by GPS as points on a map. It displays data from a Flat SQL Query that must include latitude and longitude fields and one measure.

Improved Visualizations

With the introduction of Oracle ADF technology in Oracle BAM 12c, new subtypes are supported for commonly used view types like Bar, Area, Line, Pie, and Gauge, as shown in Table 1.

Visualization	New Subtype
Bar	Dual Y, Dual Y stacked
Area	Stacked
Line	Dual Y, Dual Y stacked , Stacked
Pie	Multiple pie, Ring, Multiple ring
Gauge	Dial with threshold type, Status meter type, Vertical Status meter type

Table 1 – New Subtypes in Oracle BAM 12c

Container views from 11g are merged into dashboard template types. While designing the dashboard you can make a selection from the predefined templates or at design time alter the design of template using the controls provided in dashboards.

All crosstabs visualizations from 11g are currently represented by the Pivot Table component.

Table 2 summarizes the various visualizations available in Oracle BAM 12c.

Visualization	Purpose
Bar	Shows vertical columns to represent summarized values
Area	Shows a graphed line of values with the area filled in for visual comparison
Line	Shows a graphed line of values or compared values.
Pie	Displays values in segments of a circle.

Horizontal Bar	Shows horizontal columns to represent summarized values.
Combo	Shows a combination of values as areas, bars, and lines in the same view.
Scatter	Shows X,Y coordinates on a rectangular graph.
Bubble	Like a Scatter view, except that X,Y coordinates appear as bubbles that vary in size.
Tree map	Shows hierarchical data groupings arranged in rectangles within rectangles. For example, a hierarchy might consist of the country, state or province, and city. The count of sales might determine the size of the rectangles, and the sum of sales might determine their colors.
Point Theme Geo Map	Represents cities as points on a map.
Color Theme Geo Map	Represents geographic regions as colors on a map.
GPS Theme Geo Map	Represents moving locations tracked by GPS as points on a map.
List	Displays a table you can sort
Action List	Has values in some or all table columns that are editable. It also displays data changes without requiring a refresh.
Collapsed List	Displays table rows of aggregated data values grouped by one or more dimensions. It may also have color-coded thresholds for data values.
Pivot table	Combines rows and columns to display a multi-dimensional view of aggregated data values. A Pivot Table is summarized vertically and horizontally for columns and rows.
KPI Watch list	Displays a table of the following information for one or more key performance indicators (KPIs).
Dial gauge	Indicates the current value in a curved numeric marked gauge.
Status meter Gauge	Indicates the current value in a straight numeric marked gauge with color-coded low, medium, and high ranges.
Arrow Gauge	Is an arrow shaped view that is color-coded according to whether the value is low, medium, or high. The direction of the arrow indicates whether the current value is higher (up), the same (right), or lower (down) than the previous value.

Table 2 – Oracle BAM 12c Visualizations Summary

Using New Features from Oracle BAM 12c

Business Query

In the previous release, the report itself contained the queries, filters, parameters and views. This containment did not allow the reuse of artifacts outside the report that contained it. In this release, you have the choice of creating a query outside the dashboard using Oracle BAM Composer, allowing query sharing among business views. To create a query, select the query type and data object, measures, fields or groups, and apply filter conditions. A business query or query is a request for data that matches specified conditions. A query can fetch from a data object once, on a schedule, or continuously.

Parameters

Parameters are separated as first class citizens in the Oracle BAM project. A parameter is a variable representing the value of a data field. A filter is a condition applied to data retrieved by a query or view, which can reference one or more parameters. A prompt is a request for you to

specify the value of a parameter. For example, you can filter a product sales query by country, create a parameter for the country, and choose the country when the query is referenced by a view in a dashboard. A parameter can have a default, which can be a specific value or a special value such as ALL or NULL. For example, a product sales view could show sales for all countries by default.

Runtime slice and dice analytics

Runtime slice and dice analytics provides you with the ability to perform runtime analyses within dashboards directly. In dashboards, business executives can change dimensions or apply filter conditions to fetch data satisfying their queries. You also have design time support for analytic operations. At design time, you can configure drilling operations that allow you to take a more detailed look into the data that is available in summarized form.

Active data support

Active data support can be turned on or off at runtime using the slice and dice dialog. Active Data continuously aggregates data or displays a segment of data within a defined time window. As time passes in a time window, older data is removed from the view and newer data is added. With this support it is possible to convert a tactical query into a continuous query to see active data in the views placed inside dashboards.

Conditional Formatting

Conditional Formatting is a new addition in Oracle BAM 12c for the Collapsed List View. These formatting properties allow you to use different background colors and images based on the range of values shown in a particular column. For example, if the Sum (Sales) column has values falling in three ranges namely 1000 – 10000, 10001 – 20000, and 20001 – 30000, using conditional formatting, you can apply a different background color or image to each one of these ranges. Values falling outside these ranges can be designated with another set of colors. Categorizing data values visually provides a better insight into the results.

Figure 20 shows conditional formatting being used in a Process Summary Dashboard. The columns Not Due Soon, Due Soon, Overdue, and Faulted are annotated with threshold properties. As a result, different graphics are shown for data values based on the threshold specifications.

Process Summary Dashboard

Process Summary

Application Name	Process Name	Not Due Soon	Due Soon	Overdue	Opened Today	Closed Today	Closure % Today	Faulted
Business Account Opening	Open Business	153	106	15	12	18	0.19%	⚠ 30
Debt Collection	Collect Debt	20	33	4	2	1	0.04%	3
Employee Expense Approval	Approve Expense	21	22	6	4	6	0.05%	1
Employee Onboarding	Employee Onboarding	146	111	17	8	16	0.15%	17
Incident Reporting	Report Incident	104	92	13	14	11	0.12%	13
Internal Service Request	Request Service	19	25	1	3	2	0.04%	6
Loan Processing	Process Loan	140	100	9	10	10	0.14%	16
Sales Quote	Request Quote	160	86	28	14	12	0.16%	⚠ 22
Travel Request Management	Request Travel	111	69	16	13	8	0.12%	15

Figure 20 – Conditional Formatting

Springboard

Dashboards provide an image view in which you can provide an image of your choice. You can also configure it to open a dashboard when clicked. These views are called springboard views.

Understanding Improved Features in Oracle BAM 12c

This section outlines improvements made to the existing features within Oracle BAM 12c.

Dashboard creation approaches

A dashboard is a collection of related business views. To display data, at least one view must be included in a dashboard. Dashboards can display point-in-time or real-time information (active data). Alerts can periodically send you links to dashboards based on changing conditions in the queries and KPIs upon which the business views within them are based. A tabbed dashboard contains other complete dashboards, which you view by clicking the tabs.

You can use a bottom-up approach and create business queries and views before creating a dashboard, or use a top-down approach and create a dashboard before creating the views and queries within it.
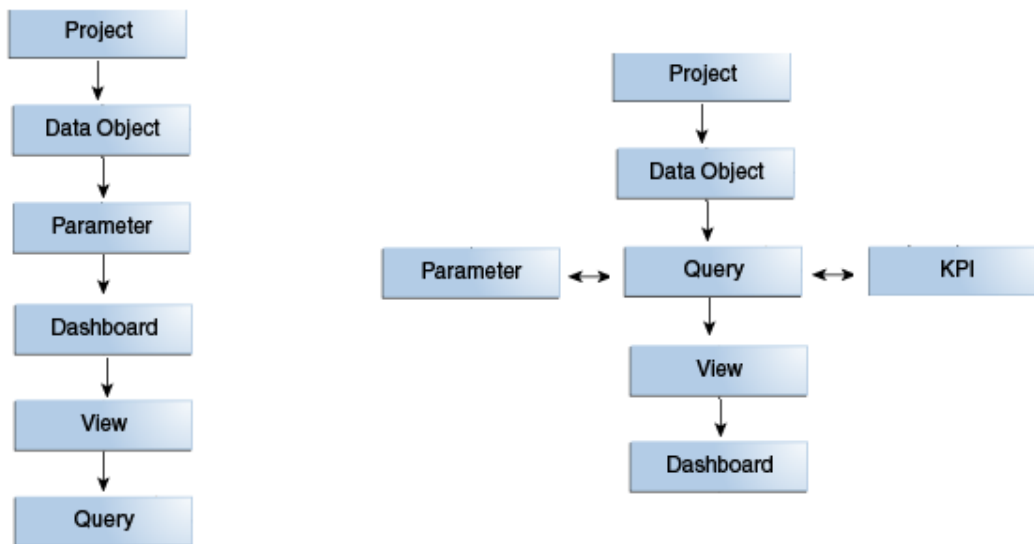
Figure 21 – Dashboard Creation Approaches

External contents integration

External contents like task flows, URLs, and images can be added to dashboards. External task flows are available through the resource catalog and can be added to dashboard cells. 'Opening URL' references the content at the specified URL and displays it in the cell. 'Inserting Image' uploads the specified graphics file and displays it in the cell. You can also specify another dashboard to link to. This ensures that when you click on the image, the other dashboard opens in a separate browser window. Supported image file types are .png, .gif, and .jpg.

Dashboard wiring

Changing a view by making a selection in another view is called 'Driving'. Driving enables you to use a selection in one view to drive a parameter in another view. For example, you can use a column in a List view to drive a Bar chart view that shows a subset of the data in the list. To be driven, a view must reference a query with a parameter used in a filter. Also, if drilling is enabled, driving will not work. Drilling overrides driving. The view that drives the other views, the driver, need not reference a query with a parameter. The link to the parameter mapping editor is available at the dashboard design time. Using this mapping editor, you can specify which field value should be passed as parameter value from source view to the target view.
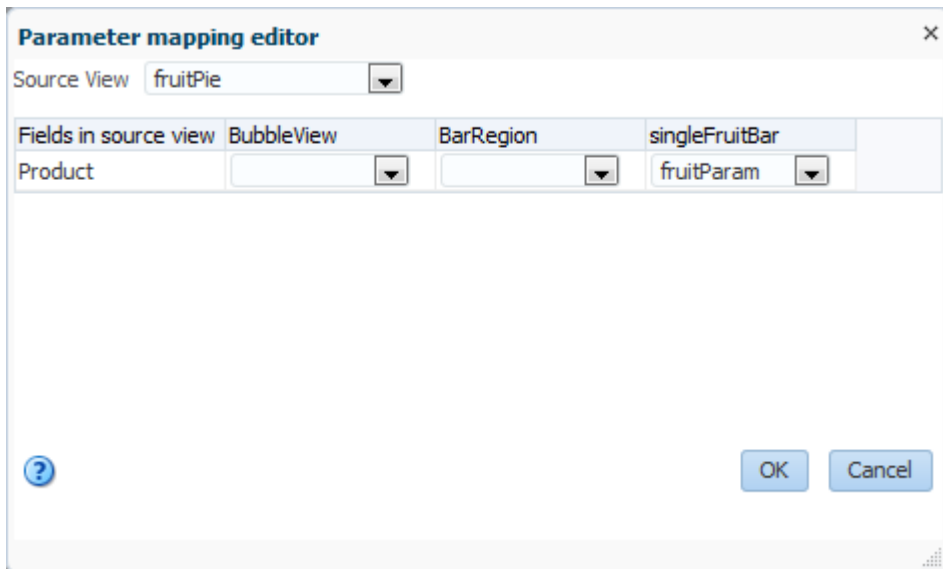
Figure 22 – Parameter Mapping Editor

Figure 23 shows a dashboard with the Parameter Mapping Editor open. The Product data field value in the pie chart drives the fruitParam parameter value in the bar chart.

Summary

Oracle BAM 12c allows you to create personalized dashboards. Oracle BAM provides a highly interactive user experience in which real-time information is updated via a standard web browser. Dashboards can be accessed through the Oracle BAM web application, the Oracle ADF framework or through a unique URL assigned during dashboard creation. You can use over 20 graphical visualizations available to display events, model processes and KPIs that update in real time.

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