Oracle – Data Warehouse and OLAP

This module will introduce you to Analytic Workspace Manager for Oracle OLAP. First, start out by creating an analytic workspace with logical dimension and cube objects. Afterwards, map these objects with existing star, snowflake, and normalized sources and then load the data.

You need Oracle 11g2 or later.

Lesson 1 – Starting with existing relational sources
Lesson 2 – Defining Analytic Workspace
Lesson 3 – Defining dimensions
Lesson 4 – Defining cubes, making data storage decisions, and summarizing
Lesson 5 – Mapping to relational sources
Lesson 6 – Loading and aggregating data into the analytic workspace
Lesson 7 – Defining calculated measures

Starting with existing relational sources

Import the data from datasource.dmp located in /awm directory in the server into your oracle user by running the following ORACLE import command. Yum must run the command from /awm directory.

```
/awm$ imp userid=yourusername/yourpassword file=datasource.dmp igno
re=y full=y
```

THE MULTIDIMENSIONAL WAREHOUSE WILL BE CREATED IN ANOTHER SCHEMA. We have already created a separate user with the username <yourusername>_aw.

Identifying Dimensions

Four dimensions will be used to organize the facts in the database.

- **Channel:** how data varies according to each distribution channel.
- **Customer:** how data varies by customer or geographic area.
- **Product:** how data varies by product.
- **Time:** how data varies over time.

Identifying Levels and Hierarchies

Now that we have identified dimensions, we can identify the levels of summarization within each dimension. Analysis requirements at Global Computing reveal that:

- Channel dimension: **(Total Channel > Channel)**.
- Customer dimension:
  - **Total Customers > Region > Warehouse > ShipTo.**
  - **Total Market > Market Segment > Account > ShipTo.**
- Product dimension: **Total > Class > Family >Item.**
- Time dimension: **Year > Quarter > Month.**

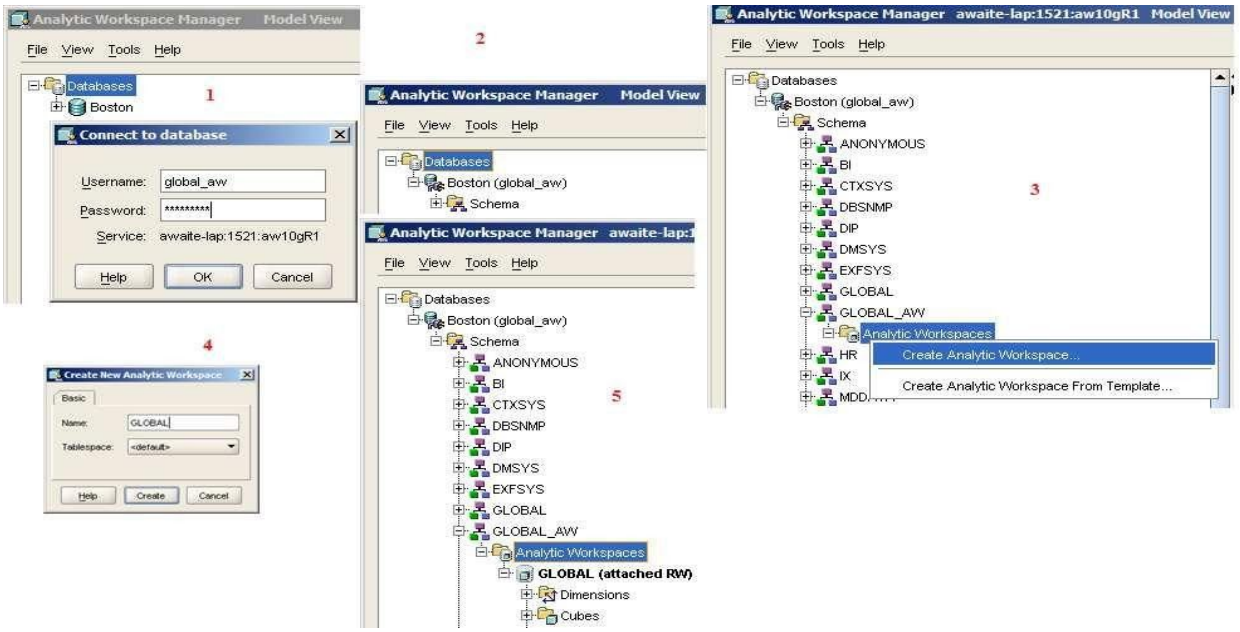
Identifying Stored Measures

Fact is acquired from the transactional database: Sales

Create Analytic Workspace

```
$ cd /awm
/awm$ sh awmrun.sh
```

1. Start Analytic Workspace Manager.
2. Fill Description with <yourrollno> and specify the Connection Information in the form hostname:port:sid i.e. localhost:1521:oracle.
3. Select database and connect. Log on with your oracle <yourusername> and <yourpassword>.

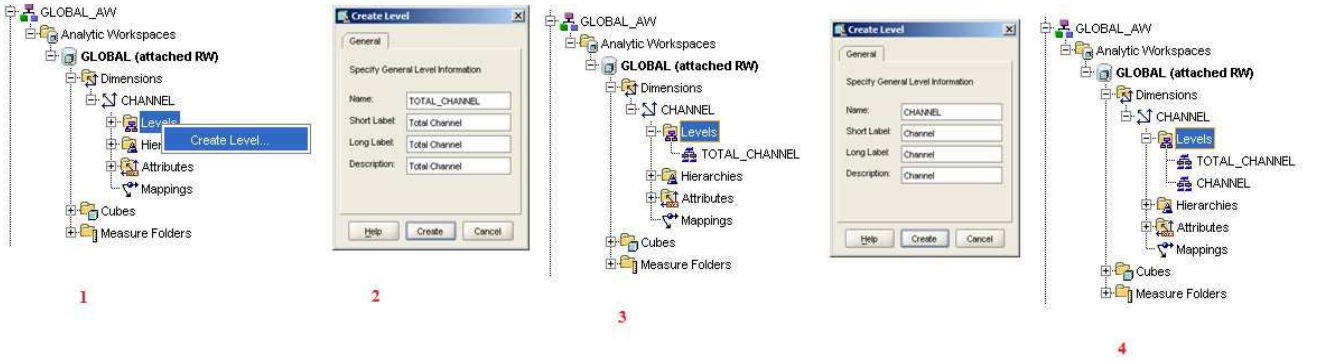


Defining Dimensions

Dimensions are the parents of levels, hierarchies, and attributes in the logical model. You define these supporting objects, in addition to the dimension itself.

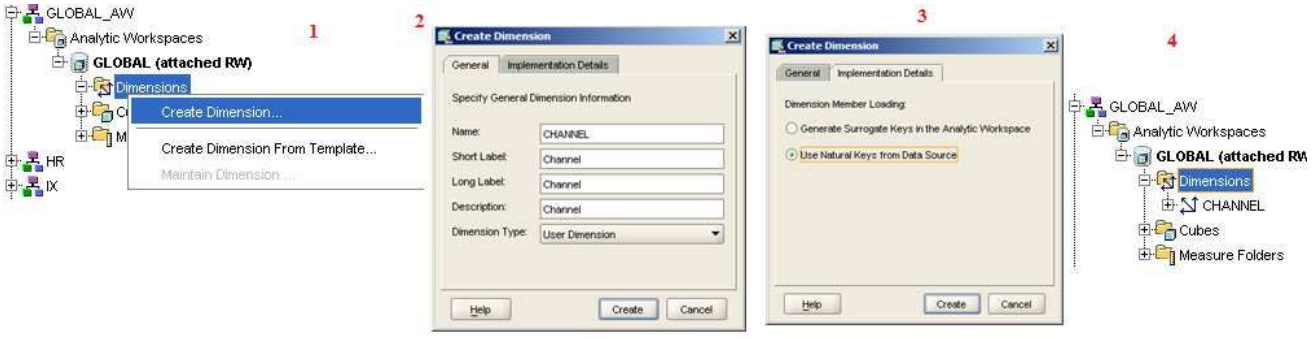
Create Channel Dimension

1. Right-click the Dimensions folder, then choose Create Dimension...



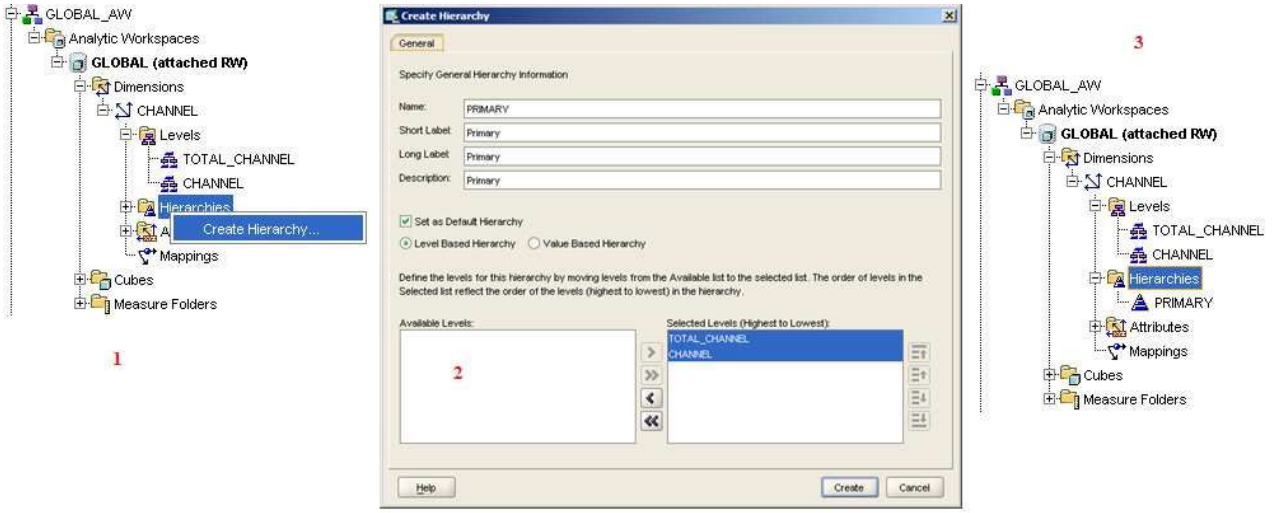
Create Channel Levels

Expand the CHANNEL node and right-click the Levels folder, then choose Create Level...



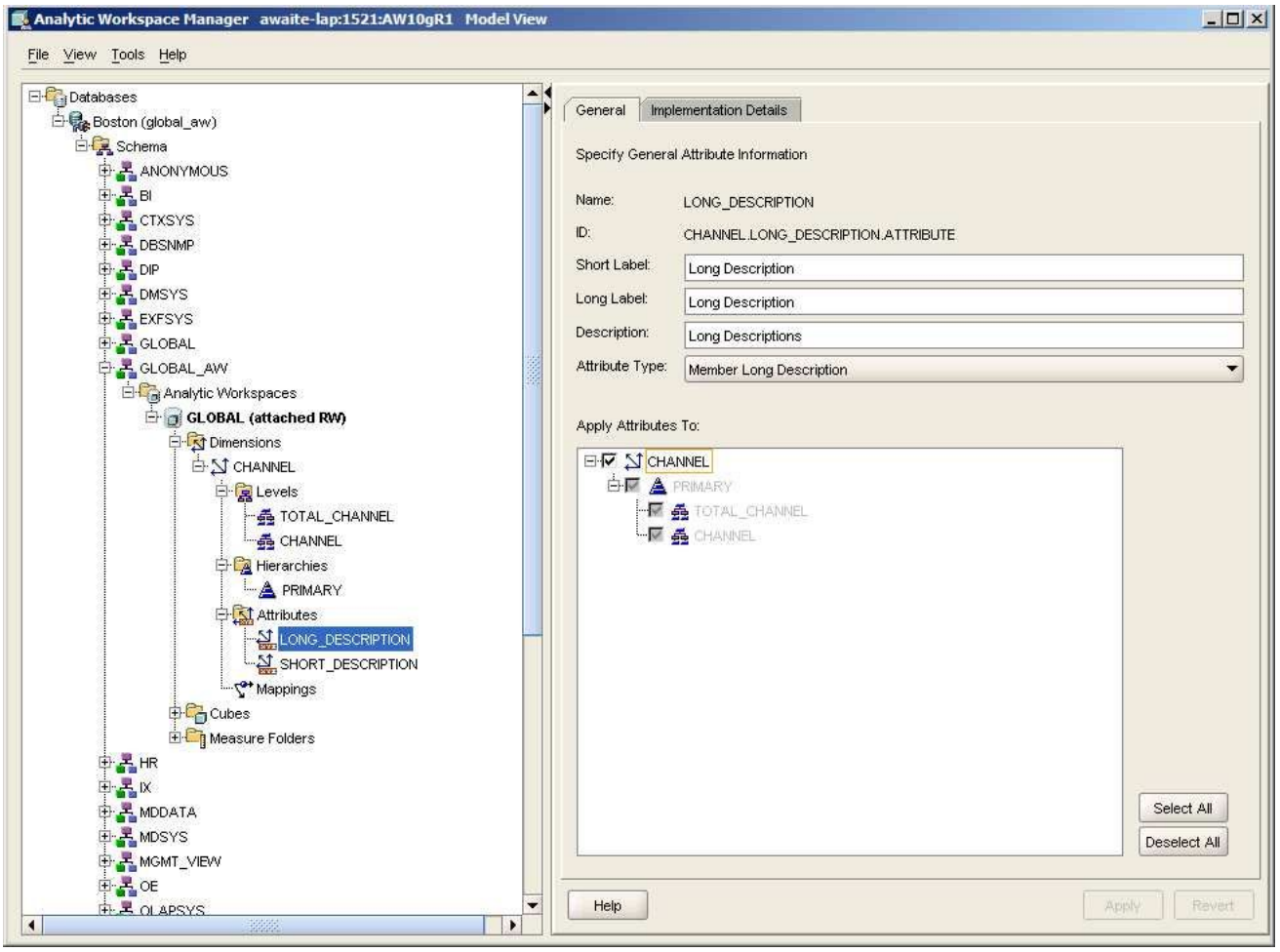
Create Channel Hierarchy

Right-click the Hierarchies folder, then choose Create Hierarchy...



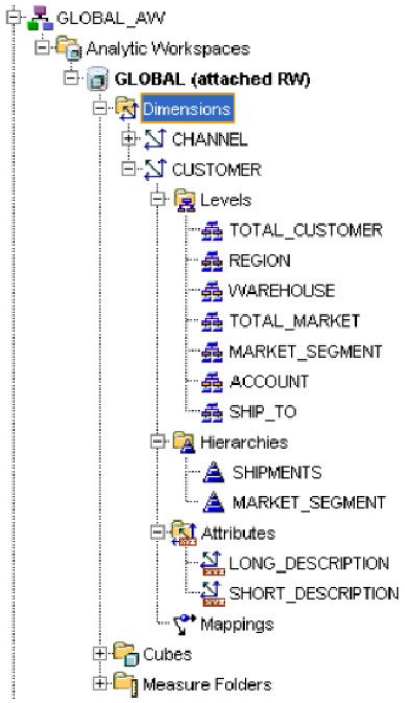
Defining Attributes

Attributes provide information about the individual members of a dimension. All dimensions are created with long and short description attributes. Time dimensions also have time-span and end-date attributes.

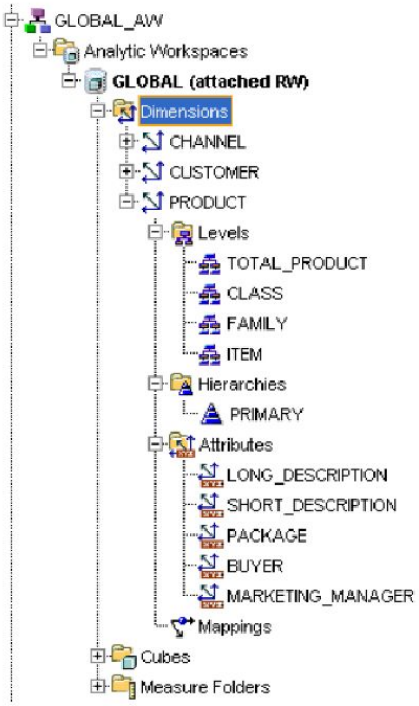


Note: *You must select the levels that the attributes apply to; otherwise, you cannot map the attributes to data sources.*

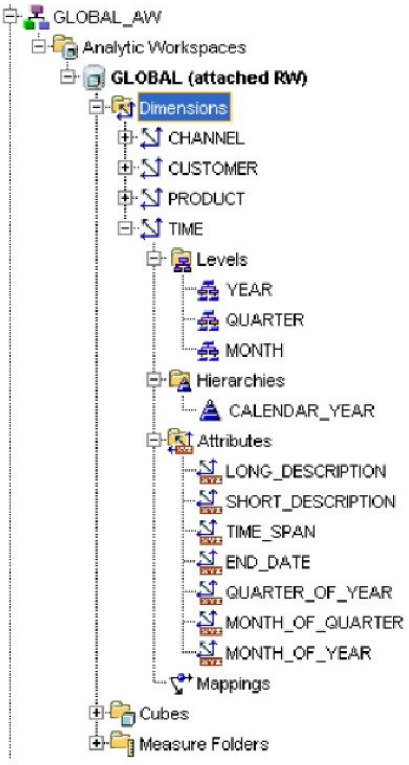
The same way for Customer, Time and Product dimensions



customer



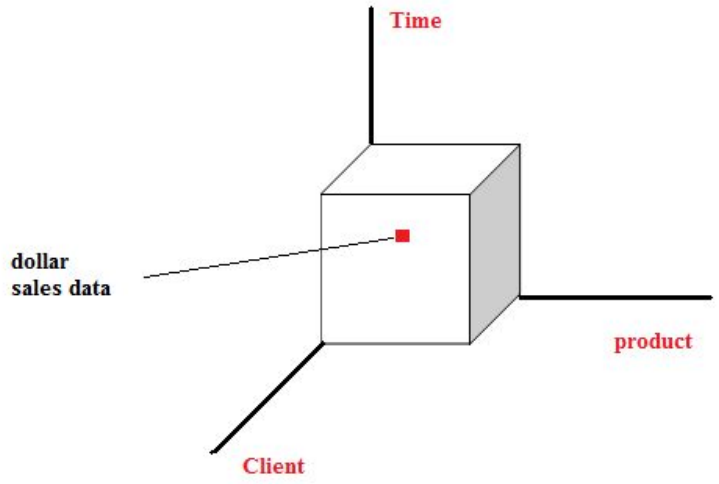
product



time

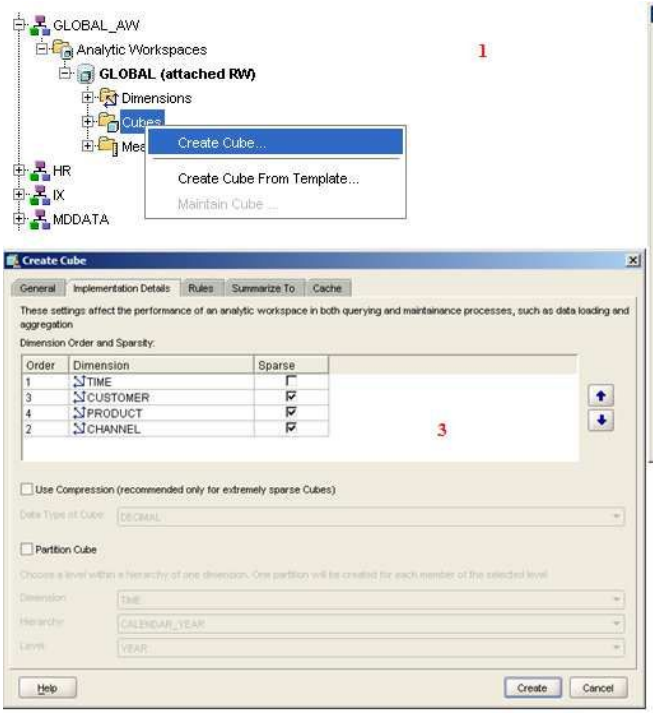
Defining Cubes

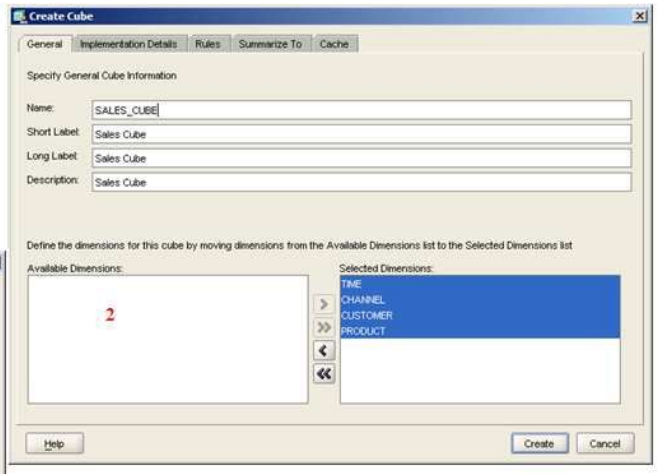
Cubes are logical representations of multidimensional data. The edges contain dimension members and the body contains data values. For example, sales data can be organized into a cube, whose edges contain values from customer, product, and time dimensions and whose body contains dollar sales data.



Create Sales Cube

Right click the Cubes folder, then choose Create Cube…





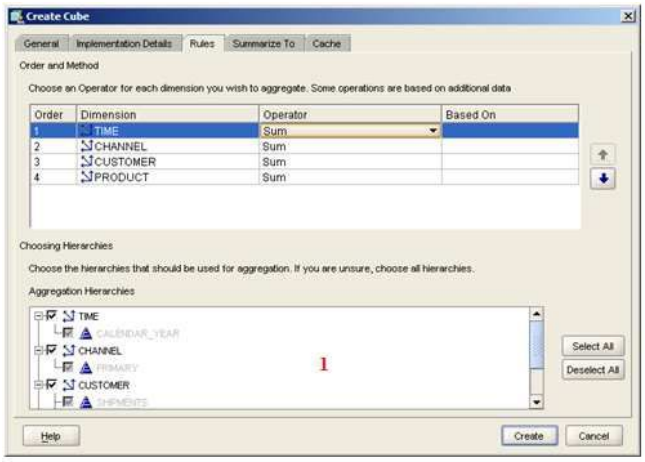
Ordering the Dimensions in a Cube

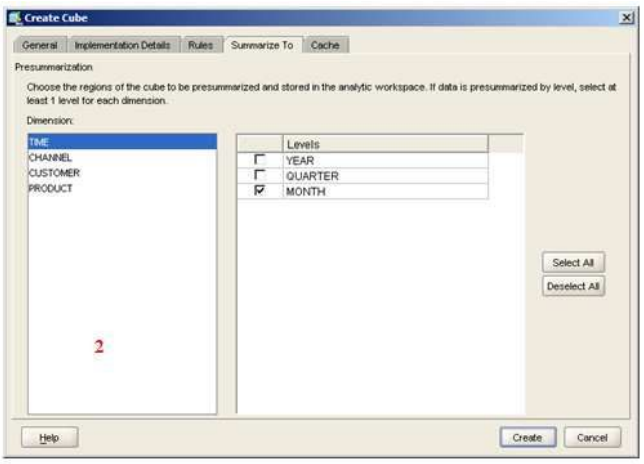
The order in which the dimensions are listed in a cube affects performance because it determines the way the data is stored on disk. The first dimension in a cube is the fastest-varying dimension, and the last dimension is the slowest-varying dimension.

Review Aggregation Plan

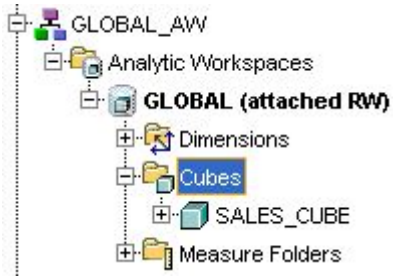
To override default behavior, you must create an aggregation plan that specify the levels at which data is pre-calculated and stored.

Click on the Rules and Summarize to tabs in the Create Cube dialog box. Review the defaults and click Create.





The new SALES_CUBE appears under the Cubes folder.

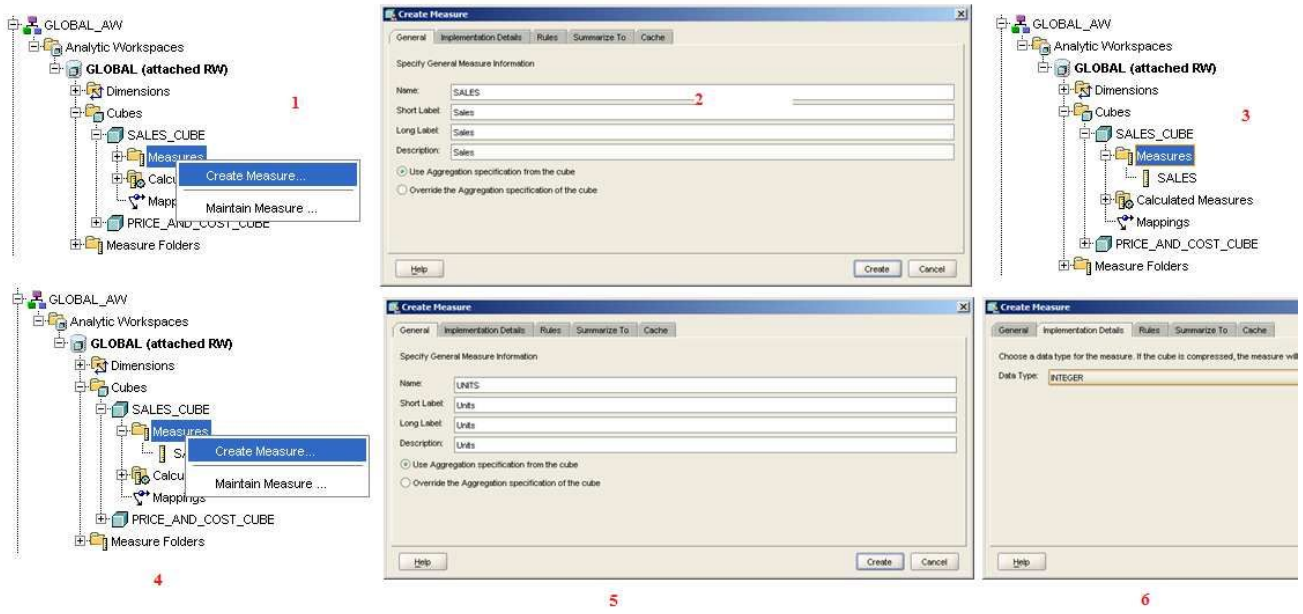


Creating Measures

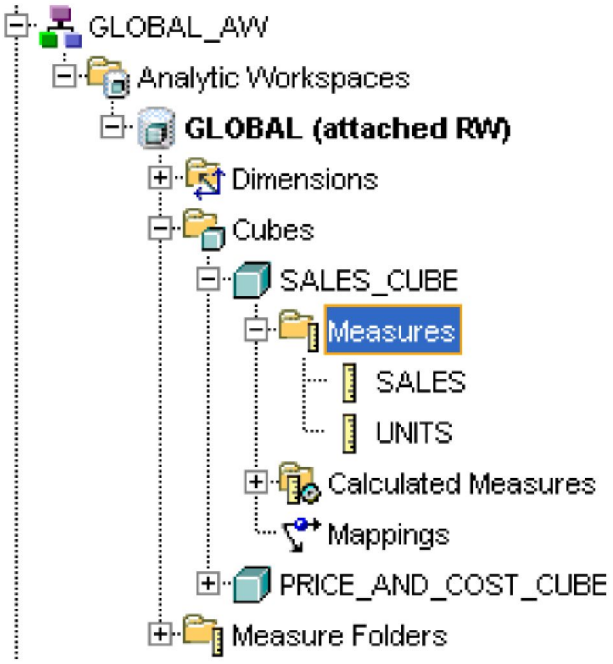
Base measures store the facts collected about your business. Each measure belongs to a particular cube, and thus shares particular characteristics with other measures in the cube, such as the same dimensions.

Create Sales Cube Measures

Expand the SALES_CUBE node and right-click the Measures folder, then choose Create Measure…



The new UNITS measure appears under the Measures folder.

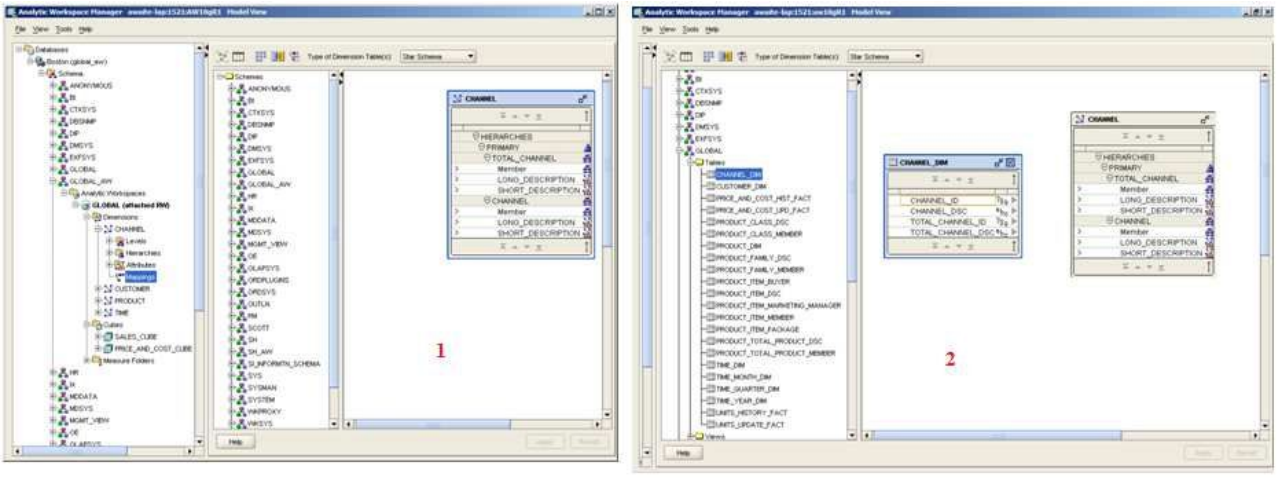


Mapping to Relational Sources

After creating logical objects, you can map them to relational data sources in Oracle Database. Afterwards, you can load data into your analytic workspace using the Maintain Analytic Workspace wizard.

Map Channel Dimension

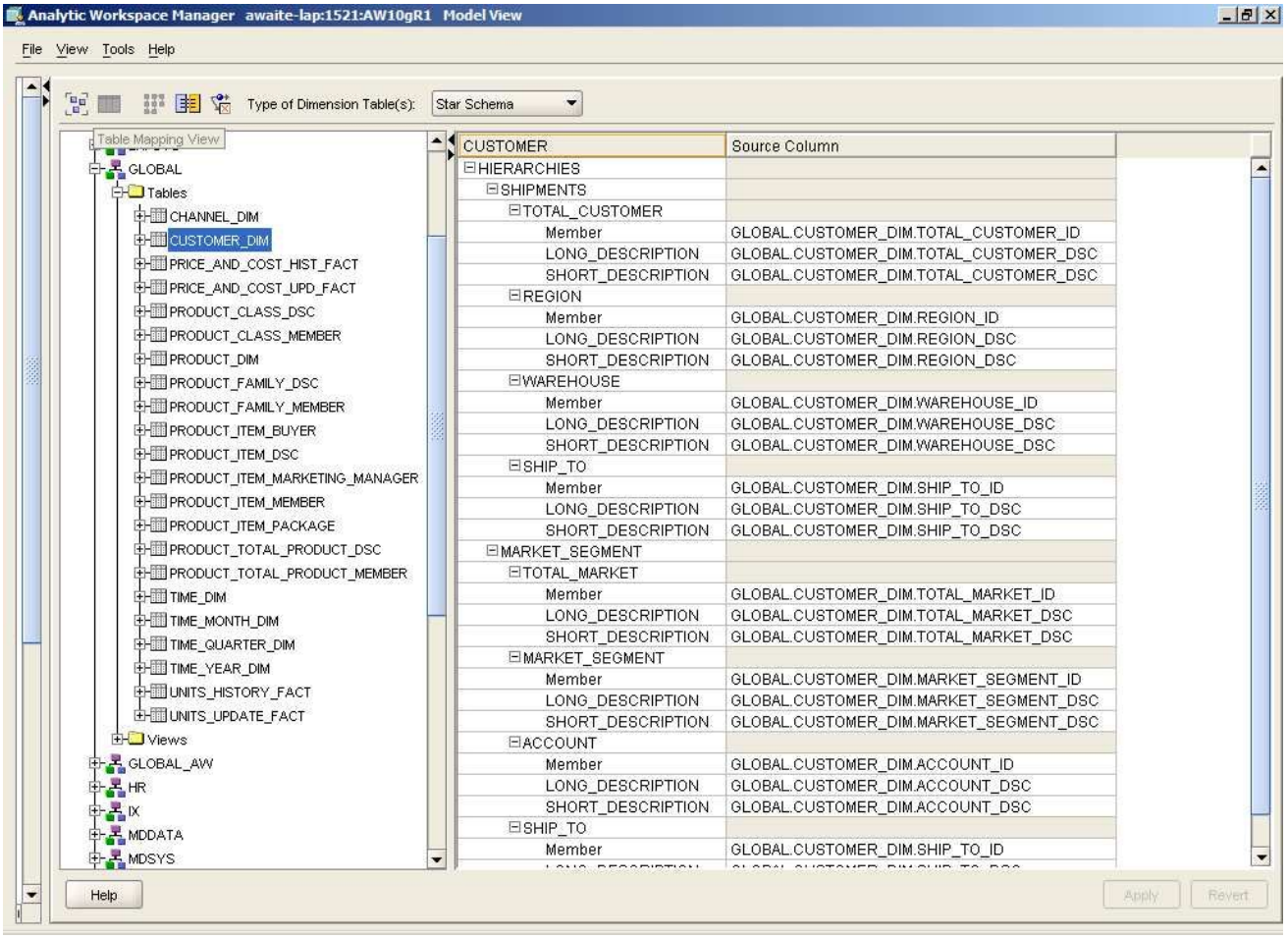
Expand the CHANNEL dimension node and click Mappings.



1. Draw lines from the CHANNEL_DIM source columns to the CHANNEL target objects. To draw a line, click the output connecter of the source column and drag it to the input connector of the target object. Once finished, click Apply.

Map Customer Dimension

2. Map the CUSTOMER_DIM star style table to the CUSTOMER target on your own.



All four dimensions are now mapped. The Product and Time templates included mappings. However, you may want to examine their mappings as they differ from star schemas. Product uses normalized tables and Time uses snowflake tables.

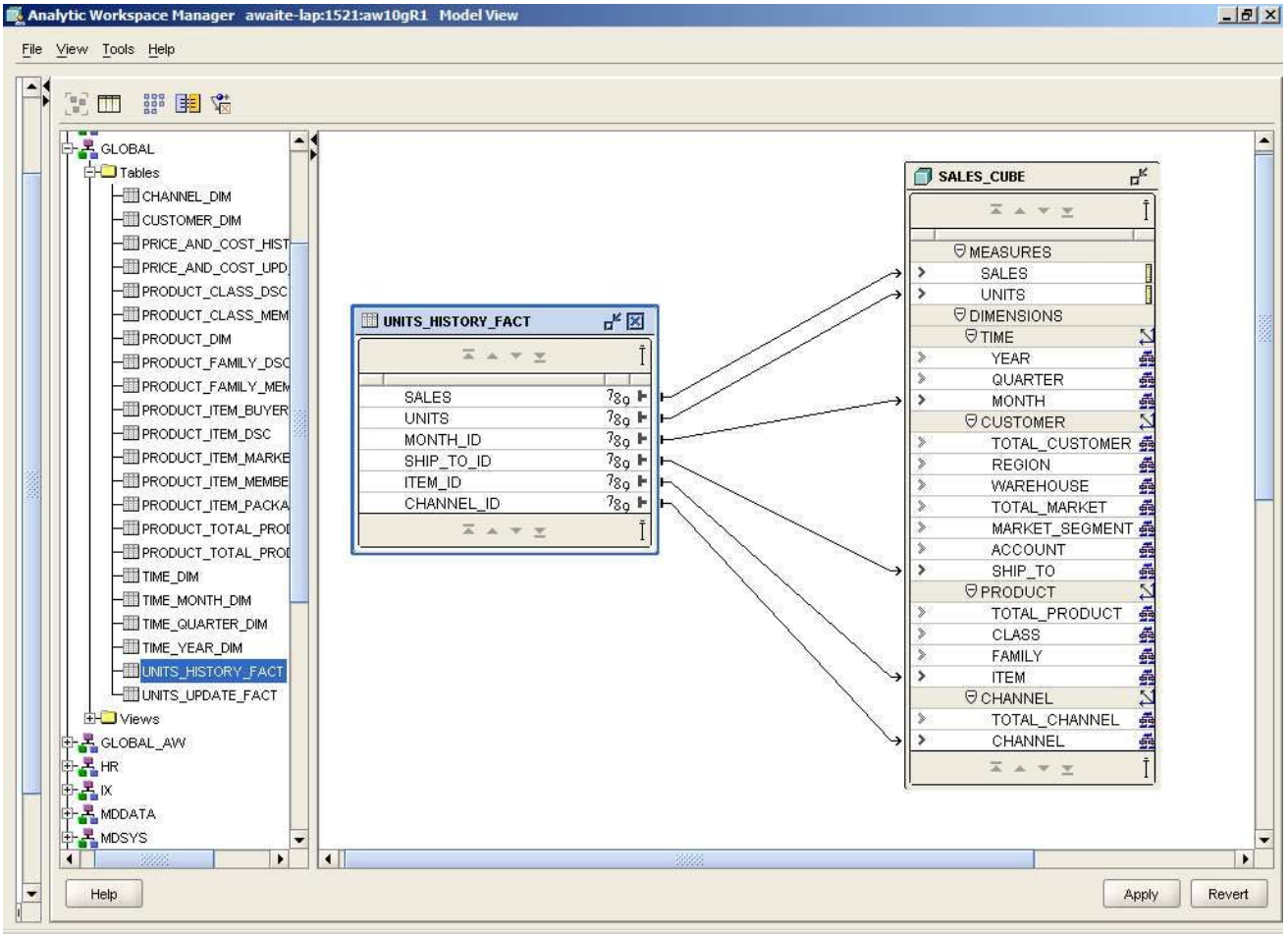
Map Sales Cube

Expand the SALES_CUBE node and click Mappings.

The Mapping Window will be displayed in the right pane. You will see a schema navigator and a table with rows for the measures, dimensions, and levels.

In the schema navigator, locate the UNITS_HISTORY_FACT table with the measures under the new schema. Drag-and-drop it on the mapping canvas.

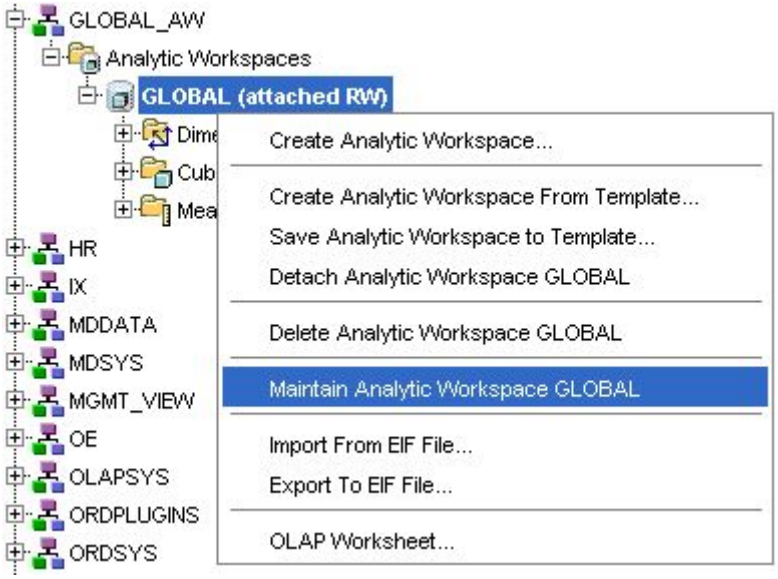
3. Draw lines from the UNITS_HISTORY_FACT source columns to the SALES_CUBE target objects. Once finished, click Apply.


Analytic Workspace Manager awaite-lap:1521:aw10gR1 Model View
File View Tools Help
GLOBAL
Tables
CHANNEL_DIM
CUSTOMER_DIM
PRICE_AND_COST_HIST
PRICE_AND_COST_UPD
PRODUCT_CLASS_DSC
PRODUCT_CLASS_MEM
PRODUCT_DIM
PRODUCT_FAMILY_DSC
PRODUCT_FAMILY_MEM
PRODUCT_ITEM_BUYER
PRODUCT_ITEM_DSC
PRODUCT_ITEM_MARKE
PRODUCT_ITEM_MEMBE
PRODUCT_ITEM_PACKA
PRODUCT_TOTAL_PROD
PRODUCT_TOTAL_PROD
TIME_DIM
TIME_MONTH_DIM
TIME_QUARTER_DIM
TIME_YEAR_DIM
UNITS_HISTORY_FACT
UNITS_UPDATE_FACT
Views
GLOBAL_AW
HR
IX
MDDATA
MDSYS
UNITS_HISTORY_FACT
SALES
UNITS
MONTH_ID
SHIP_TO_ID
ITEM_ID
CHANNEL_ID
SALES_CUBE
MEASURES
SALES
UNITS
DIMENSIONS
TIME
YEAR
QUARTER
MONTH
CUSTOMER
TOTAL_CUSTOMER
REGION
WAREHOUSE
TOTAL_MARKET
MARKET_SEGMENT
ACCOUNT
SHIP_TO
PRODUCT
TOTAL_PRODUCT
CLASS
FAMILY
ITEM
CHANNEL
TOTAL_CHANNEL
CHANNEL
Help
Apply
Revert

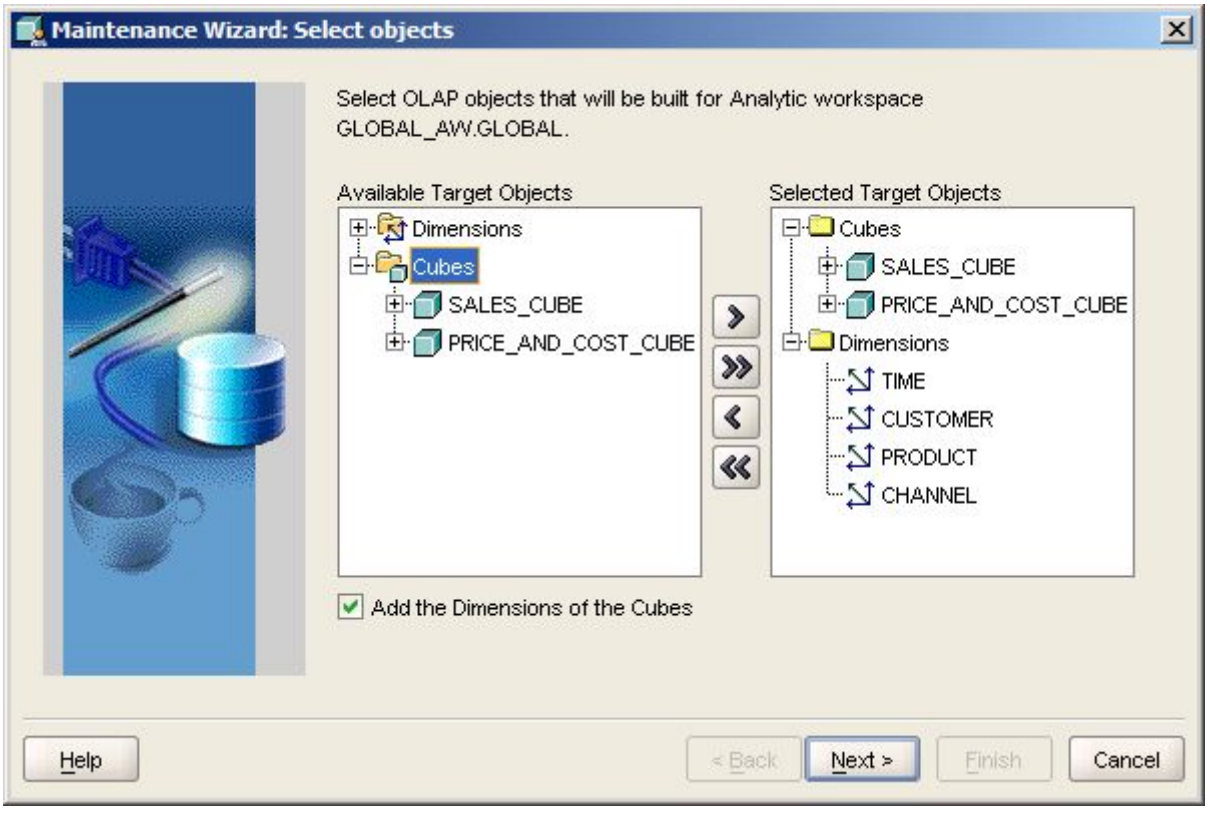
Loading and Aggregating Data into the Analytic Workspace

The Maintenance Wizard loads and aggregates the data as a single job. You can load all mapped objects in the analytic workspace, or individual dimensions and measures. You can also choose to run the job immediately, enter it in the Oracle Job Queue, or save it as a SQL script.

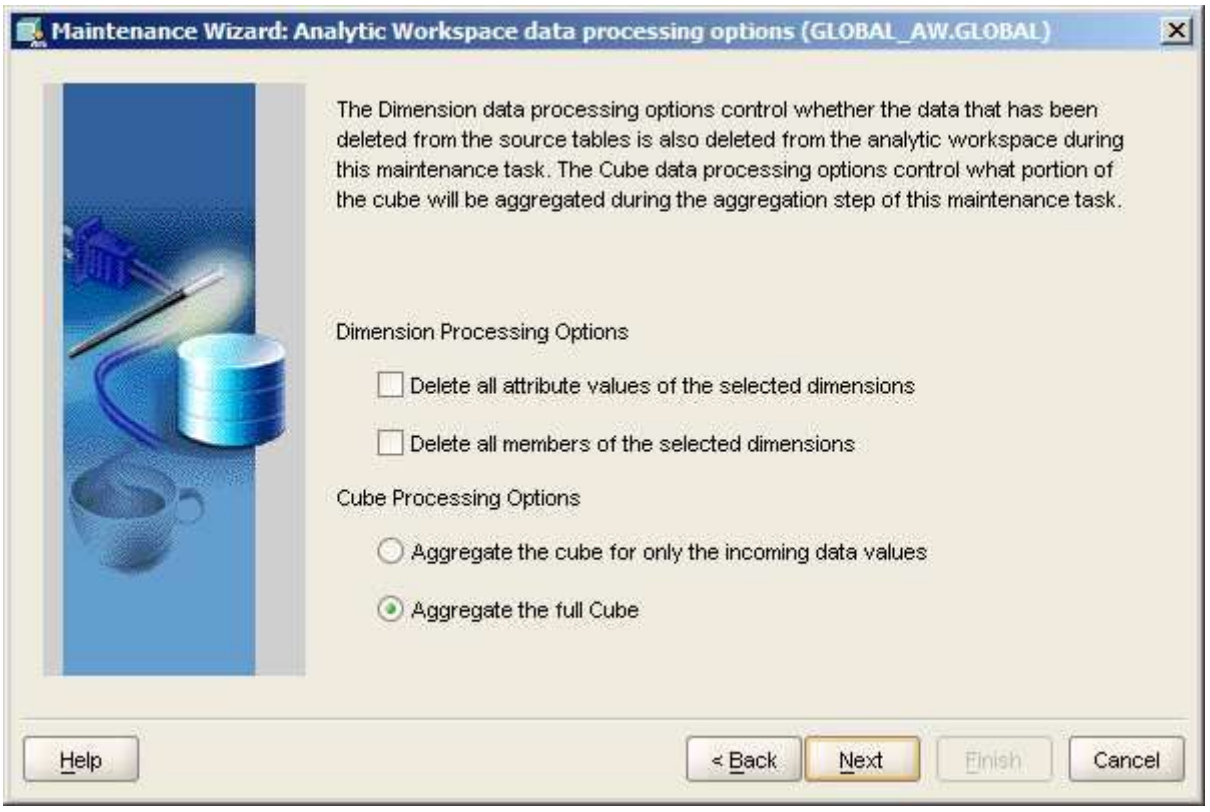
1. Right-click the analytic workspace you created, then choose Maintain Analytic Workspace.



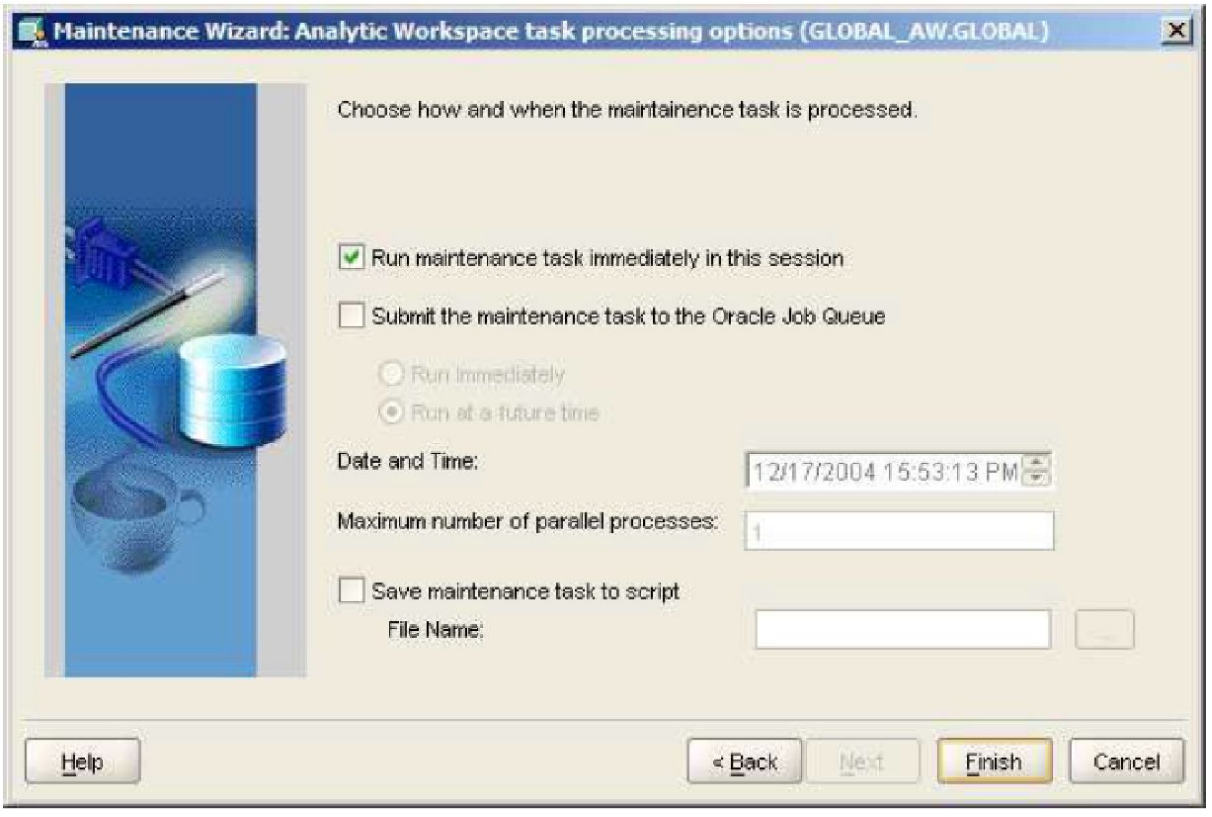
2. Select SALES_CUBE including their dimensions. Click Next.



3. Accept the defaults at Analytic Workspace data processing options and click Next.



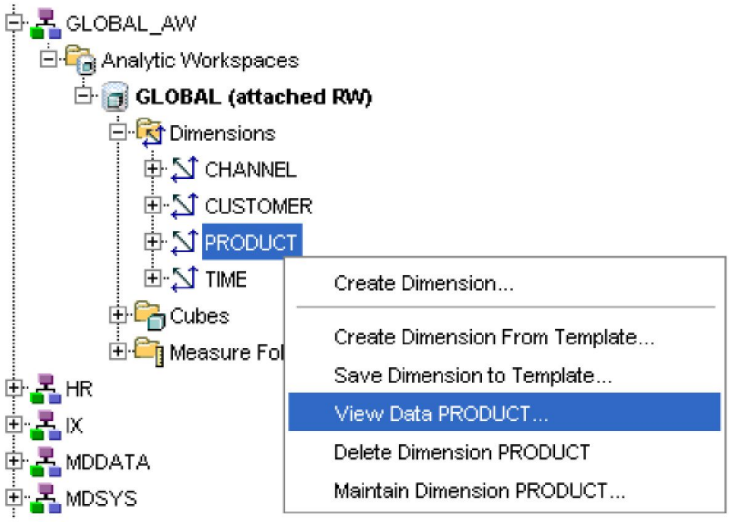
4. At Analytic Workspace task processing options accept the default and click Finish.



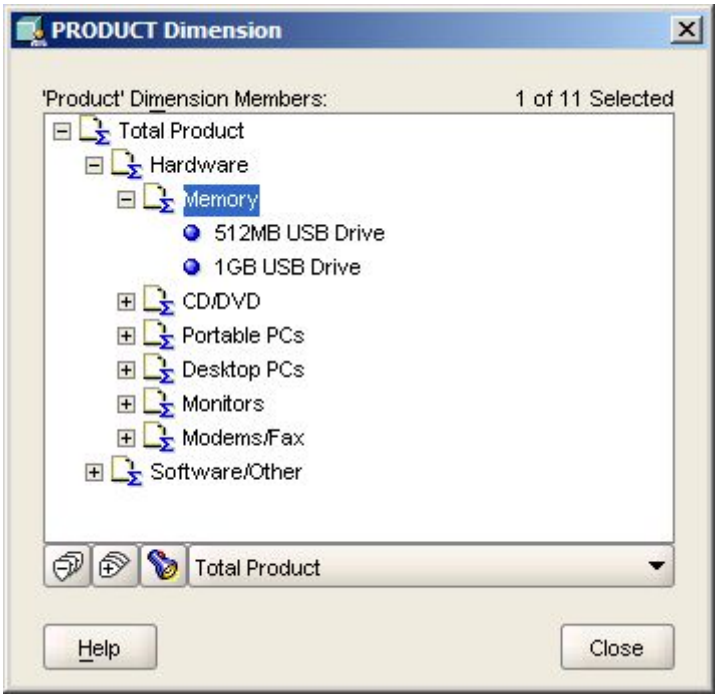
The analytic workspace contains data as specified by the aggregation plan. You can now perform ad-hoc, dimensional analysis with the View Data feature in Analytic Workspace Manager or any other Oracle Business Intelligence Beans application such as Discoverer OLAP and Spreadsheet Add-In!

View Data

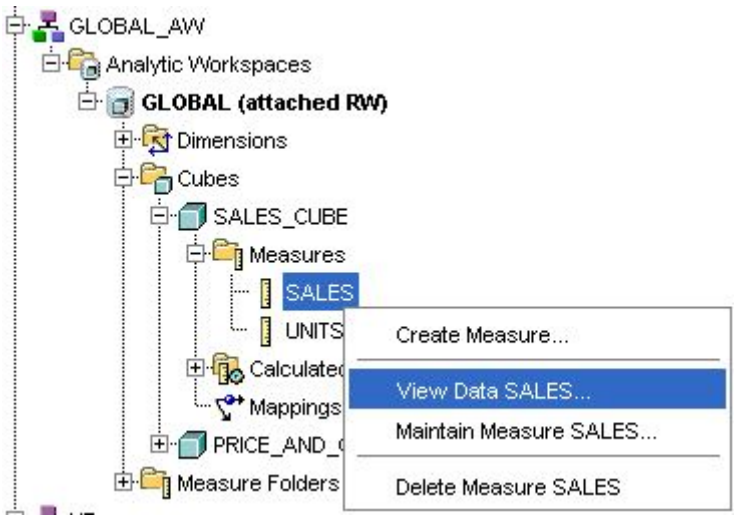
5. For example, to view dimension data, right-click the PRODUCT dimension and choose View Data PRODUCT...



You can explore and verify the dimension members for Product.



6. For example, to view Sales data, right-click the SALES measure from the SALES_CUBE and choose View Data SALES...



You can explore and verify the Sales data in a crosstab format.