

Analytic Workspace Manager and Oracle OLAP 10g

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Analytic Workspace Manager and Oracle OLAP 10g

INTRODUCTION

Designing and implementing the dimensional model is one of the core activities of building a business intelligence application. Other activities central to this process include data acquisition and the development of end-user applications. Tools used for each activity must be accessible to the appropriate user audience, and they must have the ability to work together as a system. The OLAP Option to Oracle Database 10g is the online analytic processing (OLAP) server for business intelligence. Analytic Workspace Manager, the primary administrative tool of the OLAP Option, provides users with the ability to design and manage collections of multidimensional data types in Oracle Database 10g.

The data acquisition process, typically referred to as an extraction, transformation, and loading (ETL) process, is generally the domain of the professional database administrator or data warehouse designer. Within the Oracle Business Intelligence product line, Oracle Warehouse Builder fulfills this role. Oracle Warehouse Builder has the ability to deploy either relational data warehouses or Oracle multidimensional data types.

Professional programmers typically build custom analytic applications, but frequently they do not design the analytic content of these applications. Instead, individuals with knowledge of the line of business or a specific analytic problem design the analytic content in the form of reports, graphs, and calculations. Thus, the design of analytic content is typically closer to the end user than it is to the application developer or database administrator. Analytic tools and applications from Oracle are designed with end user in mind.

Designing and implementing a dimensional model is in the middle ground between professional application developers and DBA on one side, and end users on the other. In some organizations, the dimensional model might be designed by the application developer and implemented by the DBA. This is typically the case in a large IT organization.

In other organizations, the dimensional model might be designed and implemented by the DBA in consultation with the user community. End user communities commonly design and implement their own dimensional models, particularly in departmental settings.

Analytic Workspace Manager is a tool in which the dimensional model can be defined, implemented, and managed throughout its lifecycle. It is designed to be accessible by the full range of possible users, from application developers and IT professionals, to departmental DBAs and line-of-business power users.

This paper introduces some key concepts of the OLAP Option to Oracle Database 10g and the process of designing and implementing dimensional models.

Oracle Database Incorporates OLAP

Multidimensional technology is embedded in Oracle Database 10g. By integrating a multidimensional engine and data types directly into the database, Oracle provides the power of dimensional analysis along with the manageability, scalability, and reliability of Oracle Database.

At the core of the OLAP Option to Oracle Database 10g is the multidimensional engine, multidimensional data types, and OLAP APIs.

The OLAP multidimensional engine, which runs within Oracle Database, provides support for the dimensional model, multidimensional data types, and a wide variety of calculations.

The dimensional model is implemented using Oracle multidimensional data types. A collection of multidimensional data types is known as an *analytic workspace*. Like any other object in the database, an analytic workspace is created within a schema. Within a single database, many analytic workspaces can be created and shared among applications and users.

Oracle OLAP 10g provides two Java APIs. The OLAP API is specifically designed for querying the dimensional model. The OLAP Analytic Workspace API is used to define, implement and manage analytic workspaces. Both Analytic Workspace Manager and Oracle Warehouse Builder use the OLAP Analytic Workspace API.

Oracle Business Intelligence

Analytic Workspace Manager and Oracle OLAP 10g are key components of the Oracle Business Intelligence system. Business intelligence solutions consist of: source systems that the business intelligence system will report upon; administrative tools to manage the data; and applications to query the data. Oracle offers not only a complete and integrated platform for business intelligence, but also offers choices at each level to meet the unique requirements of the organization.

An Oracle Business Intelligence solution consists of the following:

- Oracle relational and multidimensional technology for data warehousing environments:
 - Oracle Database EE with the Oracle OLAP Option
- Administrative tools to manage the data:
 - Oracle Business Intelligence Warehouse Builder

- Analytic Workspace Manager
- Development applications to create custom solutions:
 - Oracle Business Intelligence Beans
- Query and analysis tools to identify trends and patterns in the data:
 - Oracle Business Intelligence Discoverer
 - Oracle Business Intelligence Spreadsheet Add-In
- Corporate Performance Management application:
 - Oracle Enterprise Planning and Budgeting

Common to all these components is the dimensional model provided by the analytic workspace in the Oracle OLAP Option. The dimensional model is the foundation for business intelligence tools and applications developed with BI Beans such as Discoverer Plus OLAP, Spreadsheet Add-In, Enterprise Planning and Budgeting, as well as third-party products from Oracle partners.

Dimensional Model Encourages Business Analysis

The dimensional model allows analysts to formulate their queries in business terms. Most business users easily understand the data selection process, which uses logical objects such as dimensions, levels, hierarchies, and attributes to describe business measures. Dimensions provide a context for the facts. Consider the following request by a marketing analyst:

*For calendar years 2003 and 2004, show the **percent change in sales** compared with a **period a year ago**, for the **top 3 products** for each of the **top 3 customers** based on **sales**.*

This query is multidimensional. That is, the data selection and query occur along more than one dimension. The dimensional model provides a framework and allows users to select data based on levels (time at the 'year' level), attributes (where product is 'desktop PCs'), or hierarchical relationships (children of 'region').

In this example, Time, Product, and Customer dimension the Sales measure. Period-ago calculations are made along the Time dimension. Rankings occur within both the Product and Customer dimensions. The product ranking ('top 3 products') is nested within the customer ranking ('top 3 customers'). A calculated measure ('based on sales') is nested within the product and customer rankings.

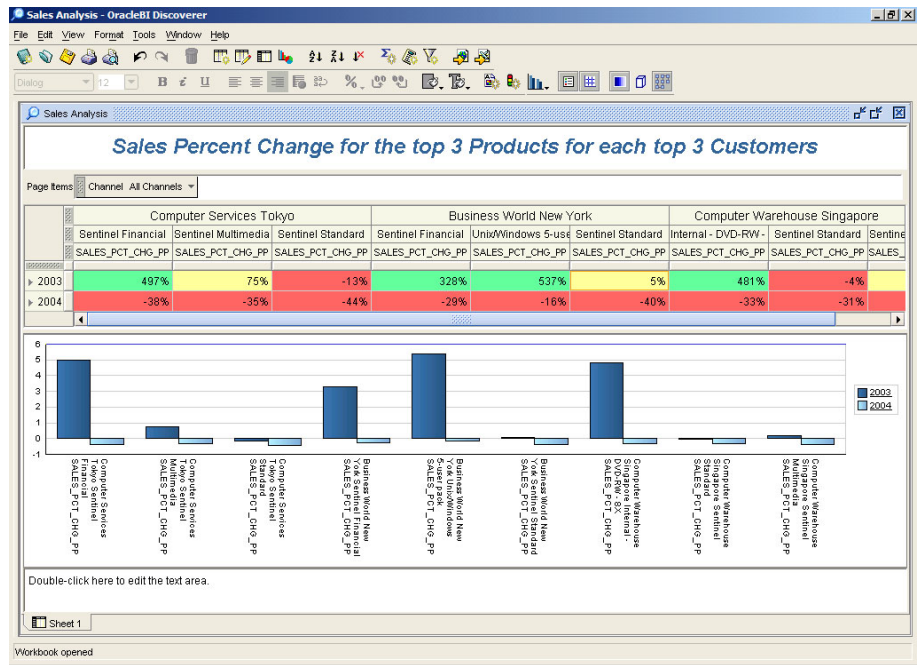
The following crosstab and bar graph illustrate the result of this query from the dimensional model in Discoverer Plus OLAP.

Computer Services Tokyo, Business World New York, and Computer Warehouse Singapore are the top 3 customers.

Sentinel Financial, Sentinel Multimedia, and Sentinel Standard PCs are the top 3 products for Computer Services Tokyo.

SALES_PCT_CHG_PP (Sales Percent Change from Prior Period) is the calculated measure based on sales.

For 2003, sales increased 497% over 2002 for Sentinel Financial, which is the top product of Computer Services Tokyo, the top customer.



Beyond presenting a data model comfortably understood by business analysts, the dimensional model greatly simplifies the process of navigating the data and of defining calculations and queries. It does so by encapsulating the physical interrelations among the logical objects. Users only need to express the conditions of a query. They are not required to explicitly define dependencies such as joins between dimensions and facts. As a result, exploring data is intuitive and defining new business measures is straightforward.

Analytic Workspaces Further Business Analysis

Databases that support dimensional models are commonly constructed of analytic workspaces in Oracle Database. An analytic workspace can be considered as a collection of multidimensional data types and the physical implementation of the logical dimensional model.

Analytic workspaces provide the best support for unpredictable query patterns. In comparison to relational data types, analytic workspaces become more efficient as the query becomes more ad-hoc in nature. 'Ad-hoc' can be defined as the ability to query any region of the data model, at any time, with user-defined calculations as part of the query. In this type of environment, Oracle OLAP delivers excellent query performance with a minimal amount of stored summary data.

Data is always presented fully solved to the end user in analytic workspaces, regardless of whether the summary data is entirely calculated and stored during a build, partially stored, or entirely calculated on the fly. In addition, analytic workspaces provide complex aggregation methods such as non-additive methods, hierarchical, and weighted calculations. Moreover, they can store aggregate data very efficiently.

The multidimensional engine and analytic workspaces provide the best performance and the most powerful computational methods for enterprise analytic reporting. Analytic workspaces support sophisticated calculations such as time series, market shares, rankings, etc. They are highly optimized for performing single-row calculations, which can be computed at run-time to support calculated measures. Furthermore, analytic workspaces can be queried with standard SQL. SQL-based reporting products, such as BusinessObjects and Cognos ReportNet, can access data in analytic workspaces.

ANALYTIC WORKSPACE MANAGER 10G

Analytic Workspace Manager is the graphical administrative tool that enables departmental or enterprise DBAs, application developers, and power users to define dimensional models and implement them. It is designed for working interactively with analytic workspaces as part of the process of creating, developing, and maintaining an analytic application. Analytic Workspace Manager manages the physical implementation of an analytic workspace throughout its life cycle, allowing users to focus on the data model and on the process of embellishing the model with rich calculations.

Analytic Workspace Manager is part of the Oracle OLAP Option. It provides one or more views of the data, depending upon the version of the Oracle Database. When connected to an Oracle Database 10g instance, Analytic Workspace Manager presents the default Model View. Users can switch between the Model View, the Object View, and the OLAP Catalog View. This paper focuses exclusively on the Model View, which facilitates creation of the logical dimensional model of the data and instantiates that model in an analytic workspace.

Analytic workspaces are data storage objects in Oracle Database. There are three general steps to creating an analytic workspace. First, the logical dimensional model (dimensions, cubes, and measures) is defined. The second step, mapping the logical model to relational data sources, is optional because data can be generated directly within the analytic workspace or loaded using other methods. The final step is the process of loading data and, optionally, precalculating all or some summary data.

Key Roles in the Development of an Analytic Application

For the purpose of this paper, it is useful to segment the user community by IT/Enterprise DBAs and application developers, departmental DBAs, and line-of-business (LoB) power users.

IT/Enterprise DBA users might use Oracle Warehouse Builder or Analytic Workspace Manager.

Departmental DBAs would probably use Analytic Workspace Manager.

LoB power users would use Analytic Workspace Manager.

Analytic Workspace Manager and Oracle Warehouse Builder, through common APIs and metadata in the analytic workspace, allow these different groups to collaborate. For example, it is common for a LoB user to define the logical model in Analytic Workspace Manager, to build an analytic workspace with a small data set for testing, and then provide the design via templates to the IT/Enterprise DBA for the full implementation and lifecycle management.

ANALYTIC WORKSPACE MANAGER FACILITATES ANALYTIC SOLUTIONS

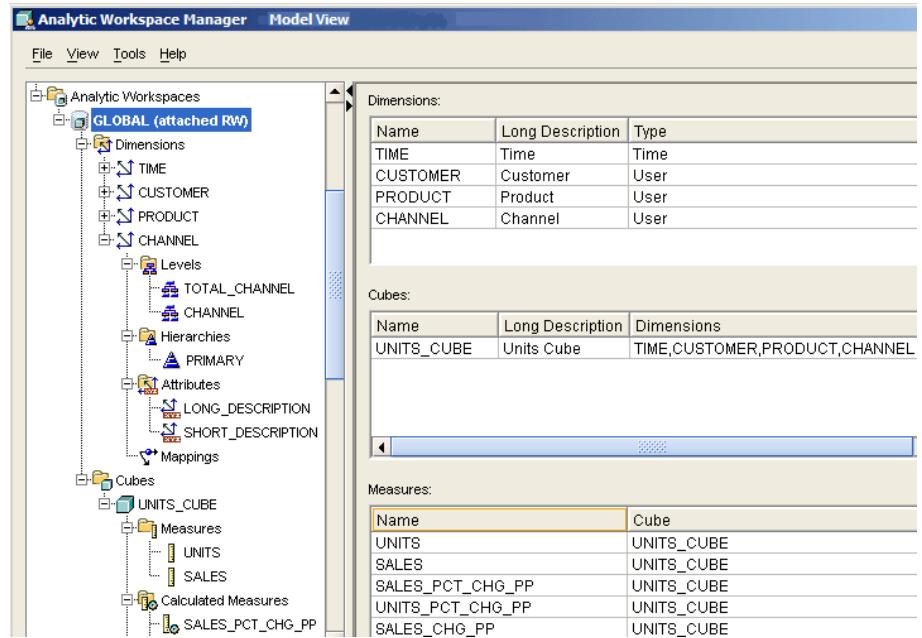
The concerns of DBAs, data warehouse designers, and power users—successfully developing, querying, and maintaining a business intelligence solution—are addressed by Analytic Workspace Manager, which does the following:

- Simplifies dimensional modeling
- Implements physical storage model
- Maps relational sources
- Manages the analytic workspace lifecycle
- Saves model designs in XML files

Simplifies Dimensional Modeling

Analytic Workspace Manager users can easily and quickly define logical objects from an end-user perspective. By a simple click of the button, users create dimensional objects. At the same time, Analytic Workspace Manager instantiates these logical objects as physical objects in the analytic workspace. If users know the reporting requirements, they can immediately begin to define the shape of their data. There is no prerequisite that the relational sources be available.

The dimensional model that supports the previous marketing analyst query on page 5 as seen in the Model View



The logical dimensional model in Analytic Workspace Manager contains the following elements:

Dimensions provide context and structure to the factual data. They form the edges of a logical cube, and the measures within the cube. Dimensions are the parents of levels, hierarchies, and attributes in the logical model. Users define these supporting objects, in addition to the dimension itself.

Levels represent positions within the hierarchy. For business analysis, data is typically summarized at various levels. For example, a data warehouse may contain monthly snapshots of a transactional database. If months are at the base level, summarization would occur at the quarterly and yearly levels.

Hierarchies organize data at different levels of aggregation. For example, in the Time dimension, a hierarchy is used to aggregate data from the month level to the quarter level to the year level. Hierarchical structures enable analysts to detect trends at the higher levels and, by drilling down to the lower levels to identify the factors that contributed to a trend.

Attributes provide information about the individual members of a dimension. They are used for selecting data and organizing dimension members.

Analytic Workspace Manager supports all common styles of dimensions, including list dimensions, level-based dimensions and value-based (also known as ‘parent-child’) dimensions.

Cubes provide a means of organizing measures that have the same shape; that is, they have the exact same dimensions. The edges of the cube contain dimension members and the body of the cube contains data values. Cubes are the parents of measures and calculated measures.

Measures are used to store fact data within a cube. Common examples include Unit Sales and Dollar Sales. Measures are organized by dimensions, which typically include a Time dimension.

Calculated Measures are created by performing calculations on the base measures stored in an analytic workspace. These derived facts are not stored; the calculations are performed in response to individual queries.

Implements Physical Storage Model

Analytic Workspace Manager handles the physical implementation of dimensional objects in Oracle Database. The user describes the logical model and provides information about the data or hints towards the physical implementation (for example, the data type of a measure). Analytic Workspace Manager creates the most efficient physical design utilizing the most up-to-date features of the database and best practices for analytic workspace physical design. DBAs, application developers, and data modelers can comfortably remain in the graphical environment of Analytic Workspace Manager and take advantage of Oracle OLAP 10g performance and manageability technologies, such as compression, partitioning, and aggregations.

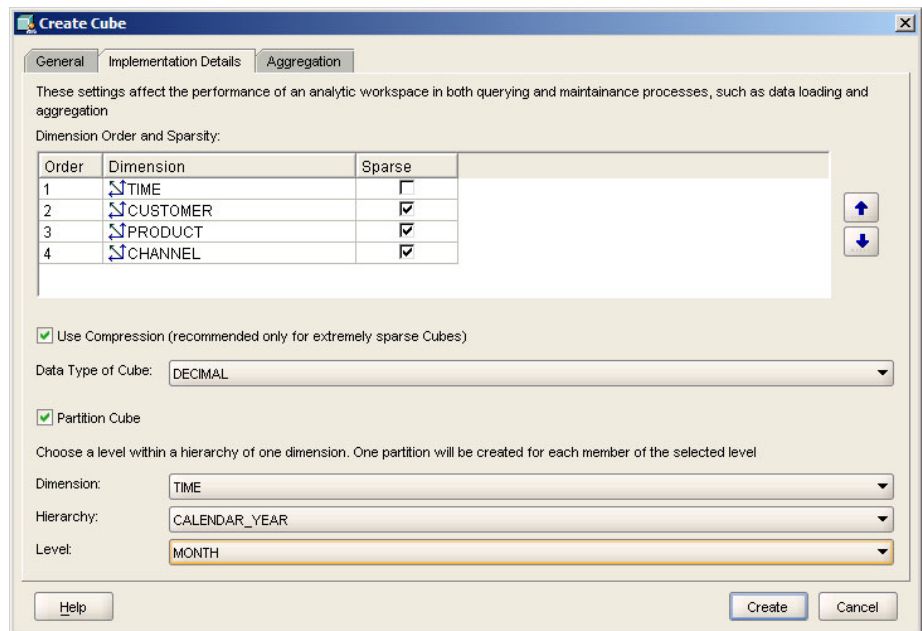
Compression. By implementing new, patented, storage methods within cubes, Analytic Workspace Manager is able to efficiently manage the extremely sparse data sets that are common to OLAP applications. Candidates for compression are those cubes that have many dimensions, dimensions with many members, and dimensions with deep hierarchies. These characteristics typically yield extremely sparse data sets. Oracle cube compression technology allows cubes to be built in less time and use less disk space, yet still provide excellent runtime query performance.

Partitioning. The performance and scalability of large measures can be greatly improved by partitioning the physical storage of a cube. There are several benefits to partitioning a cube including:

- Parallelizing data loading and aggregation.
- Breaking data loads, aggregations and other calculations into smaller units of work that can fit more readily into available memory, thus lessening I/O bottlenecks.
- New time periods can be added or dropped in partitions as needed without involving the whole cube.

Most analytic workspace implementations are partitioned along the time dimension.

Partitioning and compression options are easily accessible when the cube is defined in Analytic Workspace Manager.

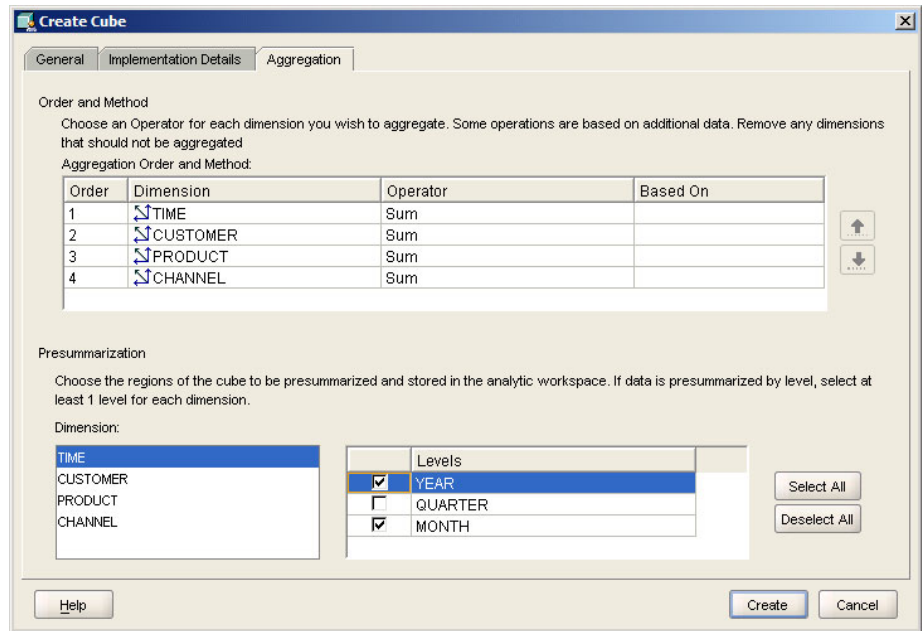


Aggregation. Analytic Workspace Manager allows the user to load leaf-level data and aggregate it according to specified aggregation methods. Data may also be loaded that has been presummarized in another system.

When detail level data is loaded in the analytic workspace, data can be presummarized and stored, or it can be calculated at runtime. Analytic Workspace Manager allows the user to choose which levels are presummarized; the multidimensional engine automatically calculates other levels as needed. Most often, a small amount of data is presummarized and the remaining regions of the cube are summarized at runtime in response to a query.

The OLAP Option provides support for many aggregation functions including sum, average, hierarchical weighted averages and scaled sums. Unlike other technologies, the OLAP Option supports varying the aggregation method by dimension. For example, a headcount measure might be aggregated as the average over the time dimension and the sum over an organization dimension. Non-additive methods are also supported.

The Aggregation tab specifies the rules for calculating summary data.



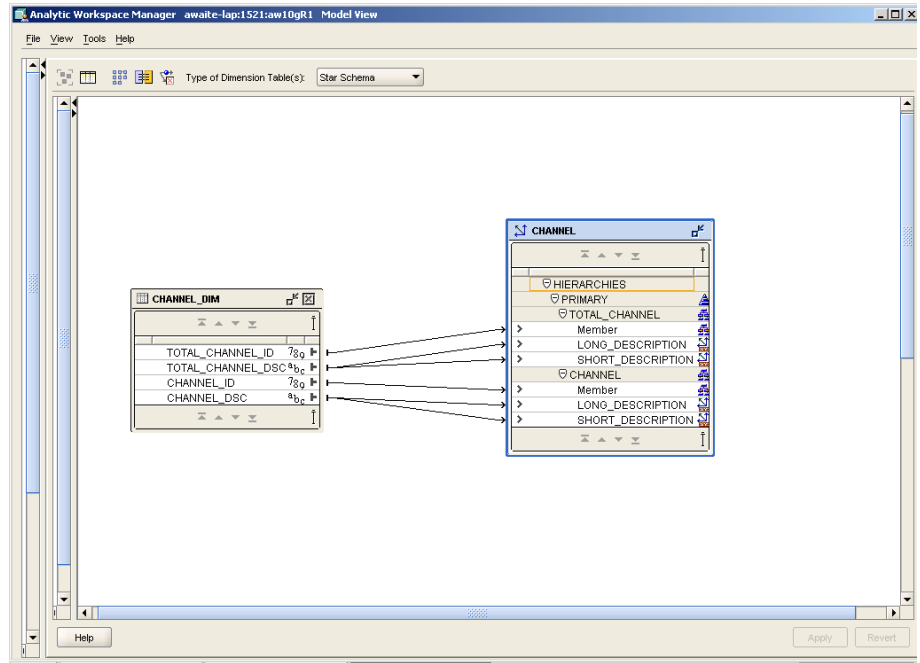
Maps Relational Sources

Once the logical and storage models have been defined, the data can be loaded into the analytic workspace. Analytic Workspace Manager supports a wide range of relational data sources within the Oracle database. Analytic Workspace Manager can map to any collection of tables that are able to provide the necessary dimension members, parent values within hierarchies, and attribute values. Most often, data is provided in the form of a star or snowflake schema. Analytic Workspace Manager is not an ETL tool, so it is assumed that the data provided in the source objects is the result of an extraction and transformation process that leave the data ready to use 'as is'. If an ETL process is required, Oracle Warehouse Builder can be used to create and manage the analytic workspaces.

Source objects can be relational objects such as tables and views. Flat files are supported in Oracle Database as external files. Data may be accessed from other instances using database links.

The process of identifying relational sources is a simple drag-and-drop in a graphical or tabular view that links the source column to the logical target object.

The graphical view of mapping the source columns from a star schema table to the target objects.



Typically data is sourced from relational tables or views, however, this process of mapping is not a requirement. Data may be generated as a result of a calculation within the analytic workspace.

Manages Lifecycle

Analytic Workspace Manager controls the initial loading, refreshing, and aggregating of data throughout the lifecycle of the analytic workspace. Users can indicate that the entire analytic workspace, or individual components, should be maintained.

Maintenance jobs may be run immediately within Analytic Workspace Manager, be submitted to the Oracle Job Queue, or be saved to a PL/SQL script. Submission to the Oracle Job Queue is preferred, because this method allows for parallel processing of the maintenance tasks. Parallel processing is supported on a single server and with Oracle Real Application Clusters and Grid Computing. Parallelism delivers significantly improved performance on multiple CPU servers, ensuring that analytic workspaces can be updated and aggregated within a narrow batch window.

Note that an analytic workspace can provide the sole storage of dimensional data in Oracle Database. Although the data is presented to Analytic Workspace Manager in the form of relational objects (tables, for example), it is not necessary for that data to persist after it is loaded into the analytic workspace. Rolling off the relational version of data is the most common practice.

Saves Model Designs

The template feature in Analytic Workspace Manager saves the definition of the logical objects to an XML file. Using a saved template, users can create a new

analytic workspace, dimension, and cube exactly like existing objects with or without the mappings. Templates do not include the data, so they can be easily exchanged due to their very small size. For example, someone using Analytic Workspace Manager can share his or her analytic workspace design by simply sending an email with a template attached to an OracleBI Warehouse Builder user. Moreover, these object definitions can be archived in source control for managing a library of approved, standard objects.

TYPICAL STEPS IN ANALYTIC WORKSPACE IMPLEMENTATIONS

A user who knows the reporting requirements and has access to the source data can successfully build analytic workspaces. These are the basic stages:

- Identify reporting requirements
- Define logical dimensional model
- Identify data sources
- Map logical objects to data sources
- Load and refresh data
- Analyze data

Identifying Reporting Requirements

A thorough understanding of the reporting requirements is essential for the design of an analytic workspace. Analysts may interview end users to identify the business questions that should be addressed in these reports. Business measures, their base level of storage, and required calculations can all be derived from these business questions.

Defining Logical Dimensional Model

Dimensions, levels, hierarchies, attributes, cubes, and measures must be defined along with the relationships among them. When defining a logical object, Analytic Workspace Manager creates the physical objects needed to instantiate the logical object.

Identifying Data Sources

The source data for the analytic workspace must be in relational tables or views in the database (or flat files represented by external tables in the database). The tables do not have to be in a data warehouse; they can have any schema design that is able to provide the appropriate data.

Mapping Logical Objects to Data Sources

Analytic Workspace Manager supports the direct mapping of logical objects to relational columns. If relational data requires transformation, then an ETL tool

such as OracleBI Warehouse Builder should be used. If the transformations are minor, views might be used to represent the data.

Loading and Refreshing Data

After the dimensional model is designed and mapped, source data can be loaded and aggregated in the analytic workspace. The Maintenance Wizard in Analytic Workspace Manager allows the option of refreshing the data in the same way that it was first loaded, or based on dimension and cube objects.

Analyzing Data

The data in an analytic workspace can be viewed using dimensionally aware tools such as Discoverer Plus OLAP, Spreadsheet Add-In, and applications built using OracleBI Beans, or a third-party analysis application. SQL-based applications can also query analytic workspaces, thus providing access through tools that use a relational model.

ANALYTIC WORKSPACE MANAGER IN ACTION

After learning a few of the capabilities of Analytic Workspace Manager, let's use it to create an analytic workspace to support the query asked by the marketing analyst:

For calendar years 2003 and 2004, show the percent change in sales compared with a period a year ago, for the top 3 products for each of the top 3 customers based on sales.

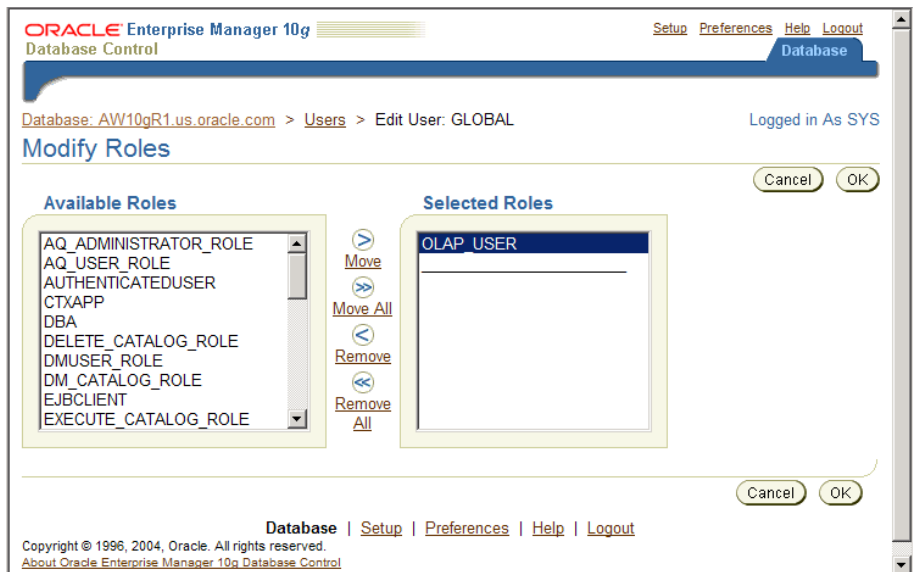
Assume you have identified the reporting requirements and have access to the source data. Next, connect to an instance of Oracle Database Enterprise Edition with the Data Warehouse database configuration. It's OLAP ready. There are no additional prerequisites.

Now you can step through these stages for creating a query-ready analytic workspace:

- Grant privileges
- Create an analytic workspace
- Create dimensions
- Create cubes
- Load and aggregate data

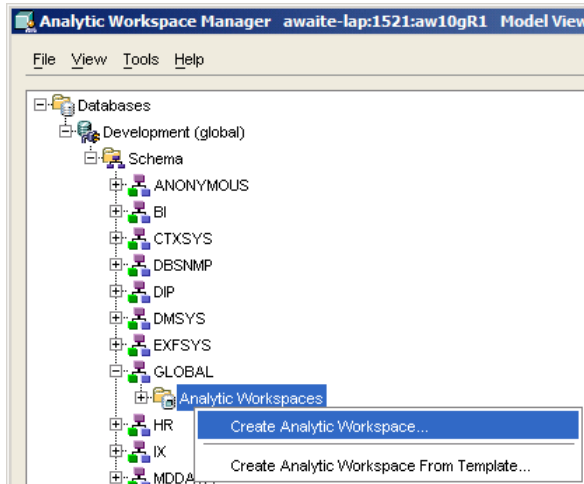
Granting Privileges

Before starting Analytic Workspace Manager, the user requires sufficient rights to create an analytic workspace. In Oracle Enterprise Manager Database Control, grant the OLAP_USER role.

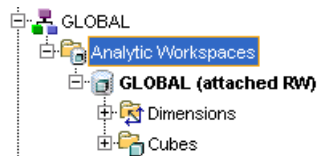


Creating Analytic Workspaces

Open Analytic Workspace Manager, right-click on the Analytic Workspaces folder, and select Create Analytic Workspace.



After you supply the name, the new analytic workspace container appears attached as read-write complete with predefined, empty folders for object storage. You can now define the dimensional model.



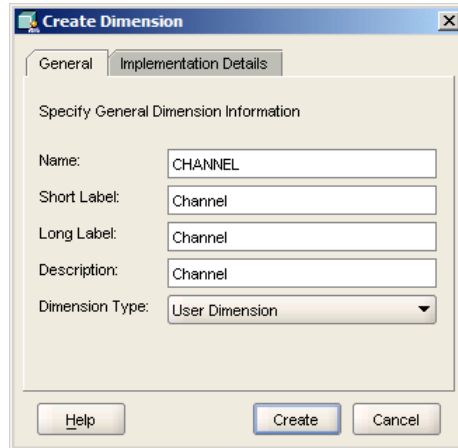
Creating Dimensions

Four dimensions will be used to organize the facts required by the marketing department: Channel, Customer, Product, and Time.

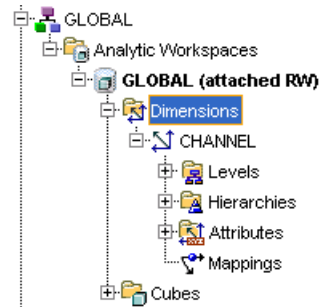
Create Channel Dimension

Right-click the Dimensions folder and select Create Dimension. Supply the name and accept the default dimension type.

You can define dimensions either as User or Time dimensions. A time dimension source should have columns for period end dates and time span. These attributes support time-series analysis, such as comparisons with earlier time periods.



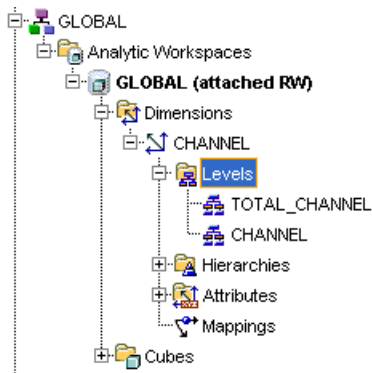
The new dimension appears with supporting objects ready for definition.



Create Channel Levels

Two levels will be used to summarize the members of the dimension: Total Channel and Channel.

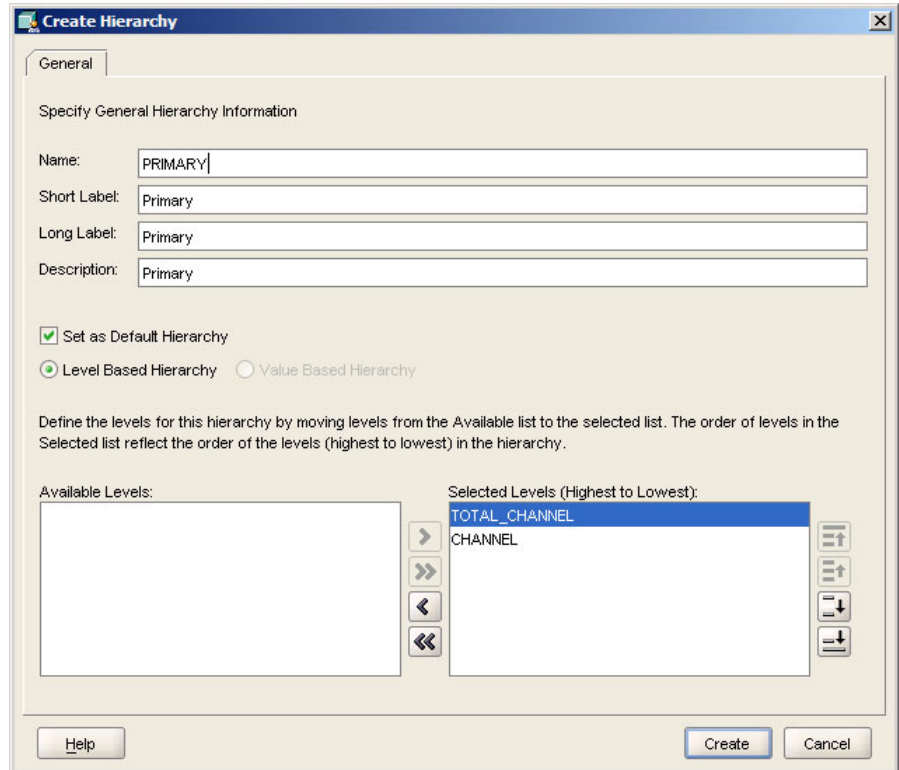
Right-click the Levels folder, select Create Level, and supply the names.



Create Channel Hierarchy

Right-click the Hierarchies folder and select Create Hierarchies. Supply the name, accept the defaults, and select the levels from high to low. This hierarchy will define the navigational drill path for end users.

Dimensions can have more than one hierarchy. If you define multiple hierarchies, set one of them as the default hierarchy.

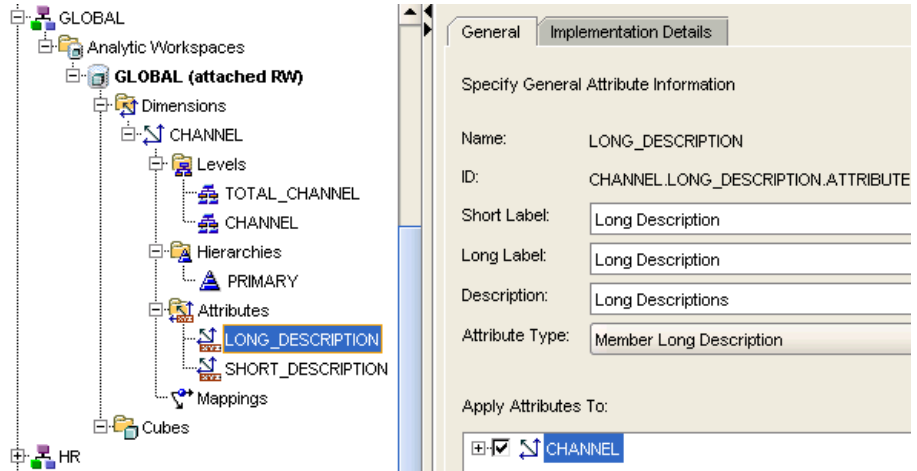


The default behavior of Analytic Workspace Manager ensures that all users are successful in creating an analytic workspace.

Review Attributes

Accept the defaults in Attributes for the dimension. These attributes will be used for selecting data by end users and displaying the cross-tabular and graphical labels.

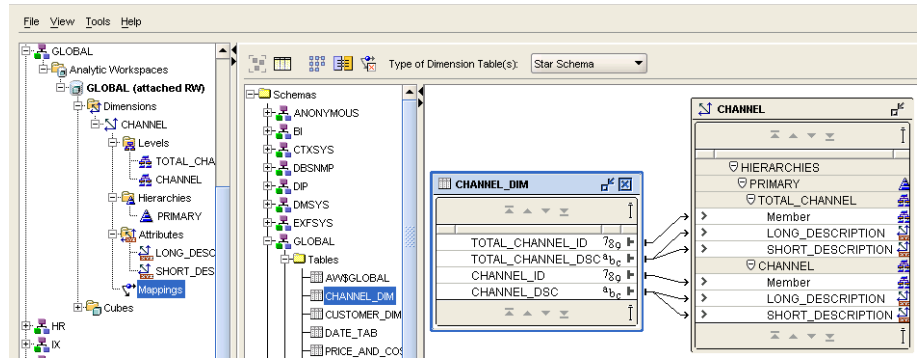
Analytic Workspace Manager defines basic attributes automatically. For all dimensions, it creates LONG_DESCRIPTION and SHORT_DESCRIPTION attributes. For time dimensions, it also creates TIME_SPAN and END_DATE attributes. You can create other attributes if you wish.



After creating the logical objects for the dimension, you can map them to the data sources.

Map Channel Dimension

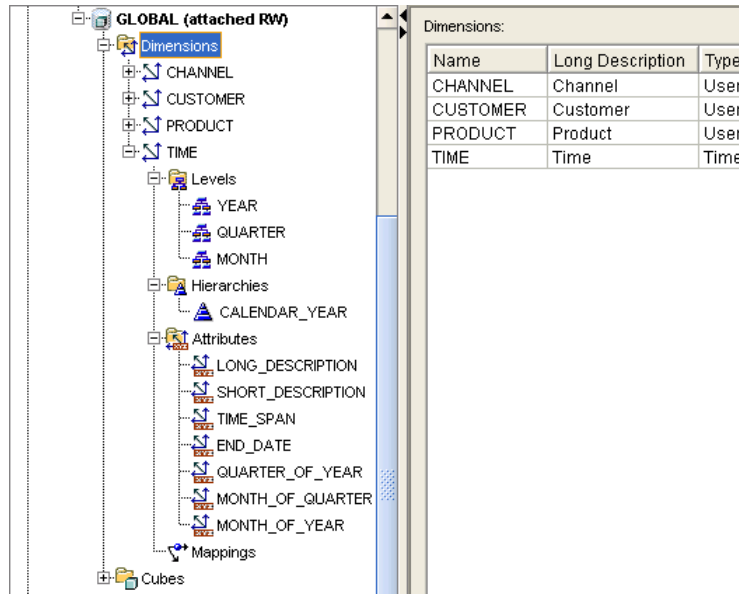
Click the Mappings node. The mapping window will be displayed in the right pane with the target object. Locate the source table from the schema navigator and drag-and-drop it on to the mapping canvas. Link the source columns to the target objects.



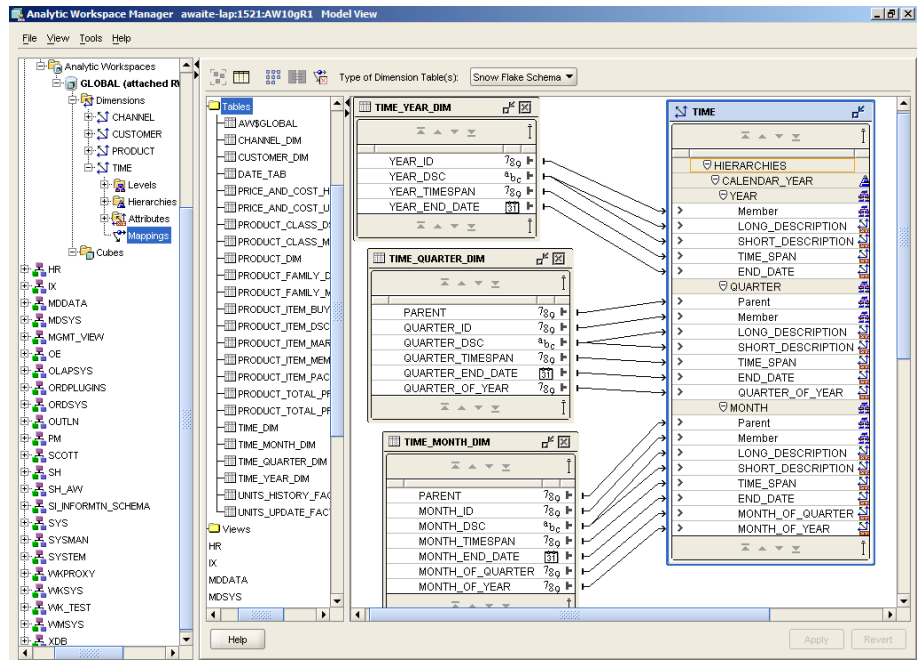
Create Dimensions from Templates

The three remaining dimensions have been previously created and archived as templates in the marketing department library.

Right-click the Dimensions folder and select Create Dimension From Template for Customer, Product, and Time.



The mappings are included with the definitions for all three dimensions.



Now that all the dimensions are created, the cube objects can be created.

Creating Cubes

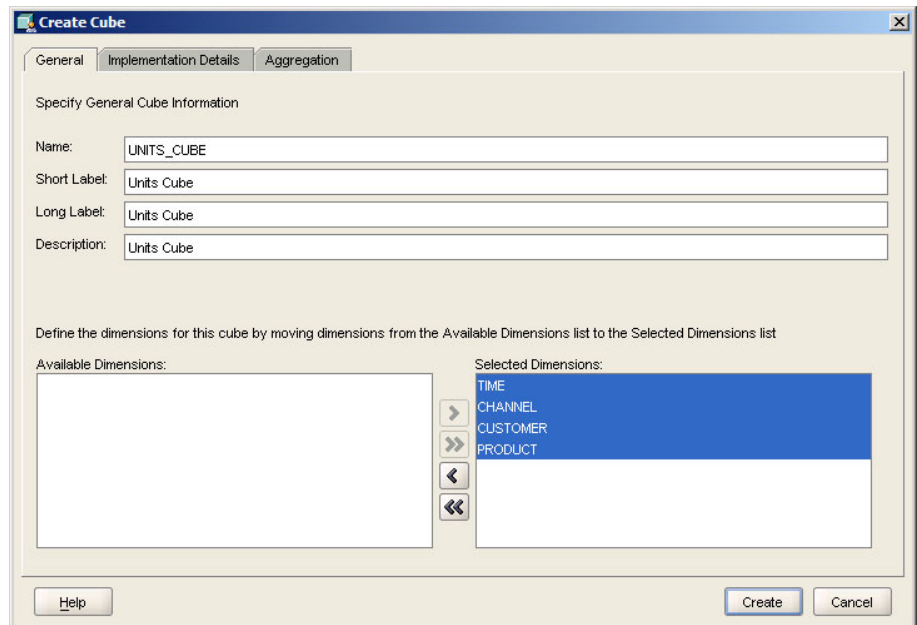
Two business facts are required to support the analysis requirements of the marketing department: Units and Sales. These measures will be acquired from the transactional database.

All of the other measures can be derived from these basic facts. The calculation such as the Sales Percent Change from Prior Period requested by the marketing analyst can be calculated on demand.

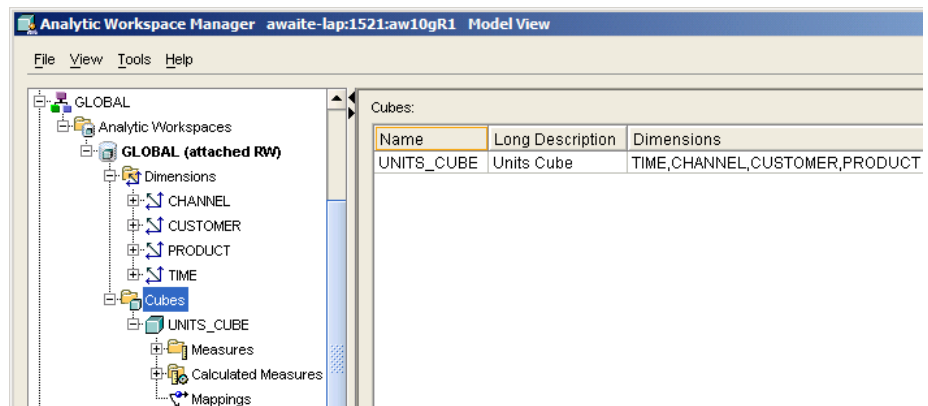
Create Units Cube

Right-click the Cubes folder and select Create Cube. Supply the name, select all four dimensions, and accept the defaults for the storage and aggregation options.

The default behavior of Analytic Workspace Manager builds an efficient and optimized cube for most users' purposes.

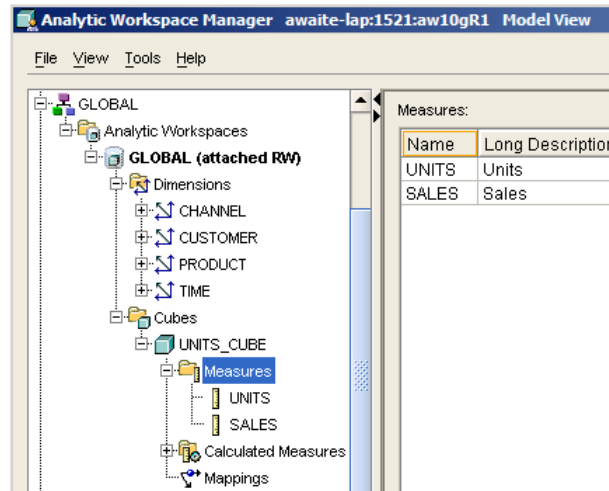


The new cube appears with supporting objects ready for definition.



Create Units and Sales Measures

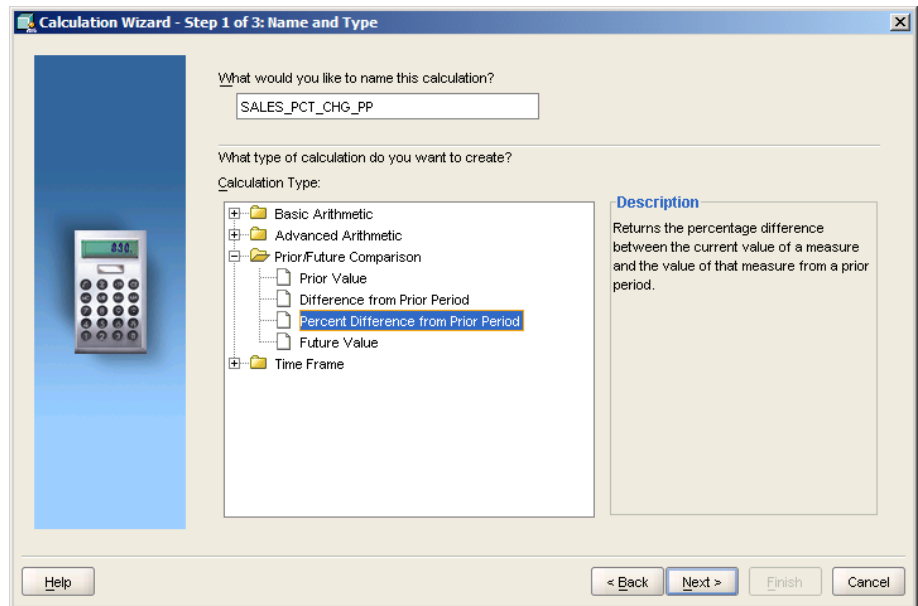
Right-click the Measures folder and select Create Measure. Supply the names and accept the defaults.



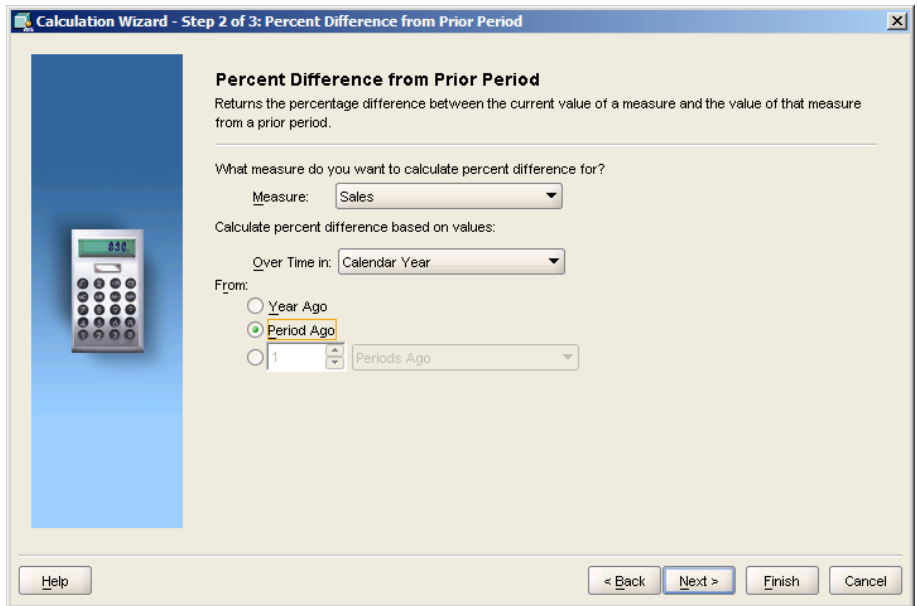
Calculated measures are derived by performing calculations on the base measures stored in an analytic workspace. Calculated measures are not stored; the calculations are performed in response to individual queries. However, the definitions of the calculated measures are stored within the analytic workspace.

Create Sales Percent Change from Prior Period Calculated Measure

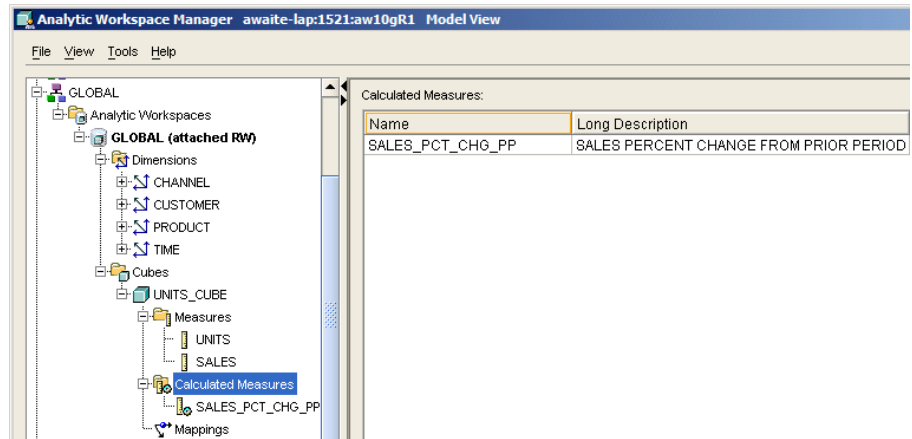
Right-click the Calculated Measures folder and select Create Calculated Measure. In the Calculation Wizard, supply the name and select the calculation Percent Difference from Prior Period.



On the Percent Difference from Prior Period page, select *Sales* as the measure and calculate the difference over *Calendar Year* from *Period Ago*.

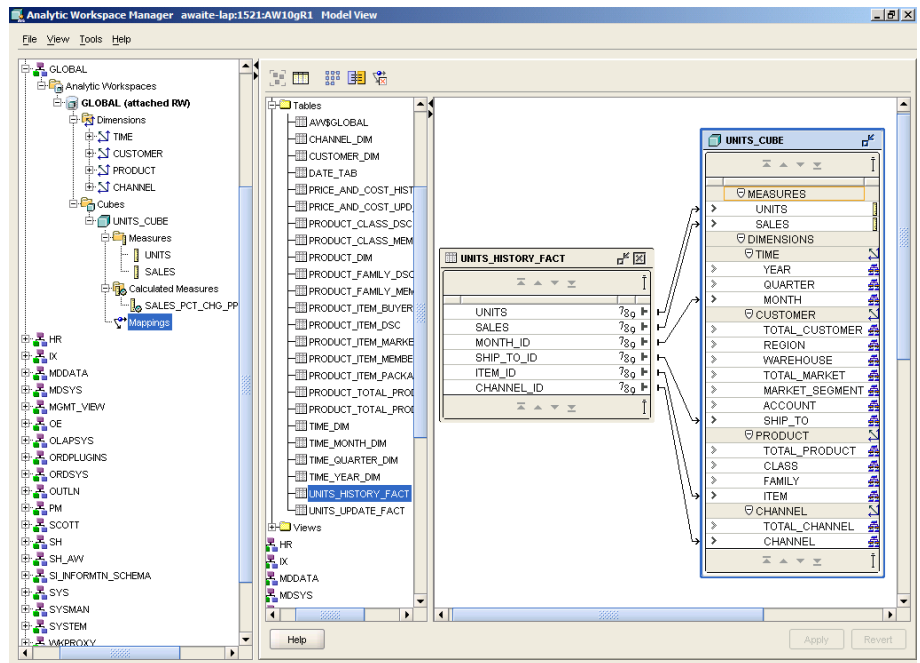


The SALES_PCT_CHG_PP measure appears in the Calculated Measures folder.



Map Units Cube

Click the Mappings node. The mapping window will be displayed in the right pane with the target object. Locate the data source from the schema navigator and drag-and-drop it on to the mapping canvas. Link the source columns to the target objects.



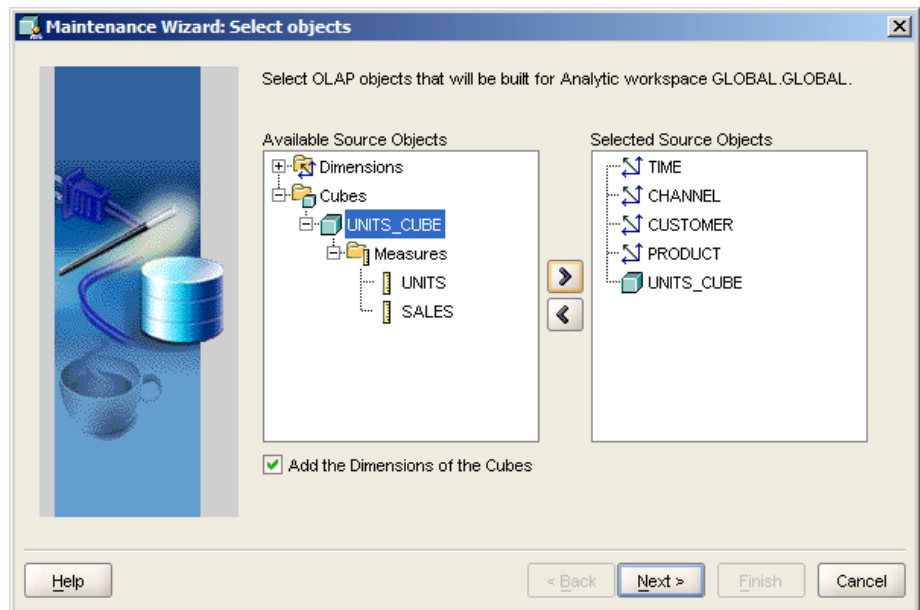
Next, we process the analytic workspace, which will load data from the relational data source and generate the summary calculations based on the aggregation plan for the cube.

Loading and Aggregating Data

The loading of dimension members and facts remains to be done before performing the marketing query.

Load and Aggregate Units Cube

Right-click the analytic workspace and select Maintain Analytic Workspace. Select the cube and its dimensions. Accept the defaults for the data and task processing options on the remaining pages of the wizard.



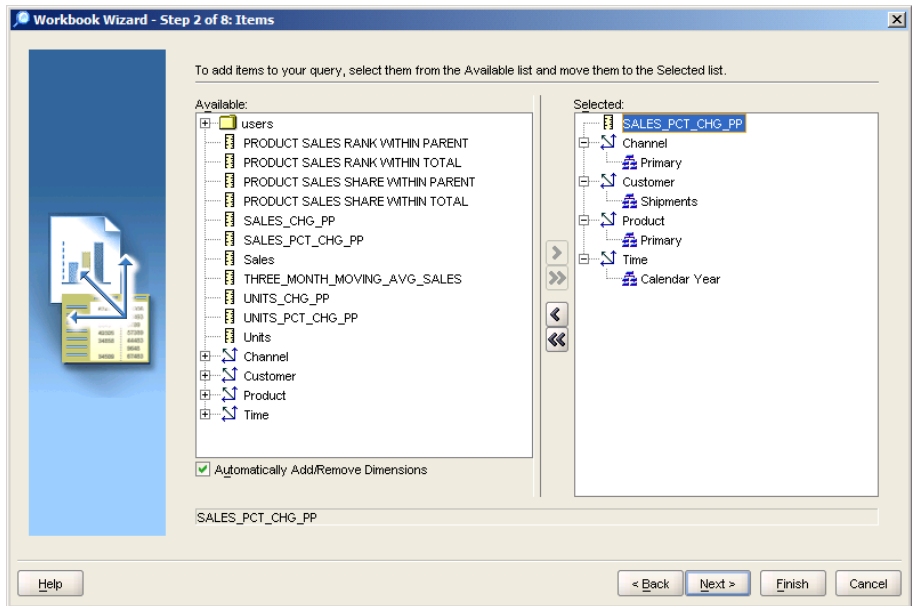
After the Maintenance Wizard processes the cube, the data that we have accumulated in the analytic workspace is ready for analysis. We will utilize the drill-down capabilities in Discoverer Plus OLAP.

ANALYZING ANALYTIC WORKSPACES

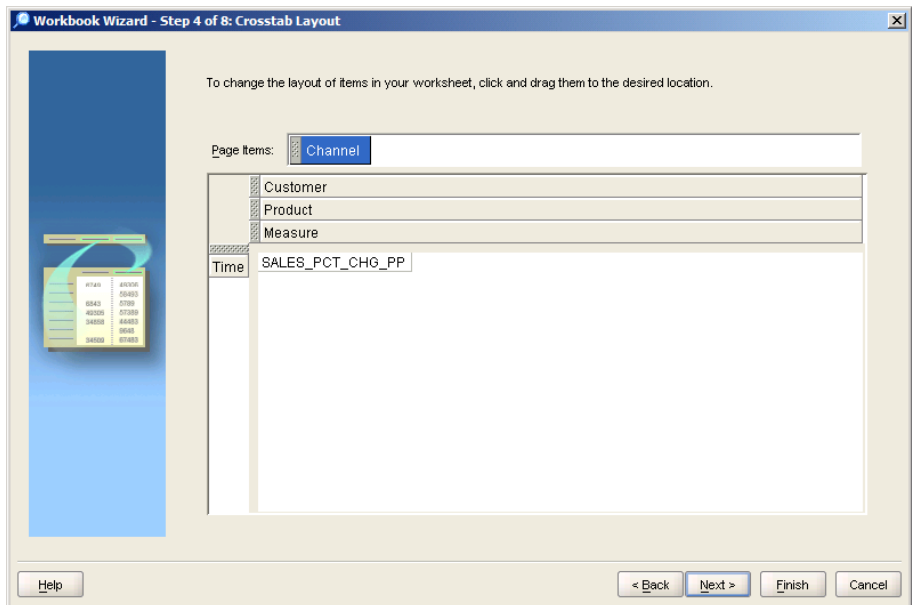
Discoverer Plus OLAP is a data analysis tool appropriate for almost any type of user. We can use it not only to browse the data in our analytic workspaces, but also to tailor the amount of dimension data visible via filtering. It allows us to drill up (to see less detail and more summary data) or to drill down (to see more detail and less summary data). Drilling is particularly useful in checking the accuracy, completeness, and effectiveness of the model design, regardless of our ultimate plans for the analytic workspace.

Formulate Query

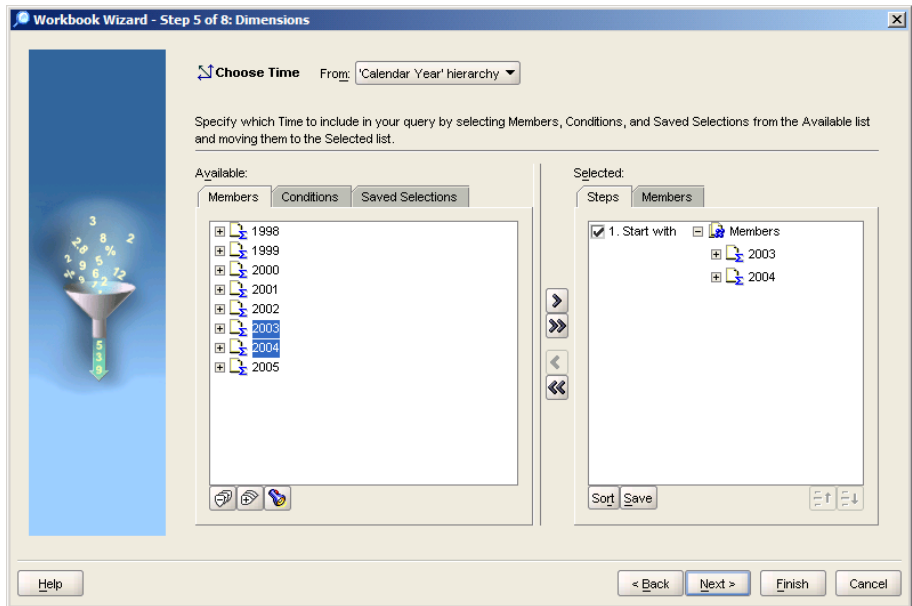
In Discoverer Plus OLAP, select the Sales Percent Change from Prior Period measure and accept its default dimensions.



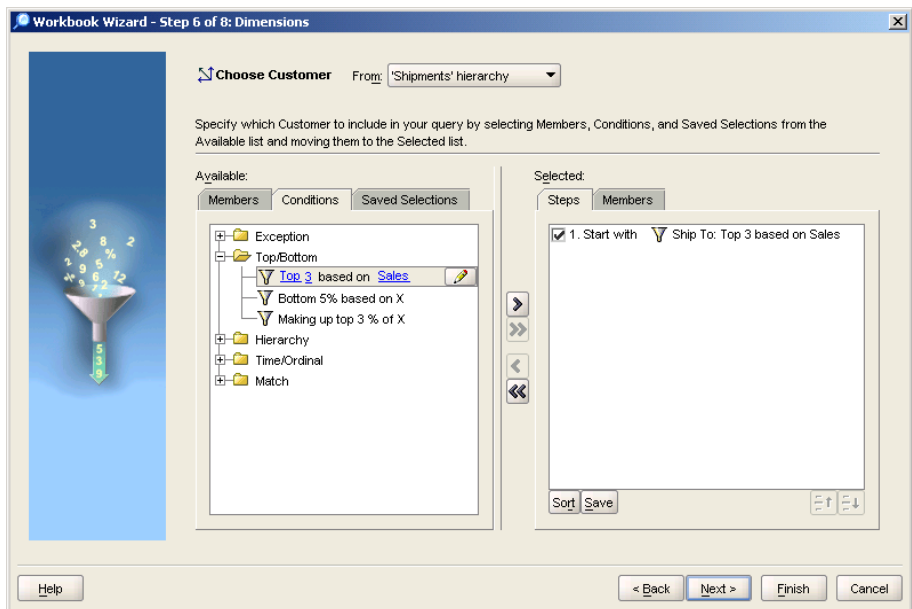
Arrange the dimensions and measure of the crosstab. Move the Product dimension under the Customer dimension. Move the measure under the Product and Customer dimensions. This layout displays the percent change in sales from a period ago for the products of each customer.



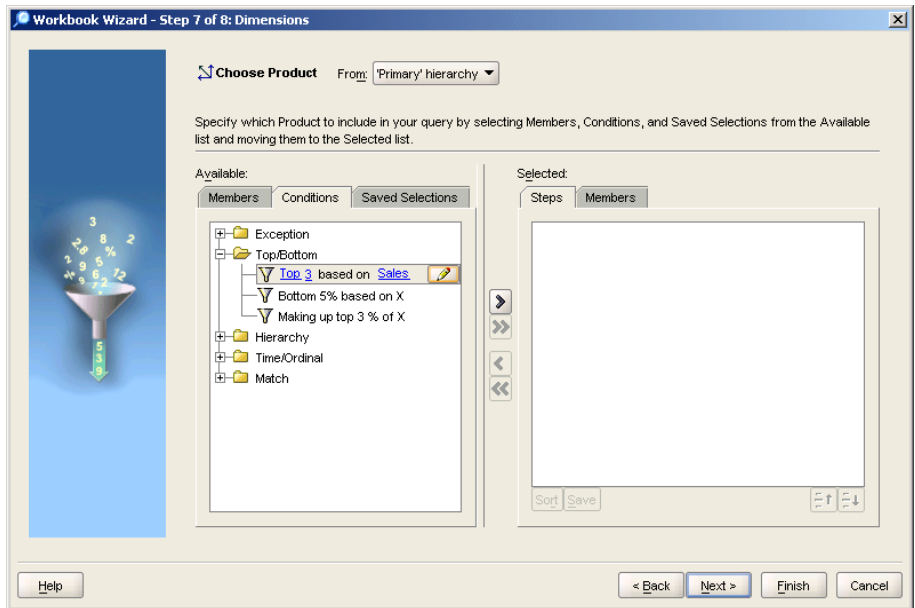
Filter the dimension members for Time to display calendar years 2003 and 2004.



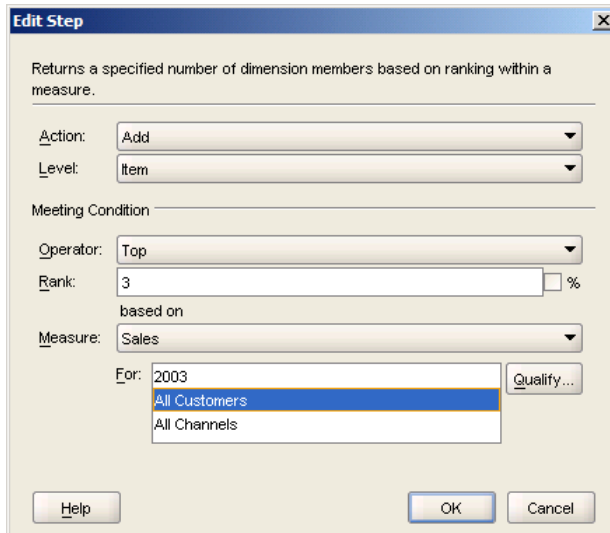
Qualify the dimension members for Customer with a ranking condition that selects the top 3 customers based on sales.



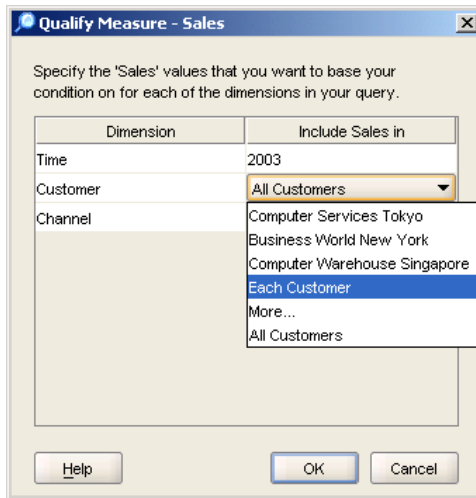
Qualify the dimension members for Product with a ranking condition that selects the top 3 products for each customer based on sales.



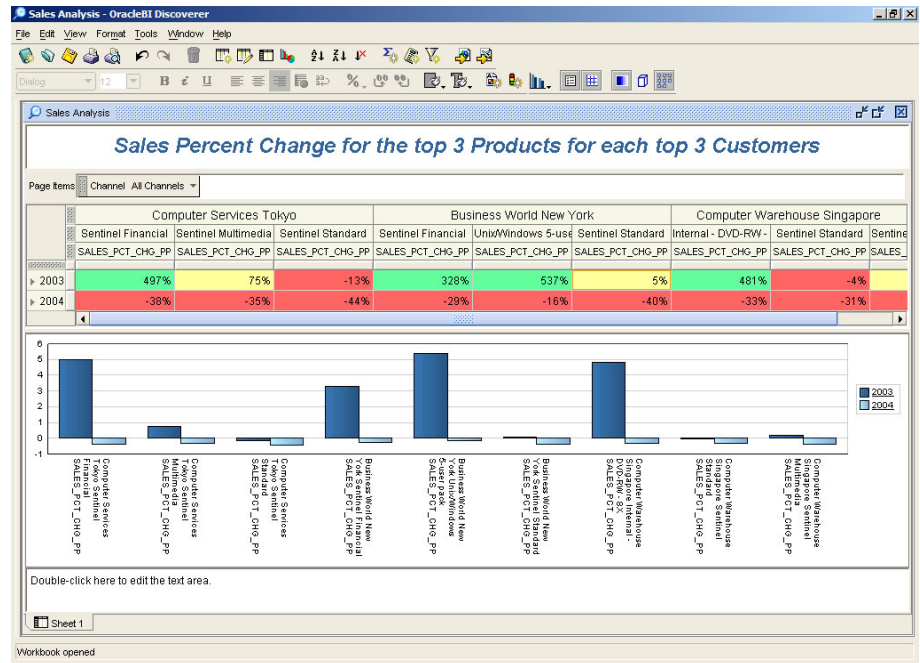
Edit the product ranking and add a condition for customers.



Filter the condition by qualifying members based on each customer.



Discoverer Plus OLAP displays the result of your query.



CONCLUSION

Analytic Workspace Manager 10g significantly increases the productivity of Oracle database administrators, data warehouse designers, and LoB power users. DBAs are able to easily create and manage the life cycle of analytic workspaces in a familiar Oracle environment. Data warehouse designers can quickly design the layout of logical dimensional models and share them with others. Power users can simply redefine the data model further to interrogate the data.



Analytic Workspace Manager and Oracle OLAP 10_g
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