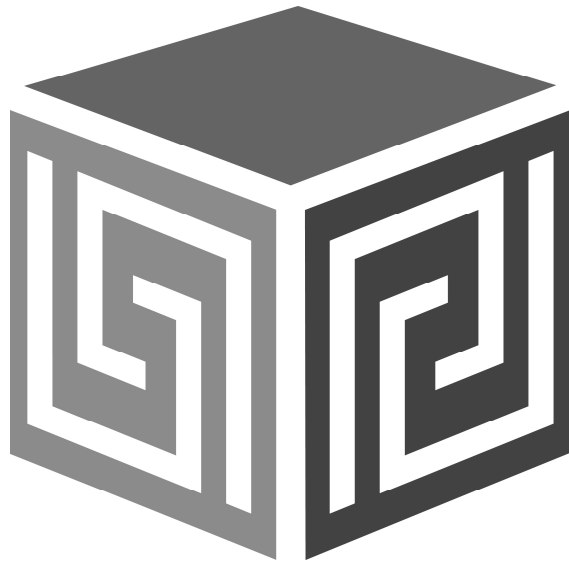


Building Cubes and Analyzing Data using Oracle OLAP 11g

Collaborate '09 Session 252



Chris Claterbos
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Vlamis Software Solutions, Inc.
816-729-1034
<http://www.vlamis.com>

Vlamis Software Solutions, Inc.

- Founded in 1992 in Kansas City, Missouri
- Oracle Partner and reseller since 1995
- Specializes in ORACLE-based:
 - Data Warehousing
 - Business Intelligence
 - Data Transformation (ETL)
 - Web development and portals
 - Express-based applications
- Delivers
 - Design and integrate BI and DW solutions
 - Training and mentoring
- Expert presenter at major Oracle conferences



Who I Am

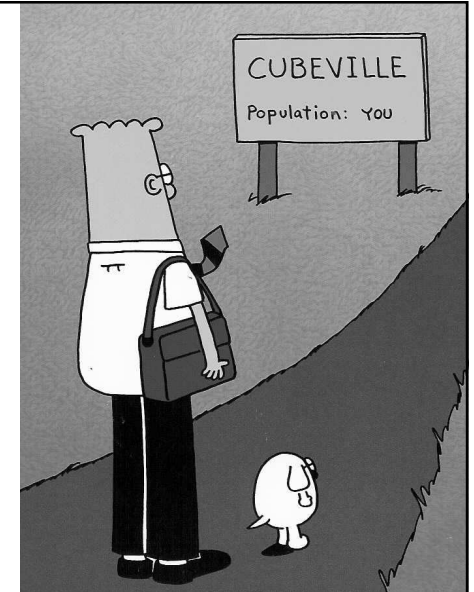


- Chris Claterbos, Consulting Manager
 - Consulting and Development Manager for Vlamis Software Solutions, Inc.
 - DBA and applications developer for Oracle products, since 1981.
 - Beta tester and early adopter of - including Oracle 8i, 9i, 10g and 11g, JDeveloper and BIBeans, Oracle AS, Portal , and Reports.
 - Expert Presenter and Author (new book on OLAP coming in 2009).
 - Previous IOUG Focus Area Manager for Data Warehousing and BI



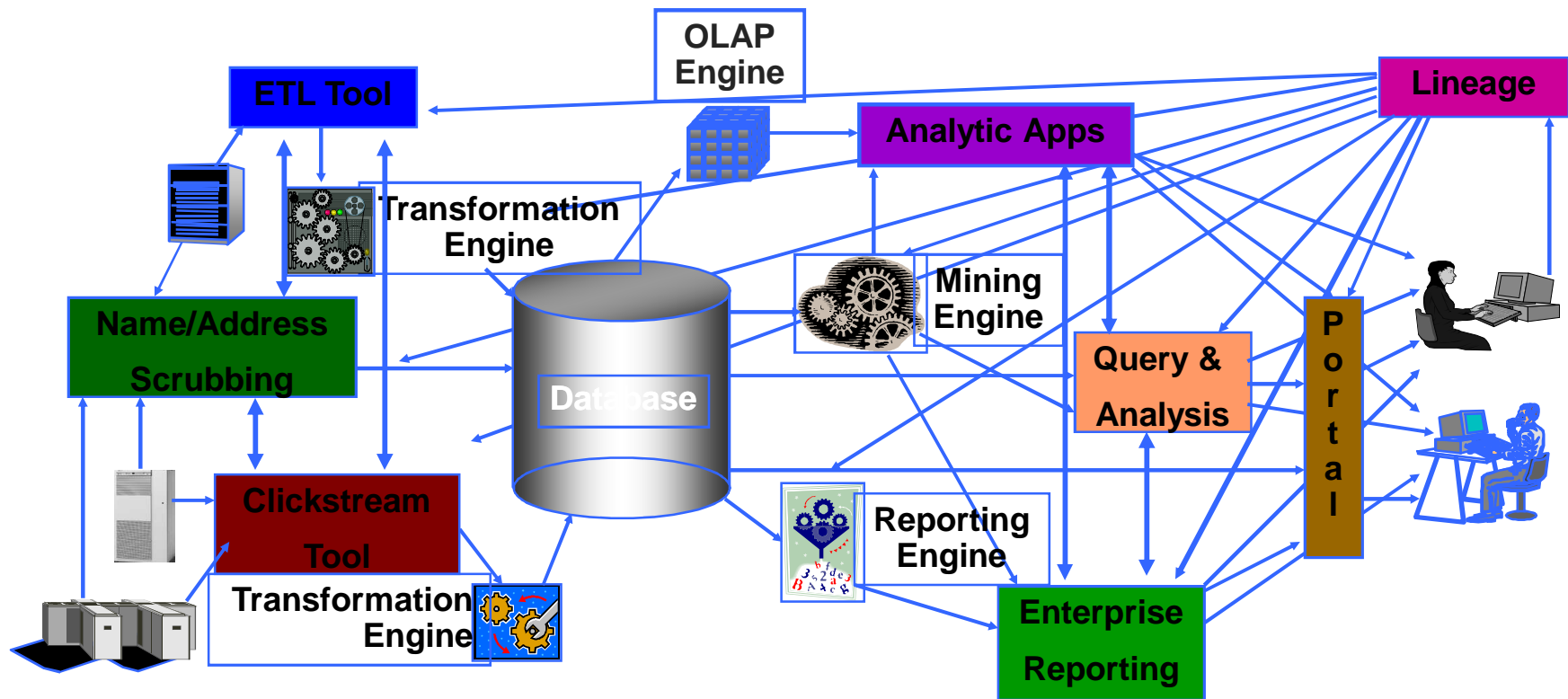
Presentation Agenda

- Brief background of BI EE and Oracle OLAP
- Demonstration of BI EE on Oracle OLAP
- Why Oracle OLAP?
- What is Oracle OLAP?
- Oracle OLAP storage options
- Structure of Analytic Workspace
- Building OLAP Cubes
- 11g OLAP Preview – what changes?
- Hands-on with Oracle OLAP and BI EE



Business Intelligence Market

Multi-Vendor, Un-integrated



- Protracted and complex implementation
 - Escalating maintenance costs
- Software **and Metadata Integration is key!**



Oracle BI Suite Enterprise Edition

Unified Business Intelligence Infrastructure

Interactive
Dashboards



Reporting &
Publishing



Ad-hoc
Analysis



Proactive
Detection



Disconnected
Analytics



MS Office
Plug-in



Simplified Business Model and Abstraction Layer

Oracle
BI Server

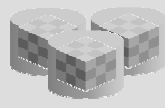
Intelligent Caching Services

Multidimensional Calculation and Integration Engine

Intelligent Request Generation and Optimized Data Access Services



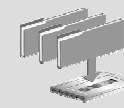
OLTP & ODS
Systems



Data Warehouse
Data Mart



SAP, Oracle
PeopleSoft, Siebel,
Custom Apps



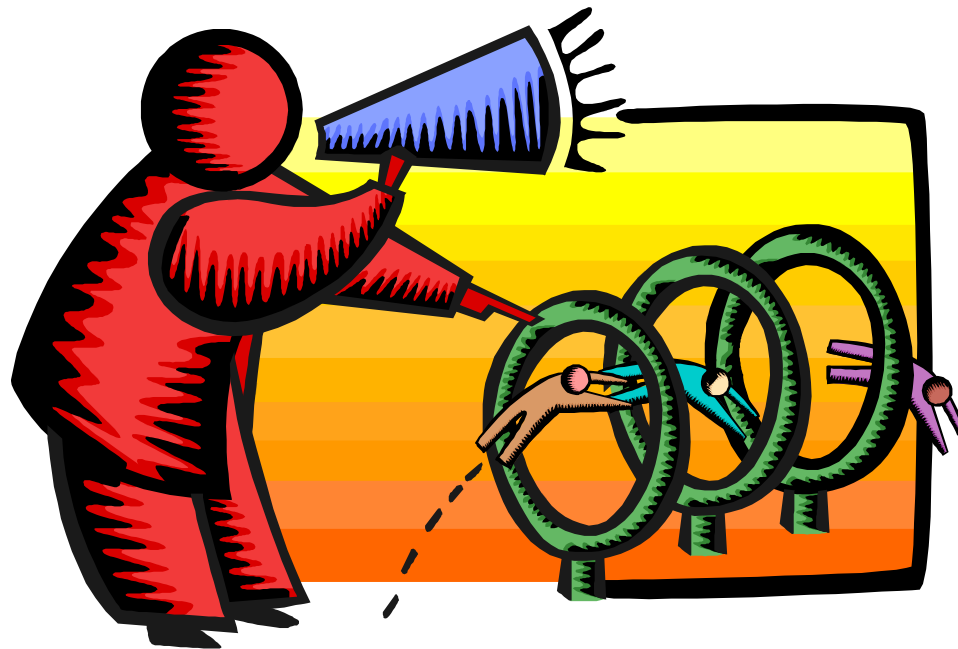
Files
Excel
XML



Business
Process



Demo of BI EE on Oracle OLAP



Definition of OLAP

- OLAP stands for On Line Analytical Processing. That has two immediate consequences: the on line part requires the answers of queries to be fast, the analytical part is a hint that the queries itself are complex.
- i.e. Complex Questions with FAST ANSWERS!



Why use OLAP?

- Empowers end-users to do own analysis
- Frees up IS backlog of report requests
- Ease of use
- Drill-down
- No knowledge of SQL or tables required
- Exception Analysis
- Variance Analysis
- EASY to IMPLEMENT and SUPPORT!



What Does Oracle OLAP Add to a DW?

- Multidimensional user view of data
- Users create own reports
- Users create own measures
- Easy drill-down, rotate
- Iterative discovery process (not just reports)
- Ad-hoc analysis
- Easy selection of data with business terms
- OLAP DML with what-if, forecasting
- Platform for extensions



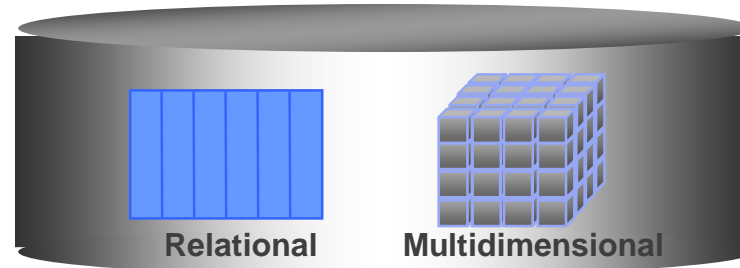
OLAP Option – High-level View

- Advanced analytics
- Integrated in RDBMS
- Easy to develop
- Easy to use
- Facilitate collaboration
- Flexible deployment
- Scaleable and performant
- True Relational – Multidimensional database

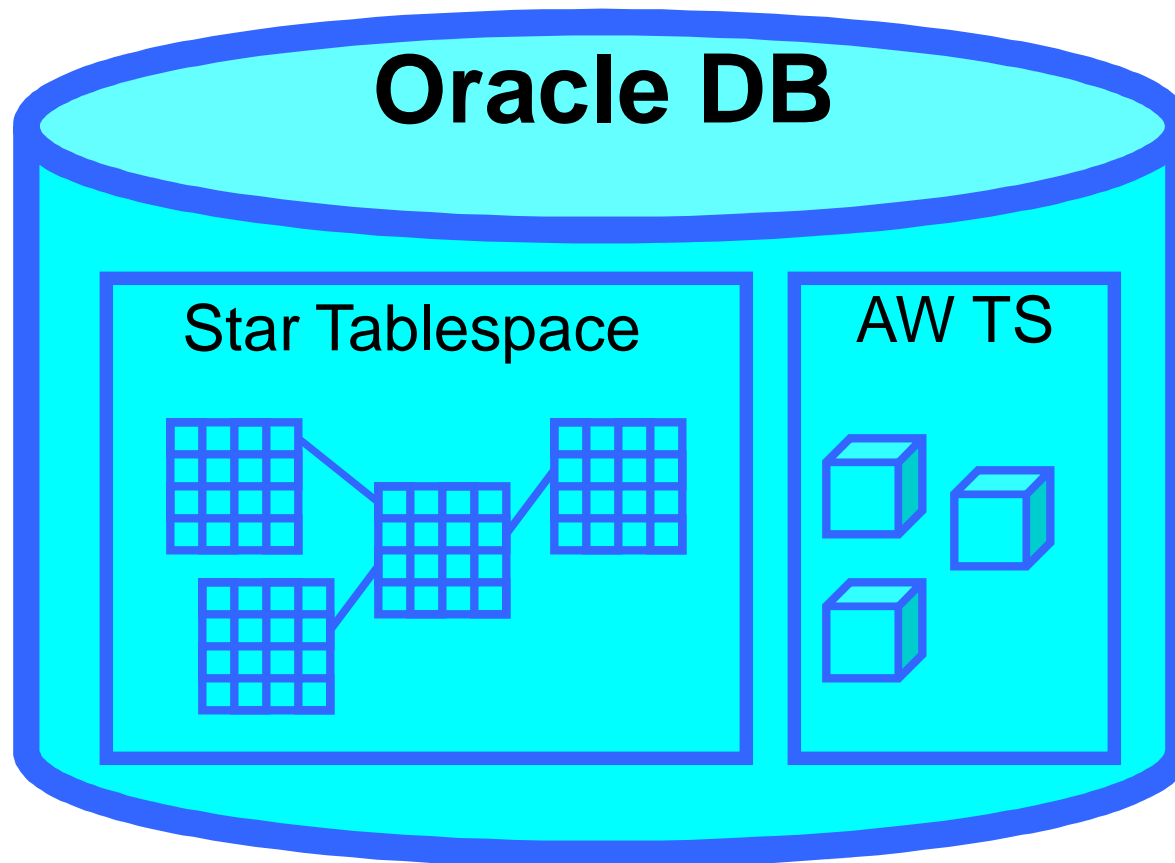


ROLAP vs. MOLAP

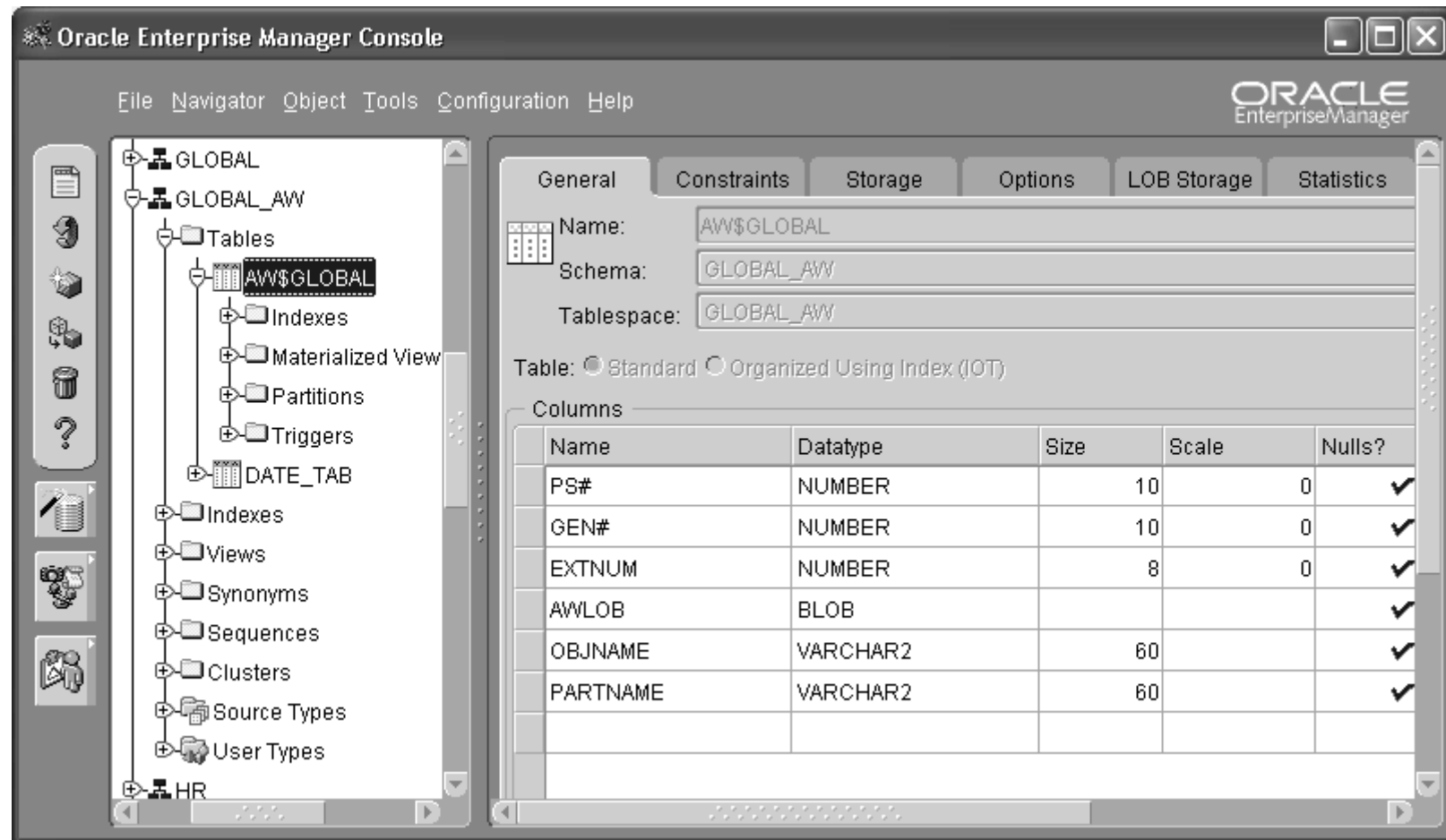
- What is ROLAP? (Relational)
- What is MOLAP? (Multidimensional)
- It's all in how the data is stored



Analytic Workspaces Are Stored in Tablespaces in OLAP



What is an Analytic Workspace?



Managing Analytic Workspaces

The screenshot shows the 'Analytic Workspace Manager' window with the title bar 'dantoshm2:1521:orcl Model View'. The interface includes a menu bar (File, View, Tools, Help) and a tree view on the left. The tree view shows a hierarchy starting with 'GLOBAL', followed by 'GLOBAL_AW', 'Analytic Workspaces', and 'GLOBAL (attached RW)'. Under 'GLOBAL (attached RW)', there are folders for 'Dimensions', 'Cubes', and 'Measures'. The 'Dimensions' folder is expanded, showing 'CHANNEL', 'CUSTOMER', 'PRODUCT', and 'TIME'. The 'Cubes' folder is also expanded, showing 'SALES_CUBE' and 'PRICE_AND_COST'. The 'Measures' folder is expanded, showing 'SALES', 'UNITS', 'BASE_COST', 'COST', and 'BASE_PRICE'.

Dimensions:

Name	Long Description	Type
CHANNEL	Channel	User
CUSTOMER	Customer	User
PRODUCT	Product	User
TIME	Time	Time

Cubes:

Name	Long Descri...	Dimensions
SALES_CUBE	Sales Cube	TIME,CUSTOMER,PRODUCT,CHANNEL
PRICE_AND_CO...	PRICE AND ...	TIME,PRODUCT

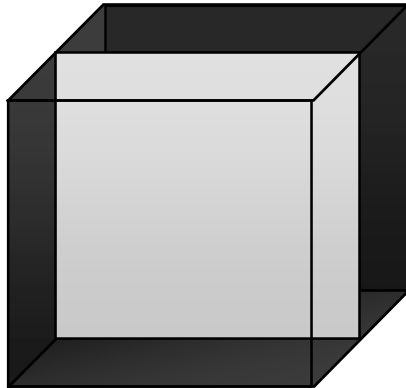
Measures:

Name	Cube
SALES	SALES_CUBE
UNITS	SALES_CUBE
BASE_COST	SALES_CUBE
COST	SALES_CUBE
BASE_PRICE	SALES_CUBE

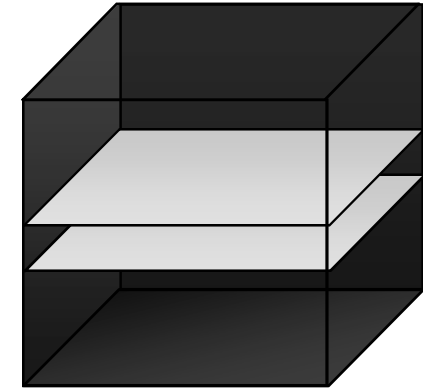


OLAP AW Stores Data in Cubes

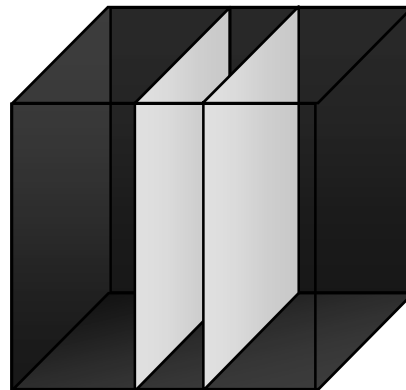
Fast Flexible Access to Summarized Data



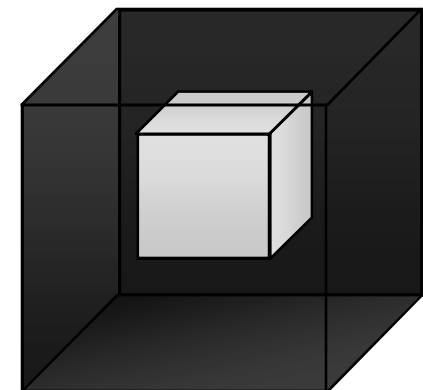
Product Mgr. View



Regional Mgr. View



Financial Mgr. View



Ad Hoc View



What Are AW Cubes?

- Data stored as arrays
- Dimension values are internally integers
- Offset calculated using simple multiplication
- Offset tells exactly where to look for data
- Pages and segmentation complicate design
- Conjoins and composites handle sparsity



Dimensions

- Definition:
- Dimensions are collections of keys or lookup values that allow for querying and subsetting data.
- Dimensions can be flat, parent-child or hierarchical in nature
- Examples:
 - Time (year,quarter, month, day)
 - Geography (continent,region,country,state)
 - Product(all products, division, group, class, item)

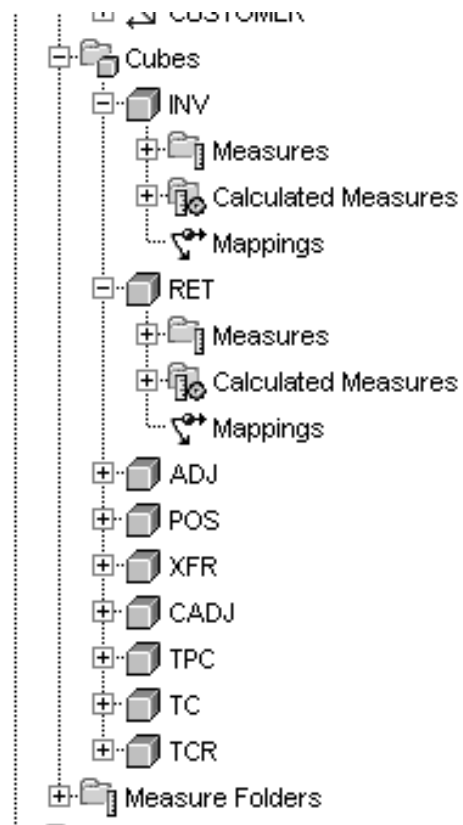


Cubes Defined

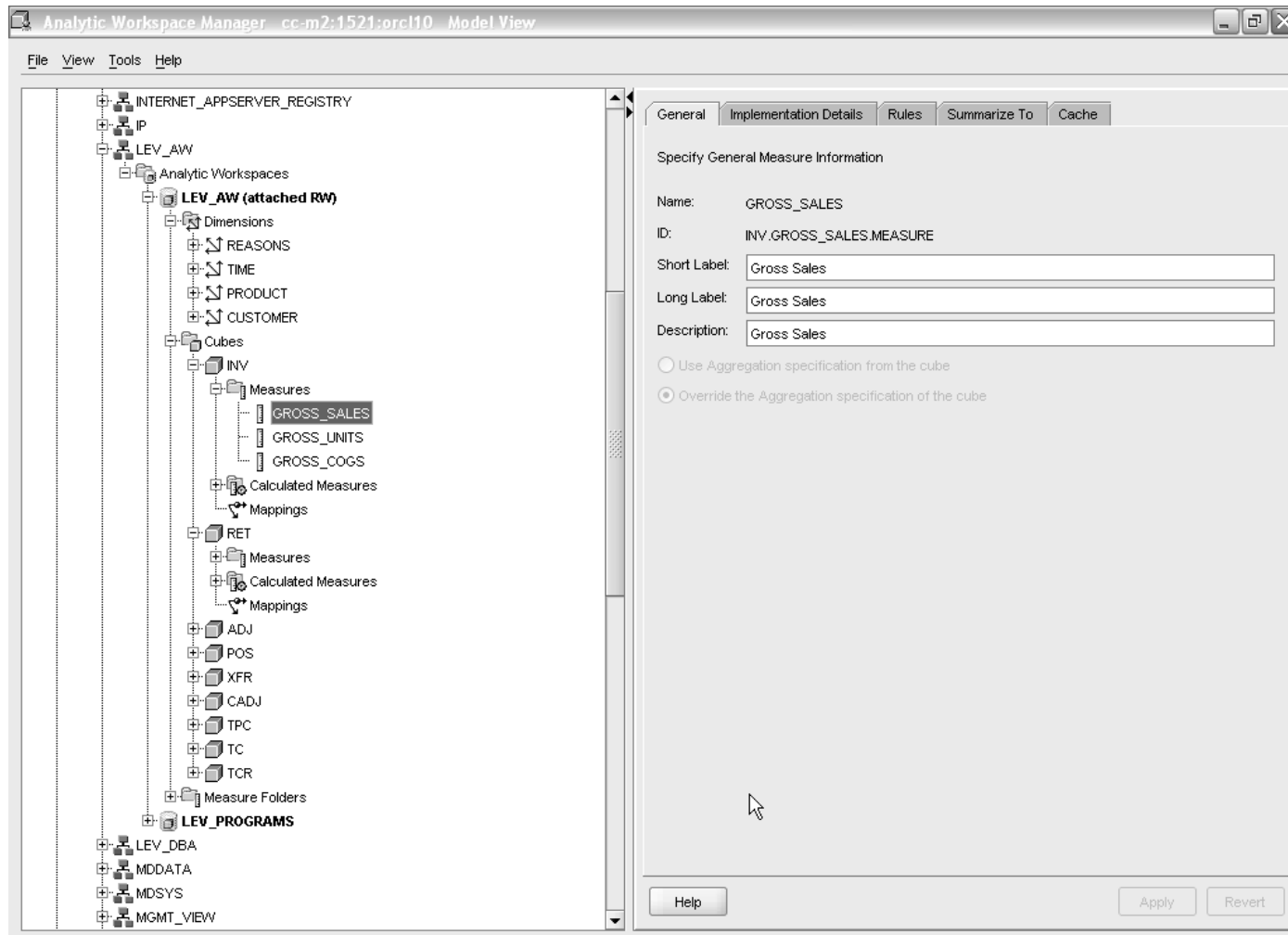
- Definition:
- Cubes are collections of measures. They are a logical way to organize data. All measures in a cube share the same dimensionality
- Examples:
 - Sales_Cube (with Units, Dollars, Profit)
 - Finance_Cube (with Actual, Budget, Variance)



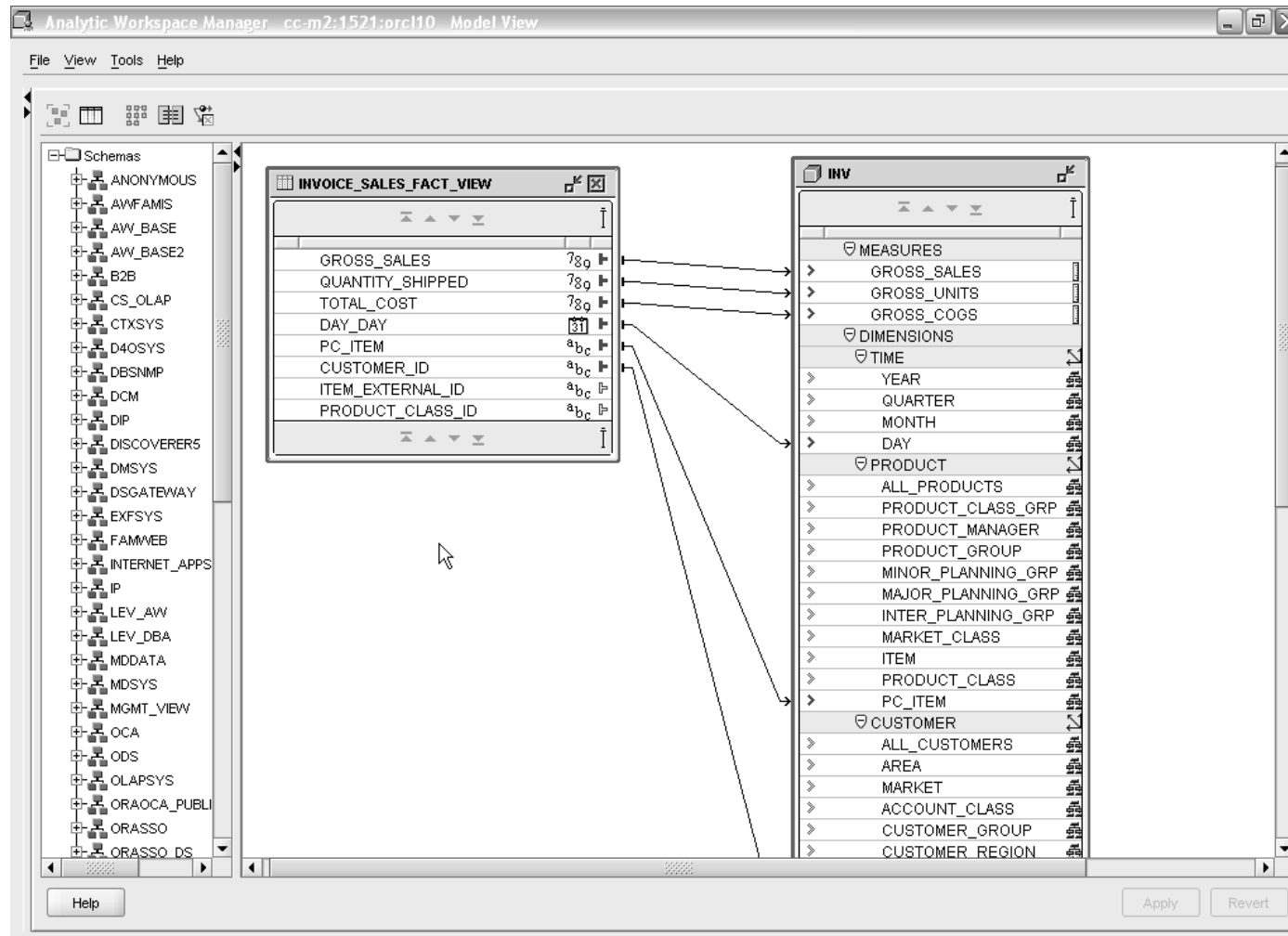
Cubes in AWM



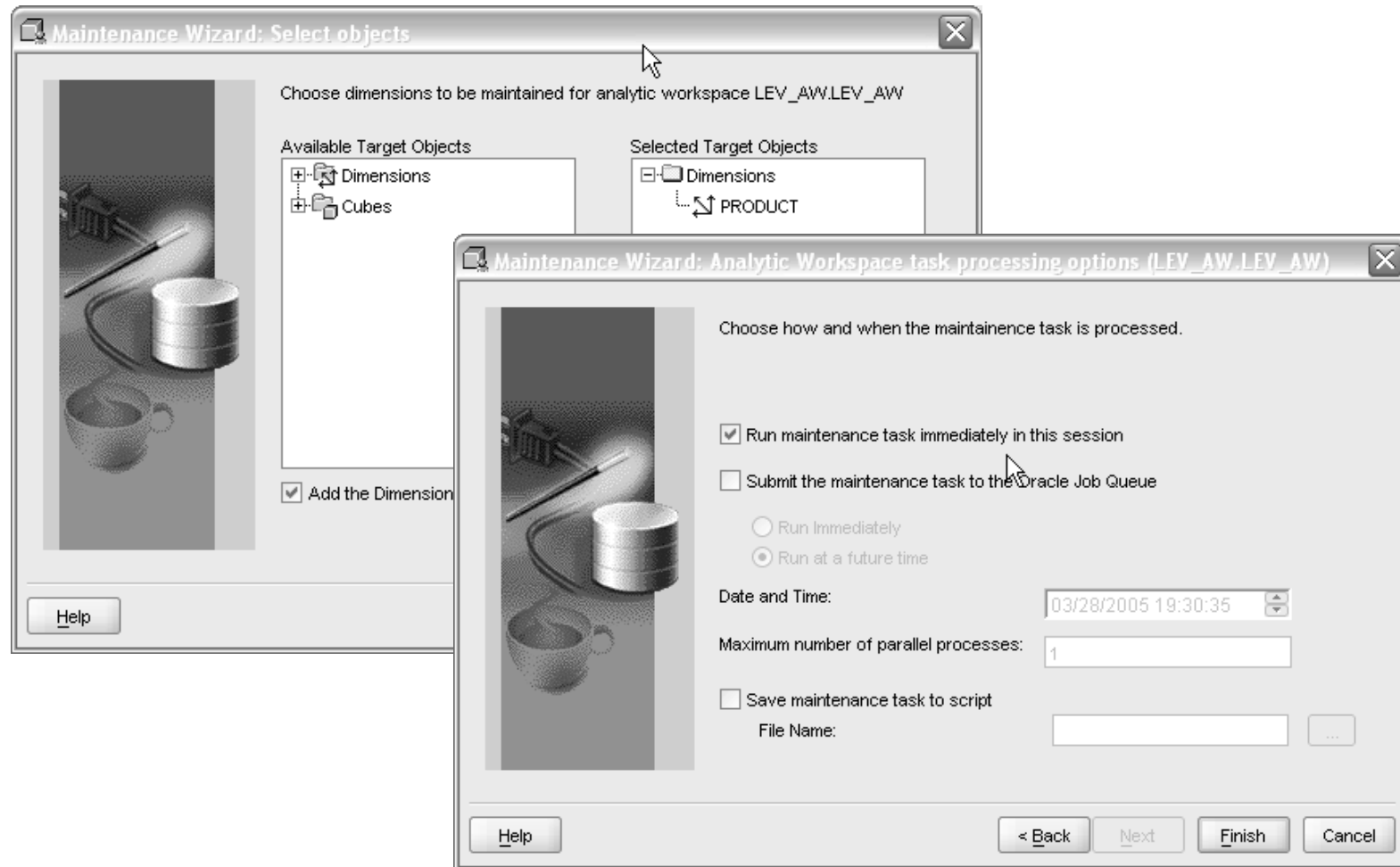
Define Measures



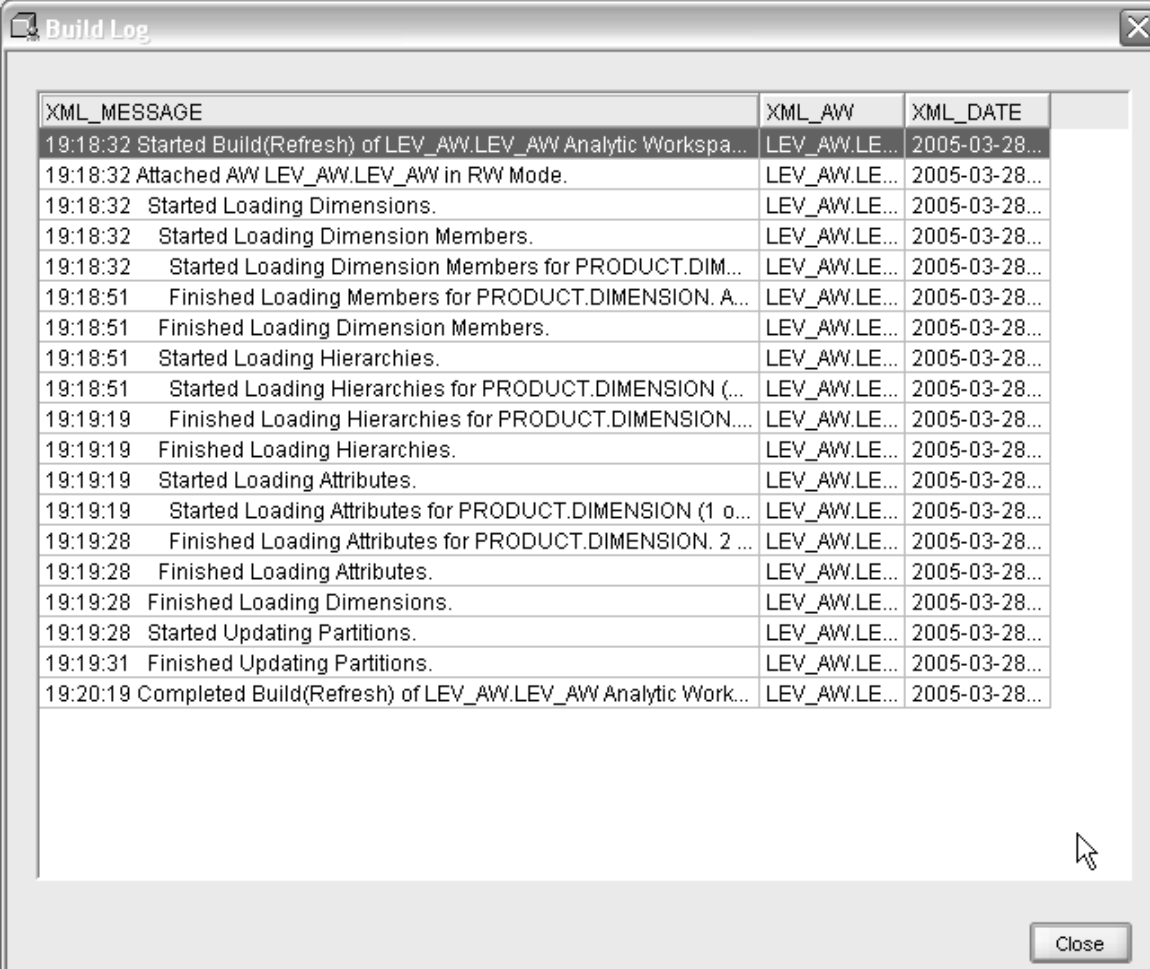
Map Cube



Maintaining Dims/Cubes



Maintaining Dims/Cubes



The image shows a 'Build Log' window with a table of messages. The table has three columns: XML_MESSAGE, XML_AW, and XML_DATE. The messages describe the steps of a build process, including starting and finishing loading dimensions, dimension members, hierarchies, and attributes, as well as updating partitions. The process is completed at 19:20:19.

XML_MESSAGE	XML_AW	XML_DATE
19:18:32 Started Build(Refresh) of LEV_AW.LEV_AW Analytic Workspa...	LEV_AW.LE...	2005-03-28...
19:18:32 Attached AW LEV_AW.LEV_AW in RW Mode.	LEV_AW.LE...	2005-03-28...
19:18:32 Started Loading Dimensions.	LEV_AW.LE...	2005-03-28...
19:18:32 Started Loading Dimension Members.	LEV_AW.LE...	2005-03-28...
19:18:32 Started Loading Dimension Members for PRODUCT.DIM...	LEV_AW.LE...	2005-03-28...
19:18:51 Finished Loading Members for PRODUCT.DIMENSION. A...	LEV_AW.LE...	2005-03-28...
19:18:51 Finished Loading Dimension Members.	LEV_AW.LE...	2005-03-28...
19:18:51 Started Loading Hierarchies.	LEV_AW.LE...	2005-03-28...
19:18:51 Started Loading Hierarchies for PRODUCT.DIMENSION (...)	LEV_AW.LE...	2005-03-28...
19:19:19 Finished Loading Hierarchies for PRODUCT.DIMENSION....	LEV_AW.LE...	2005-03-28...
19:19:19 Finished Loading Hierarchies.	LEV_AW.LE...	2005-03-28...
19:19:19 Started Loading Attributes.	LEV_AW.LE...	2005-03-28...
19:19:19 Started Loading Attributes for PRODUCT.DIMENSION (1 o...	LEV_AW.LE...	2005-03-28...
19:19:28 Finished Loading Attributes for PRODUCT.DIMENSION. 2 ...	LEV_AW.LE...	2005-03-28...
19:19:28 Finished Loading Attributes.	LEV_AW.LE...	2005-03-28...
19:19:28 Finished Loading Dimensions.	LEV_AW.LE...	2005-03-28...
19:19:28 Started Updating Partitions.	LEV_AW.LE...	2005-03-28...
19:19:31 Finished Updating Partitions.	LEV_AW.LE...	2005-03-28...
19:20:19 Completed Build(Refresh) of LEV_AW.LEV_AW Analytic Work...	LEV_AW.LE...	2005-03-28...



Looking at OLAP 11g

- Oracle 11g is currently Available limited to SQL access today!
- Oracle OLAP has many NEW things
 - New CUBE_TABLE function in SQL
 - Tight integration with SQL
(automatically generated views)
 - Tight integration with data dictionary
 - New Calc Wizard in AWM!
 - Easier to use and deploy
 - Ability to use OLAP for Materialized views
(get MUCH FASTER response times!)



OLAP 11g Changes

- New CUBE_TABLE function simplifies access to AW data (replacing OLAP_TABLE)

The screenshot displays the Oracle SQL Developer environment. On the left, the 'Connections' tree shows a hierarchy: 'stack07 - global' > 'stack07 - global - main3' > 'Views' > 'CUSTOMER_SHIPMENTS_VIEW'. The main window is titled 'stack07 - global - main3' and shows the 'CUSTOMER_SHIPMENTS_VIEW' selected. The 'Enter SQL Statement' pane contains the query: `SELECT * FROM TABLE(CUBE_TABLE('GLOBAL.CUSTOMER;SHIPMENTS'));`. Below the query, a blue rectangular box highlights the results area. The 'Results' pane at the bottom shows a table with 6 columns: REGION, WAREHOUSE, SHIP_TO, LEVEL_NAME, and LONG_DESCRIPTION. The data is as follows:

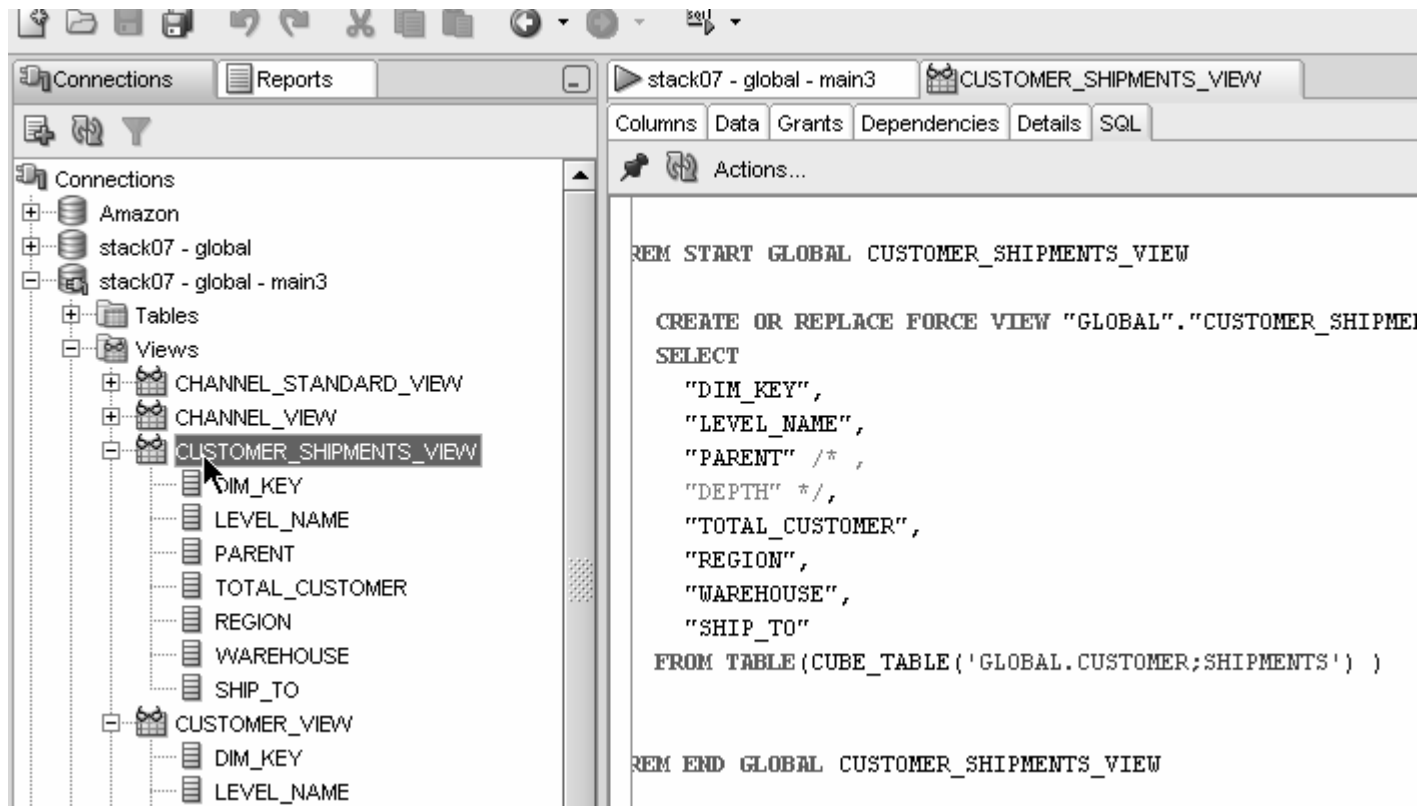
	REGION	WAREHOUSE	SHIP_TO	LEVEL_NAME	LONG_DESCRIPTION
1		(null)	(null)	REGION	Europe
2		(null)	(null)	REGION	North America
3		(null)	(null)	REGION	Asia Pacific
4	20		99	SHIP_TO	UK Env Dept Glasgow

Standard Disclaimer – Beta software! No promises!



OLAP 11g Changes

- Views automatically created for SQL access to AWs – Dimensions and Cubes!

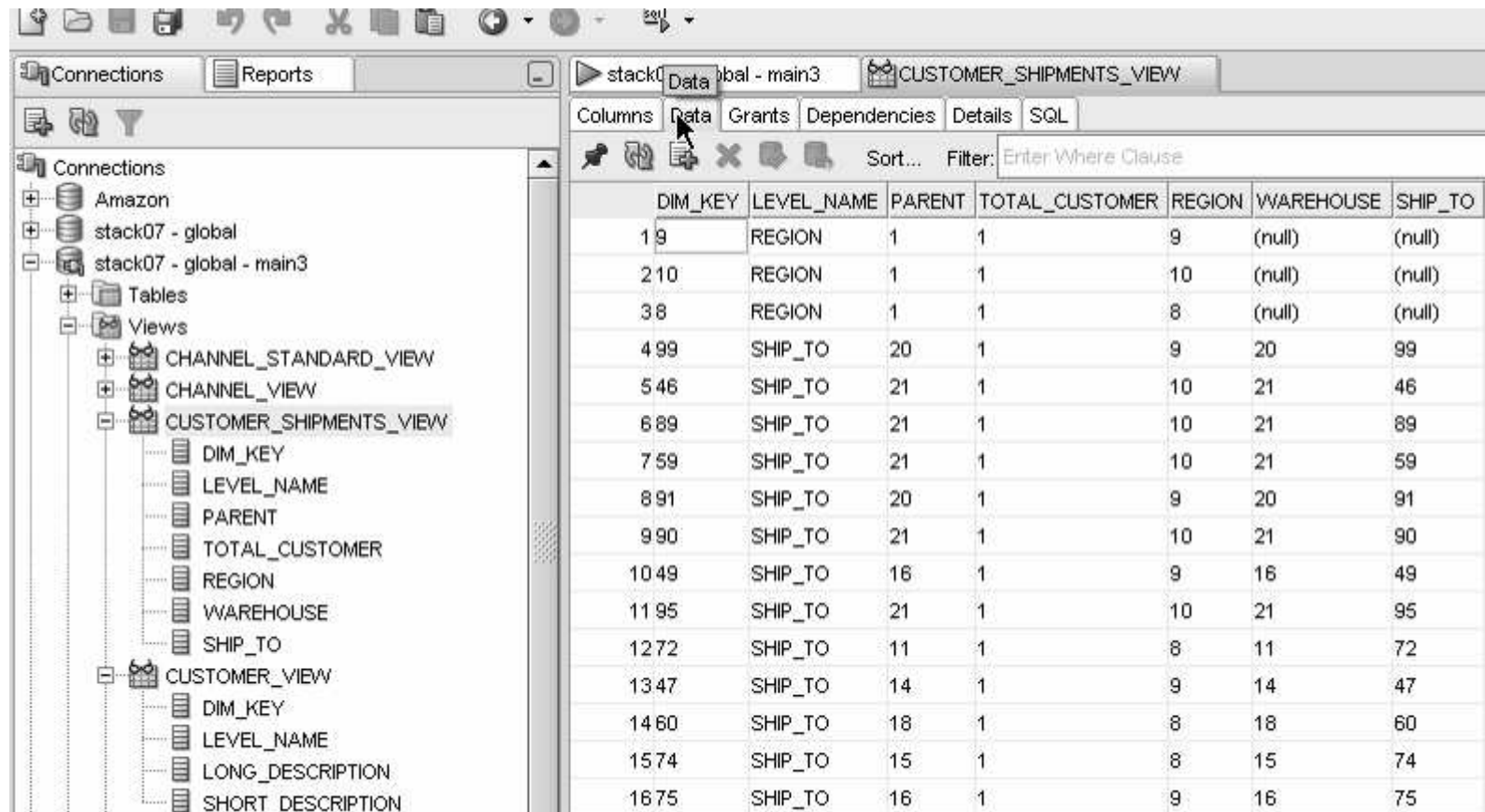


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OLAP 11g Changes

- Views easily accessed from SQL Developer



The screenshot shows the SQL Developer interface. On the left, the 'Connections' pane shows a tree structure with 'Amazon' and 'stack07 - global' connections. Under 'stack07 - global - main3', there are 'Tables' and 'Views'. The 'Views' folder is expanded, showing 'CHANNEL_STANDARD_VIEW', 'CHANNEL_VIEW', and 'CUSTOMER_SHIPMENTS_VIEW'. The 'CUSTOMER_SHIPMENTS_VIEW' is selected, and its columns are listed: DIM_KEY, LEVEL_NAME, PARENT, TOTAL_CUSTOMER, REGION, WAREHOUSE, and SHIP_TO. On the right, the 'Data' tab is active, displaying a table with 16 rows of data. The columns are DIM_KEY, LEVEL_NAME, PARENT, TOTAL_CUSTOMER, REGION, WAREHOUSE, and SHIP_TO. The data is as follows:

DIM_KEY	LEVEL_NAME	PARENT	TOTAL_CUSTOMER	REGION	WAREHOUSE	SHIP_TO
1 9	REGION	1	1	9	(null)	(null)
2 10	REGION	1	1	10	(null)	(null)
3 8	REGION	1	1	8	(null)	(null)
4 99	SHIP_TO	20	1	9	20	99
5 46	SHIP_TO	21	1	10	21	46
6 89	SHIP_TO	21	1	10	21	89
7 59	SHIP_TO	21	1	10	21	59
8 91	SHIP_TO	20	1	9	20	91
9 90	SHIP_TO	21	1	10	21	90
10 49	SHIP_TO	16	1	9	16	49
11 95	SHIP_TO	21	1	10	21	95
12 72	SHIP_TO	11	1	8	11	72
13 47	SHIP_TO	14	1	9	14	47
14 60	SHIP_TO	18	1	8	18	60
15 74	SHIP_TO	15	1	8	15	74
16 75	SHIP_TO	16	1	9	16	75

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OLAP 11g Changes

- Automatic views accessible from AWM

The screenshot displays the Oracle AWM (Analytic Workspace Manager) interface. On the left, a tree view shows the hierarchy: **abases** > **stack07 (global)** > **Schemas** > **GLOBAL** > **Analytic Workspaces** > **GLOBAL (attached RW)** > **Dimensions** > **CHANNEL**. The **CHANNEL** dimension is expanded, showing sub-nodes: **Levels** (with **TOTAL_CHANNEL** and **CHANNEL**), **Hierarchies** (with **STANDARD**), **Attributes**, **Unique Key Attributes**, **Mappings**, **Views** (with **CHANNEL_VIEW - [Dimension ET]** and **VIEWNAME - [Hierarchy: STANDARD]**), and **Data Security**. The **Views** folder is highlighted with a blue box. On the right, the **General** tab is active, showing **Specify View Information**. The **Dimension Name** is **CHANNEL**, the **Hierarchy Name** is **STANDARD**, and the **View Name** is empty. Below this, a table lists the columns and their data types and object types.

Column Name	Data Type	Object Type
DIM_KEY	VARCHAR2	Key
LEVEL_NAME	VARCHAR2	Level Name
PARENT	VARCHAR2	Parent
TOTAL_CHANNEL	VARCHAR2	Hierarchy Level
CHANNEL	VARCHAR2	Hierarchy Level



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Collaborate 2009

OLAP 11g Changes

- Query Rewrite knows about AWs now

The screenshot shows the 'Materialized Views' tab in the Oracle OLAP 11g configuration window. The window has several tabs: General, Translations, Implementation Details, Materialized Views, Rules, Summarize To, and Cache. The 'Materialized Views' tab is selected.

Choose this option to manage refresh of the cube with the Materialized View refresh system

☐ Enable Materialized View Refresh of the cube

Choose how and when to refresh of the cube with the Materialized View refresh system

Refresh Method: Refresh Mode:

Start With:

Next Refresh:

Constraints: ☒ Trusted ☐ Enforced

☐ Parallel: Degree of Parallelism:

Choose this option to allow queries on the source tables of the cube to be automatically rewritten to use summary data in the cube

☐ Enable the Query Rewrite Materialized View

Materialized View Implementation Details

☒ Refresh ☐ Rewrite

☒ Compatibility Check list ☐ Materialized View details

Status	Object	Check
--------	--------	-------



OLAP 11g Changes

- Optimizer pushes joins down to AW
- Enables efficient non-OLAP-aware SQL queries

The screenshot displays the Oracle SQL Developer interface. The top pane shows a SQL query with a blue box highlighting the WHERE clause. The bottom pane shows the execution plan with a tree view on the left and a table on the right.

```
FROM time_view t,  
product_view p,  
customer_view cu,  
channel_view ch,  
units_cube_view f  
WHERE t.dim_key = f.TIME  
AND p.dim_key = f.product  
AND cu.dim_key = f.customer  
AND ch.dim_key = f.channel  
AND t.long_description = '2000'  
AND p.long_description = 'Total Product'  
AND cu.long_description = 'All Customers'
```

Operation	Optimizer	Cost	Cardinality	Bytes	Part
SELECT STATEMENT	ALL_ROWS	1028	1	520	
HASH JOIN		1028	1	520	
MERGE JOIN(CARTESIAN)		407	1	380	
MERGE JOIN(CARTESIAN)		305	1	240	
MERGE JOIN(CARTESIAN)		203	1	160	
CUBE SCAN(OUTER) GLOBAL.CHANNEL					
BUFFER(SORT)		102	1	80	
CUBE SCAN(OUTER) GLOBAL.PRODUCT					
BUFFER(SORT)		102	1	80	



OLAP 11g Changes

- Views are stored in Oracle Dictionary
- Notice in SYS.USER_DIMENSION_VIEWS

The screenshot displays the Oracle SQL Developer interface. On the left, the 'Connections' tree shows the 'stack07 - global - main3' connection expanded, with 'Views' further expanded. The 'CUSTOMER_SHIPMENTS_VIEW' is highlighted. The main window shows the 'Enter SQL Statement' area with the query: `select * from sys.user_dimension_views;`. Below the query, the 'Results' tab is active, showing a table with 4 rows and 4 columns: DIMENSION_NAME, VIEW_OWNER, VIEW_NAME, and VIEW_TYPE. The results are as follows:

	DIMENSION_NAME	VIEW_OWNER	VIEW_NAME	VIEW_TYPE
1	TIME	GLOBAL	TIME_VIEW	ET
2	CHANNEL	GLOBAL	CHANNEL_VIEW	ET
3	PRODUCT	GLOBAL	PRODUCT_VIEW	ET
4	CUSTOMER	GLOBAL	CUSTOMER_VIEW	ET



OLAP 11g Changes

- Cost-based presummarization balances aggregation time with performance

Create Cube

General | Translations | Implementation Details | Materialized Views | Rules | Summarize To | Cache

Presummarization
Select the type of presummarization you wish to use

☐ No presummarization

☒ Cost-based presummarization

Percentage: 21

☐ Level-Based Presummarization

Choose the regions of the cube to be presummarized and stored in the analytic workspace.

Dimension:

Dimension	Levels
TIME	<input type="checkbox"/> ALL_TIMES
CUSTOMER	<input type="checkbox"/> CALENDAR_YEAR
PRODUCT	<input type="checkbox"/> MONTH
CHANNEL	<input type="checkbox"/> QUARTER



OLAP 11g Changes

- Native support for AWs with skip level and ragged hierarchies

Create Hierarchy

General Translations

Specify General Hierarchy Information

Name: CALENDAR_YEAR_HIER

Short Label: Calendar Year Hier

Long Label: Calendar Year Hier

Description: Calendar Year Hier

☒ Set as Default Hierarchy

☐ Skip Level

☐ Ragged

☒ Level Based Hierarchy ☐ Value Based Hierarchy



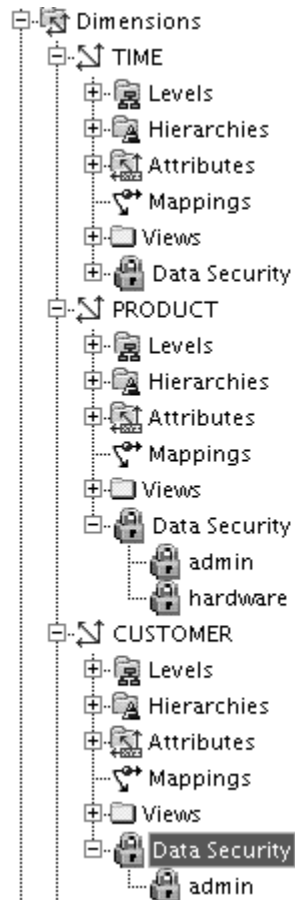
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OLAP 11g Changes

- Create security policies based on hierarchies



Create Data Security Policy

General Member Selection

Choose Product From: 'Primary' hierarchy

Available: Members Conditions

Selected: Steps Members

1. Start with Hardware

2. Add Descendants of Hardware

Create Data Security Policy

General Member Selection

Specify Data Security Policy Information

Data Security Policy Name: north america

Select the access privileges for each user or role below

User or Role	Type	Select	Insert
SCOTT	User	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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OLAP 11g Changes

- Calc Wizard replaced by powerful "complete the sentence" wizard
- Expression language more SQL-like
- EQs of Calculated Measures in 11g-format AWs "read-only"

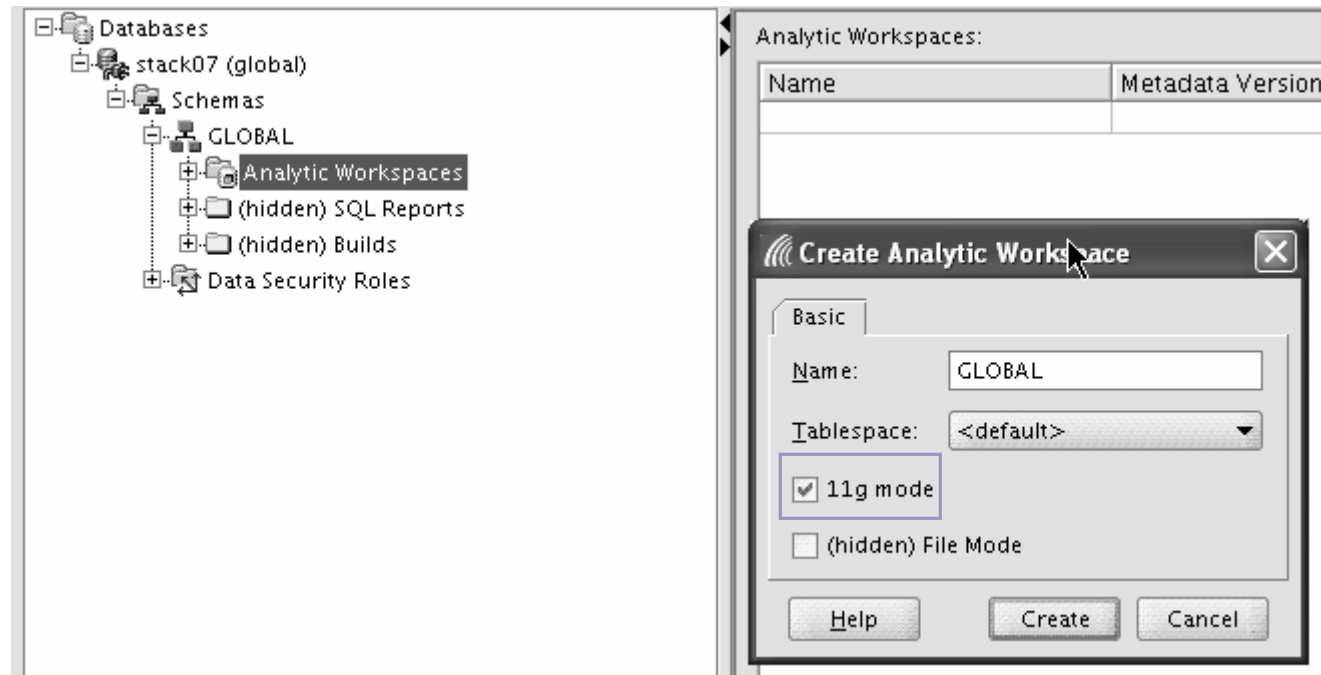
The screenshot shows a web-based interface for creating calculated measures. At the top, a dropdown menu labeled 'Choose a calculation type:' has 'Rank' selected. Below this, a large text area titled 'Calculation:' contains the following text: 'Rank members of the PRODUCT dimension and PRIMARY hierarchy based on measure UNITS_CUBE.UNITS (...). Calculate rank using RANK method with member's level in order lowest to highest.' A mouse cursor is hovering over the 'member's level' text, which has opened a dropdown menu with three options: 'member's level' (highlighted), 'member's parent', and 'member's ancestor'. At the bottom of the interface, there is an 'Expression:' label and a text box containing the SQL-like expression: 'RANK() OVER HIERARCHY (GLOBAL.PRODUCT.PRIMARY ORDER BY GLOBAL.UNITS_CUBE.UNITS WITHIN LEVEL)'. The interface has a light gray background and a simple, functional design.

Standard Disclaimer – Beta software! No promises!

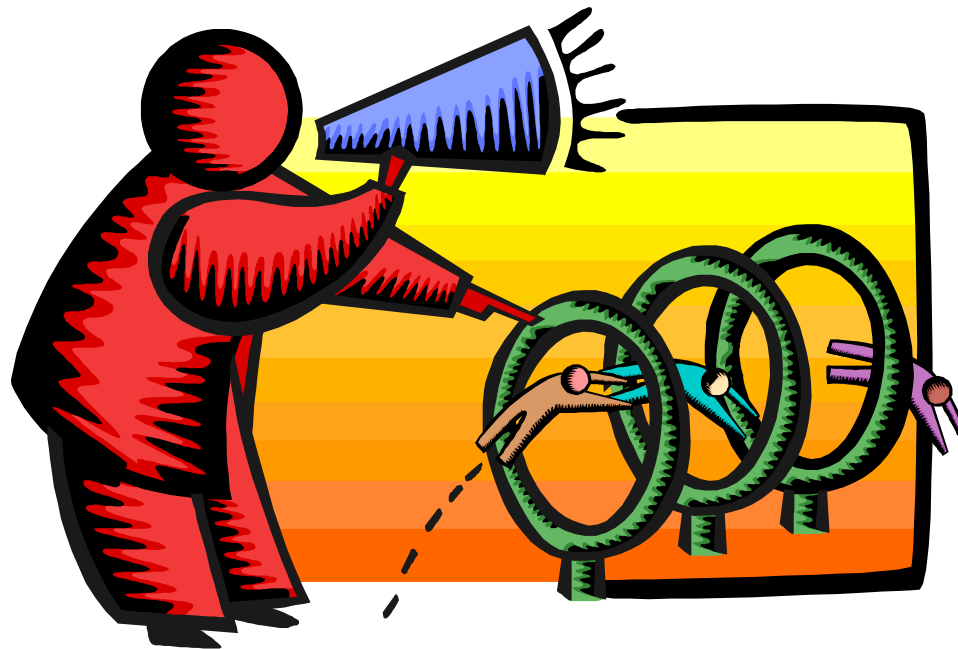


OLAP 11g Changes

- Can Create AWs in 11g mode (automatic views)
- If no 11g mode, have same flexibility as 10g



Building Cubes in AWM



AWM Cube Builder Tips

- Remember to save Everything to XML files
- Remember this is Realtime.... So changes are nearly immediate (may need to reload data)
- Use “View” to see results in tool – No Need for BI Beans to validate success!
- Move Measures to Folders
- Can save Calculated Measures to XML – Then you can Edit!



Getting the Data Out

- Once the Data is in OLAP how do we get the data out?
- Alternatives
 - BI Beans applications (Custom or pre-built)
 - Discoverer
 - Oracle Reports
 - SQL Access from any SQL tool
 - Spreadsheet Add-in
 - Any except Spreadsheet add-in can be in a portal and with web interface



What Access Tool?

- Java OLAP API designed for products
- Discoverer for ad hoc analysis
- BI Beans for custom applications (using JDev)
- Spreadsheet Add-in for access from Excel
- Oracle Reports for highly formatted reports
- Oracle Apps for analysis of Apps data
- Oracle BIEE
- BI Publisher
- 3rd Party tools fill in gaps



Changing Oracle BI Product Line

- Frontends
 - Oracle BI EE (Siebel)
 - Oracle BI SE (Discoverer, BI Beans)
 - Oracle BI SE One (stripped down Siebel)
- Backends
 - Oracle relational (and Disco Administrator)
 - Oracle OLAP cubes
 - Heterogeneous for BI EE (MS, SAP BW, etc.)



Editing Oracle BI Metadata

- Oracle Warehouse Builder (ETL, integrated)
- Discoverer Administrator (Discoverer)
- Analytic Workspace Manager (AWs)
- Oracle BI Administrator (OBI EE)

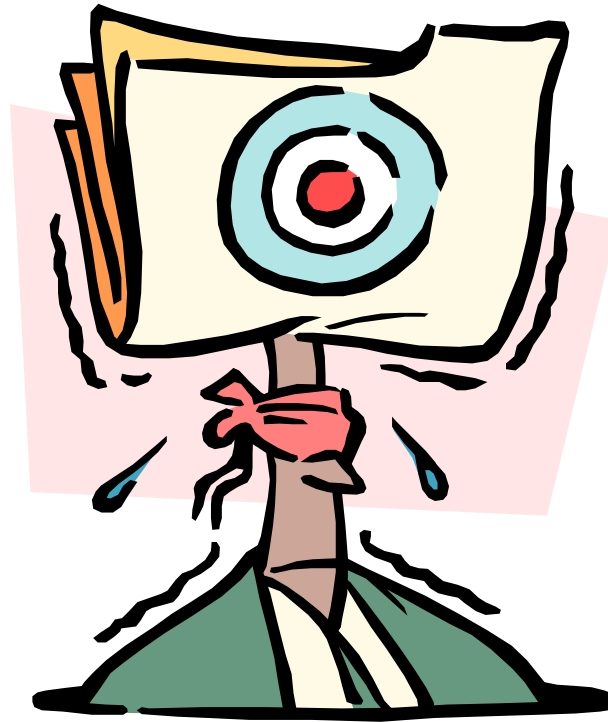


Further Information

- Oracle BI Sales
 - <http://www.oracle.com/bi>
- Oracle BI Technical
 - <http://www.oracle.com/technology/tech/bi/index.html>
- Oracle BI EE on top of Oracle OLAP
 - Collaborate 208: Using Oracle BI EE with Oracle OLAP Cubes on www.vlamis.com/presentations
- VMWare image with Demo environment
 - Send dvlamis@vlamis.com an email
- Oracle OLAP and AWM Sales
 - http://www.oracle.com/solutions/business_intelligence/olap.html
- Oracle OLAP Technical
 - <http://www.oracle.com/technology/products/bi/olap/index.html>

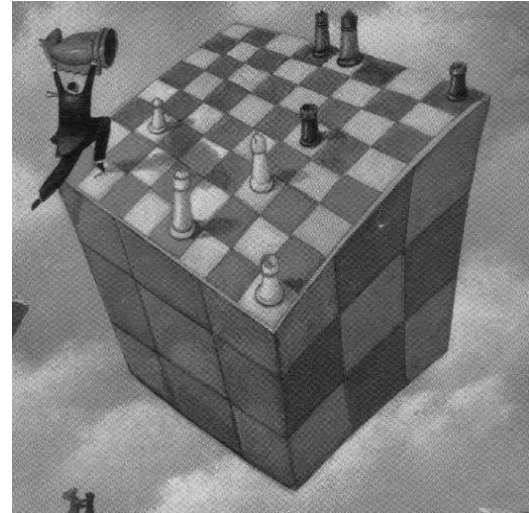


QUESTIONS?



Oracle Essbase & Oracle OLAP: A Guide to Oracle's Multidimensional Solution

- Published by Oracle Press – Late 2009
 - Dan Vlamis
 - Chris Claterbos
 - Michael Nader
 - David Collins
 - Floyd Conrad
 - Mitchell Campbell
 - Michael Schrader



- Cover both Oracle Essbase and Oracle OLAP Database Option
- 500 Pages
- Special Thanks to Kathy Horton



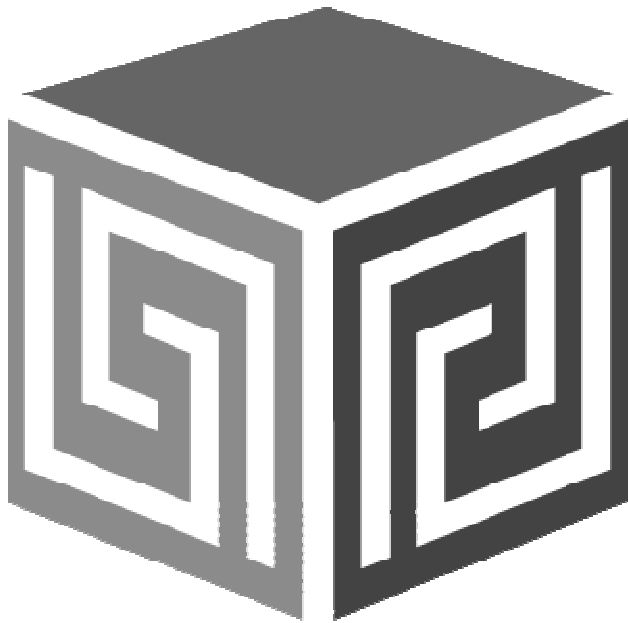
Oracle Essbase & Oracle OLAP: A Guide to Oracle's Multidimensional Solution - Outline

- WHY Need OLAP
- History
- Design and Overall Methodology
- Building your database (how to do it, step by step guide)
- Application of OLAP
- Keeping it Running (Care and Feeding?)
- Advanced Topics
- Real-world Examples
- Futures (Statement of direction, collaborate with product management)
- Appendices
- Bibliography
- Glossary
- Index



Building Cubes and Analyzing Data using Oracle OLAP 11g

**Collaborate '09
Session 252**



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