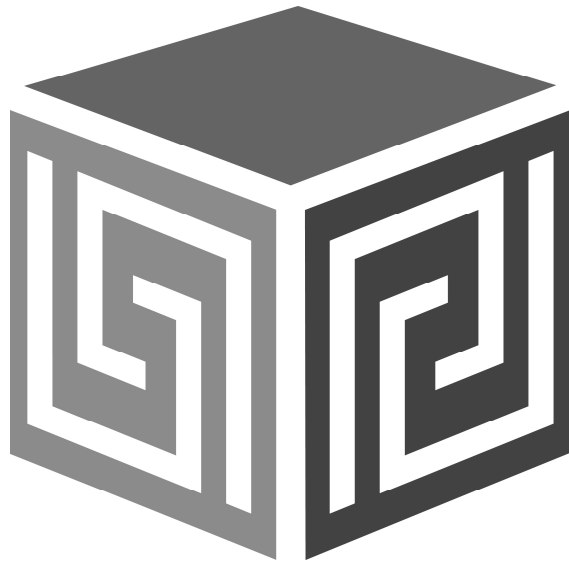# Building Cubes and Analyzing Data using Oracle OLAP 11g

Collaborate '09
Session 252

Chris Claterbos

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Vlamis Software Solutions, Inc.

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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
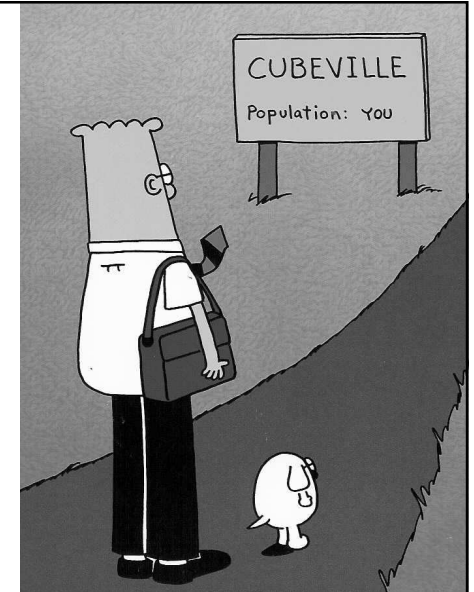- Expert presenter at major Oracle conferences

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).
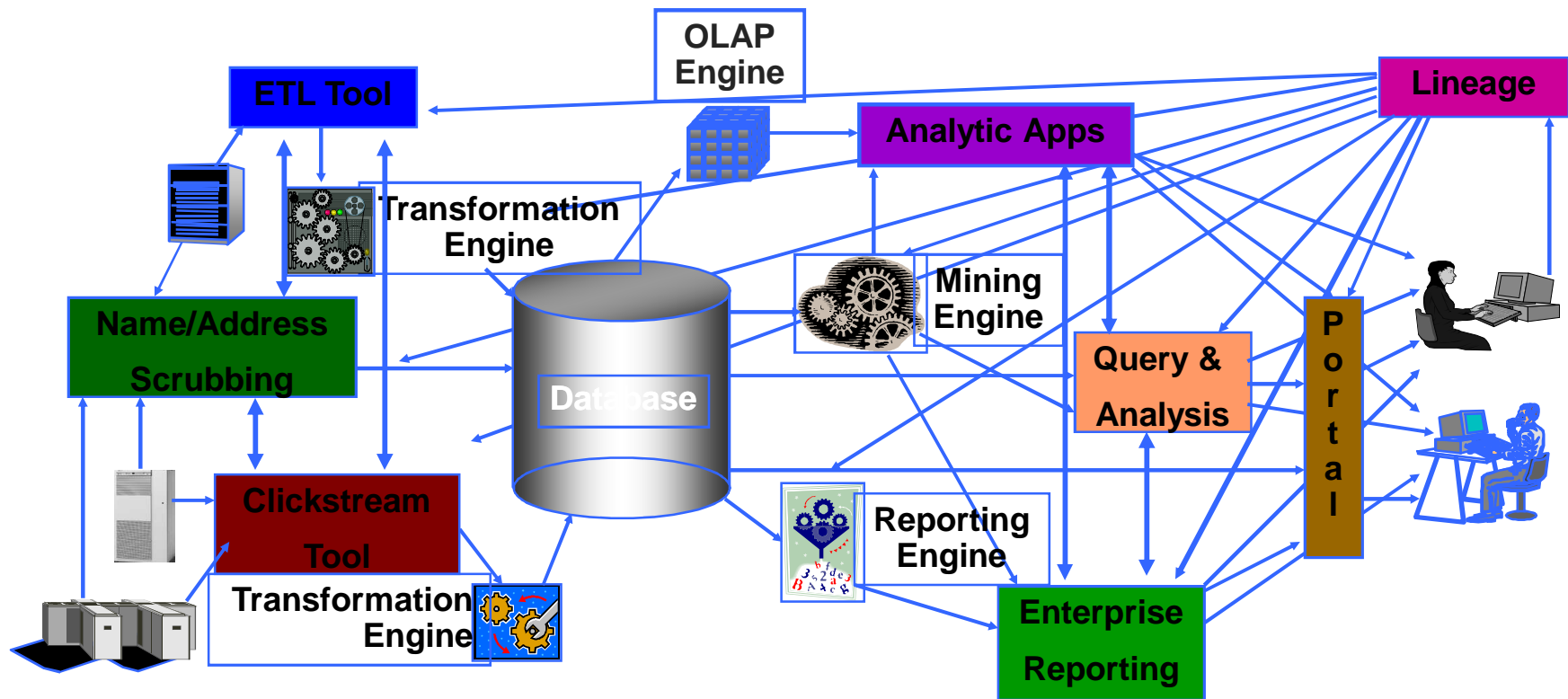 - Previous IOUG Focus Area Manager for Data Warehousing and BI

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

OLAP Engine

ETL Tool

Lineage

Analytic Apps

Transformation Engine

Name/Address Scrubbing

Mining Engine

Database

Query & Analysis

Portal

Clickstream Tool

Transformation Engine

Reporting Engine

Enterprise Reporting

- 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

Oracle BI Server

Simplified Business Model and Abstraction Layer

Intelligent Caching Services

Multidimensional Calculation and Integration Engine

Intelligent Request Generation and Optimized Data Access Services
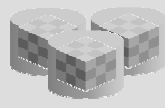
OLTP & ODS Systems	Data Warehouse Data Mart	SAP, Oracle PeopleSoft, Siebel, Custom Apps	Files Excel XML	Business Process
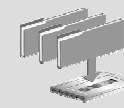
Demo of BI EE on Oracle OLAP
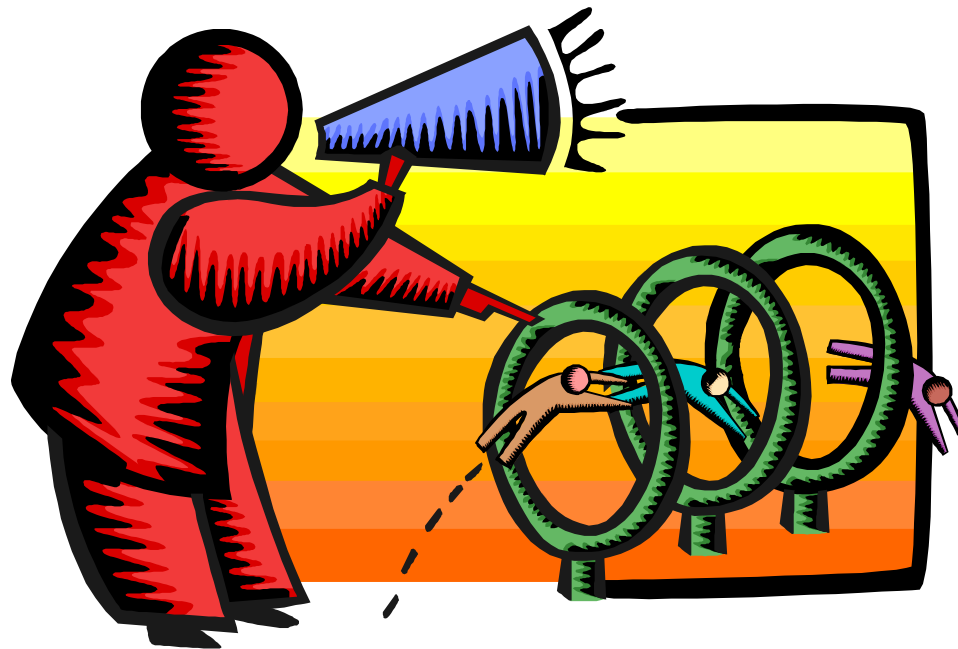
Definition of OLAP

- 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

Relational   **Multidimensional**
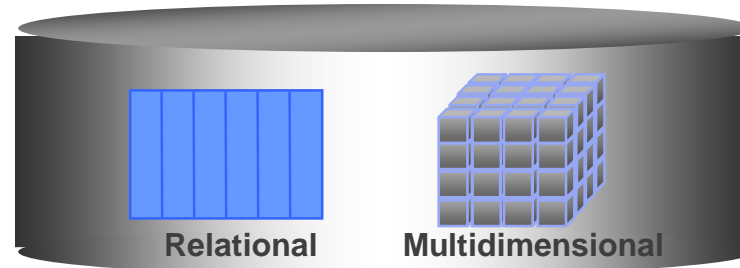
Analytic Workspaces Are Stored in Tablespaces in OLAP

Oracle DB

Star Tablespace

AW TS
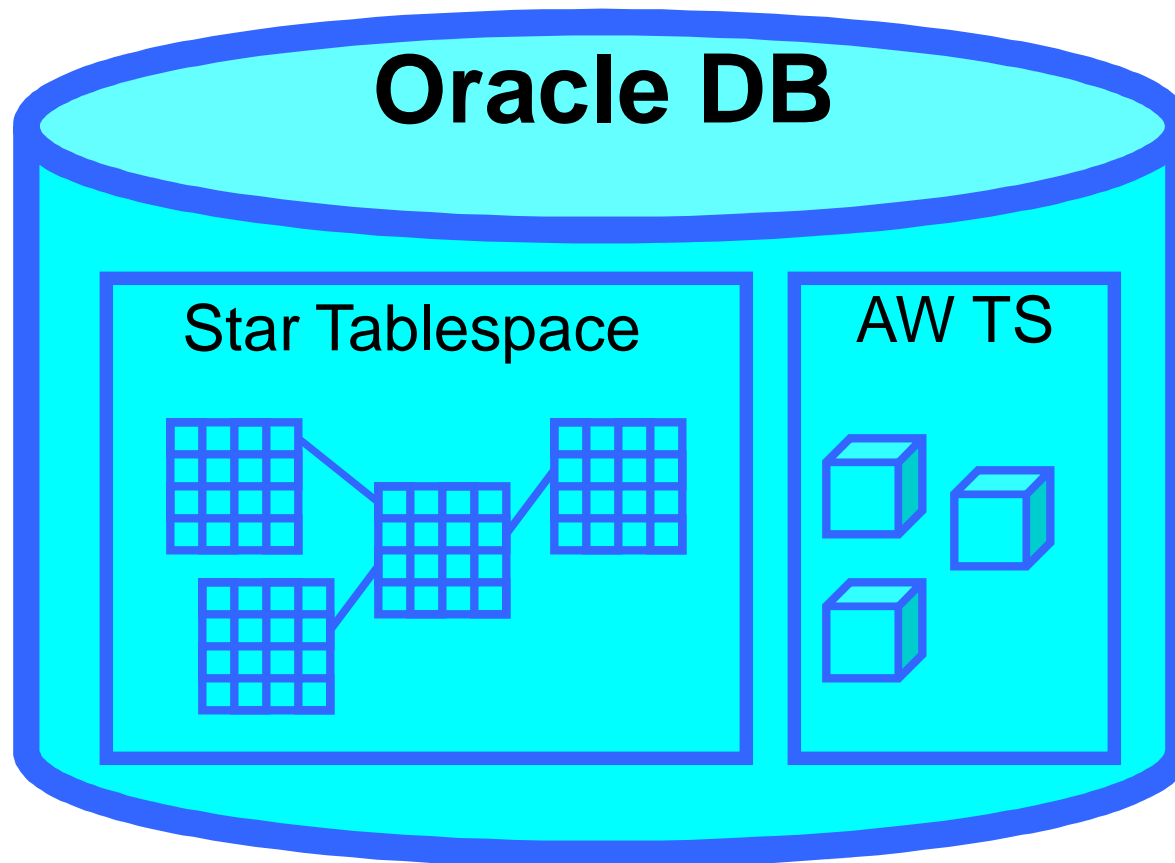
What is an Analytic Workspace?
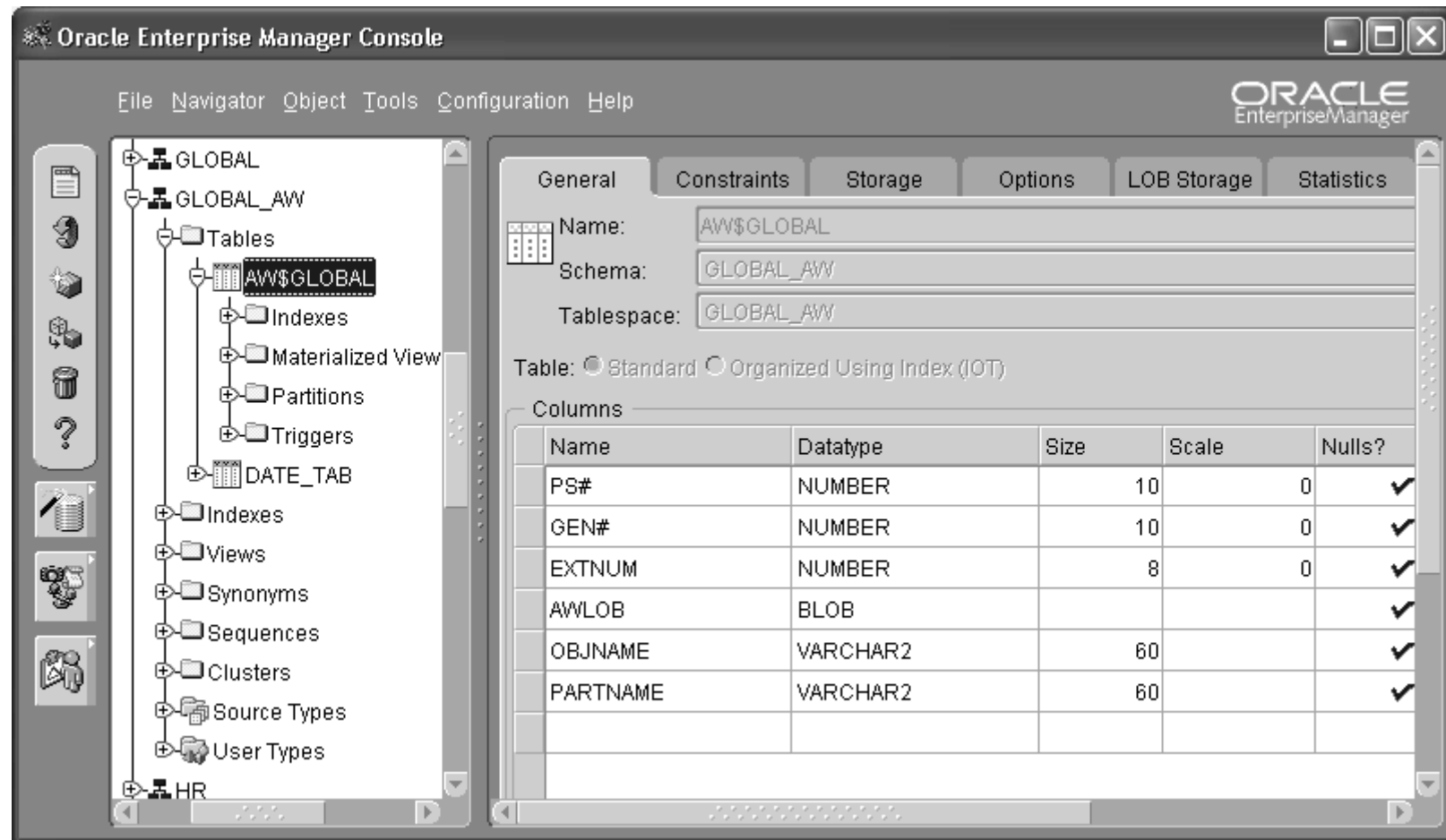
Managing Analytic Workspaces

OLAP AW Stores Data in Cubes

Fast Flexible Access to Summarized Data
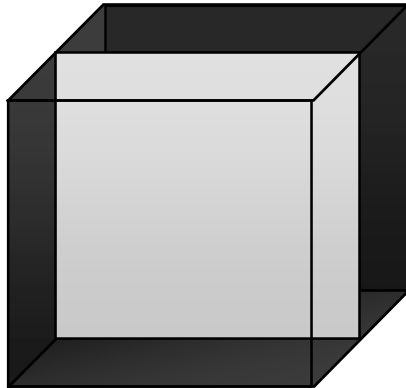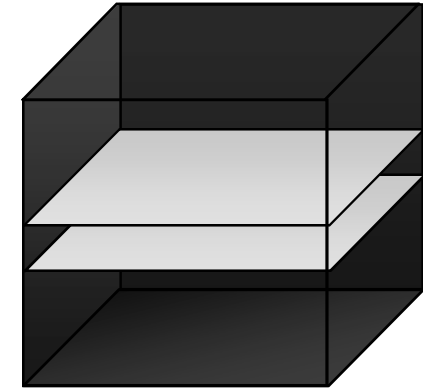
Product Mgr. View

Financial Mgr. View

PRODUCT

M A R K E T

SALES

TIME
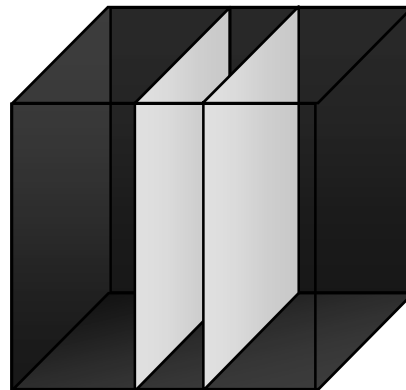
Regional Mgr. View
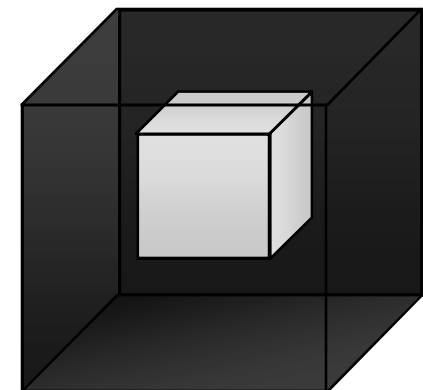
Ad Hoc View

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
- Conjoints and composites handle sparsity

Dimensions

- Definition:
- Dimensions are collections of keys or lookup values that allow for querying and subsettng data.
- Dimensions can be flat, parent-child or hierarchical in nature
- Examples:
  - Time (year,quarter, month, day)
  - Geograpy (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
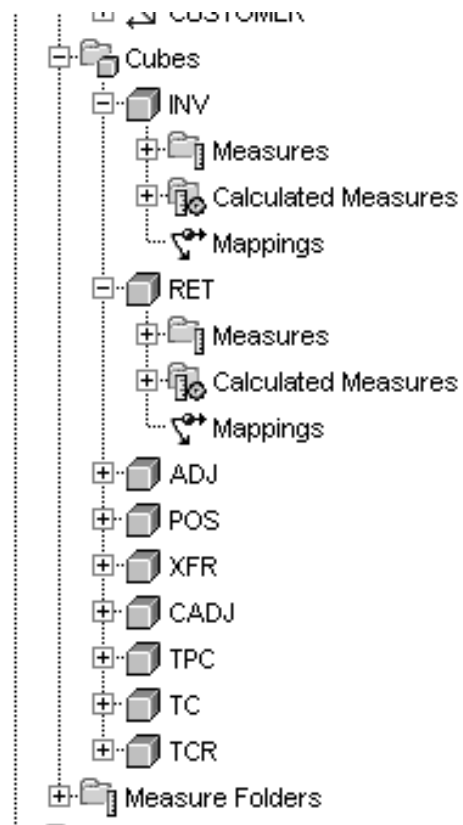
Define Measures

Map Cube

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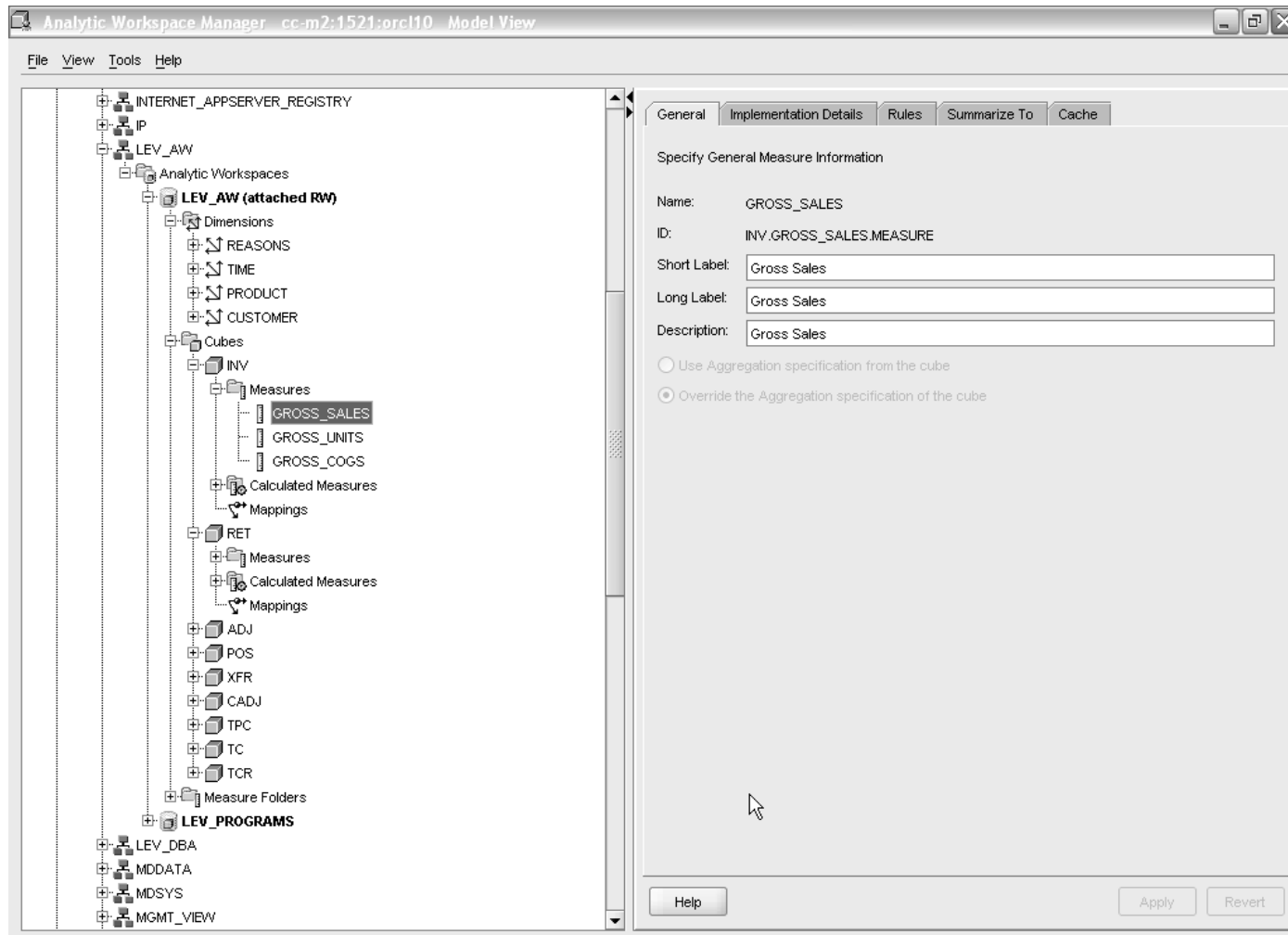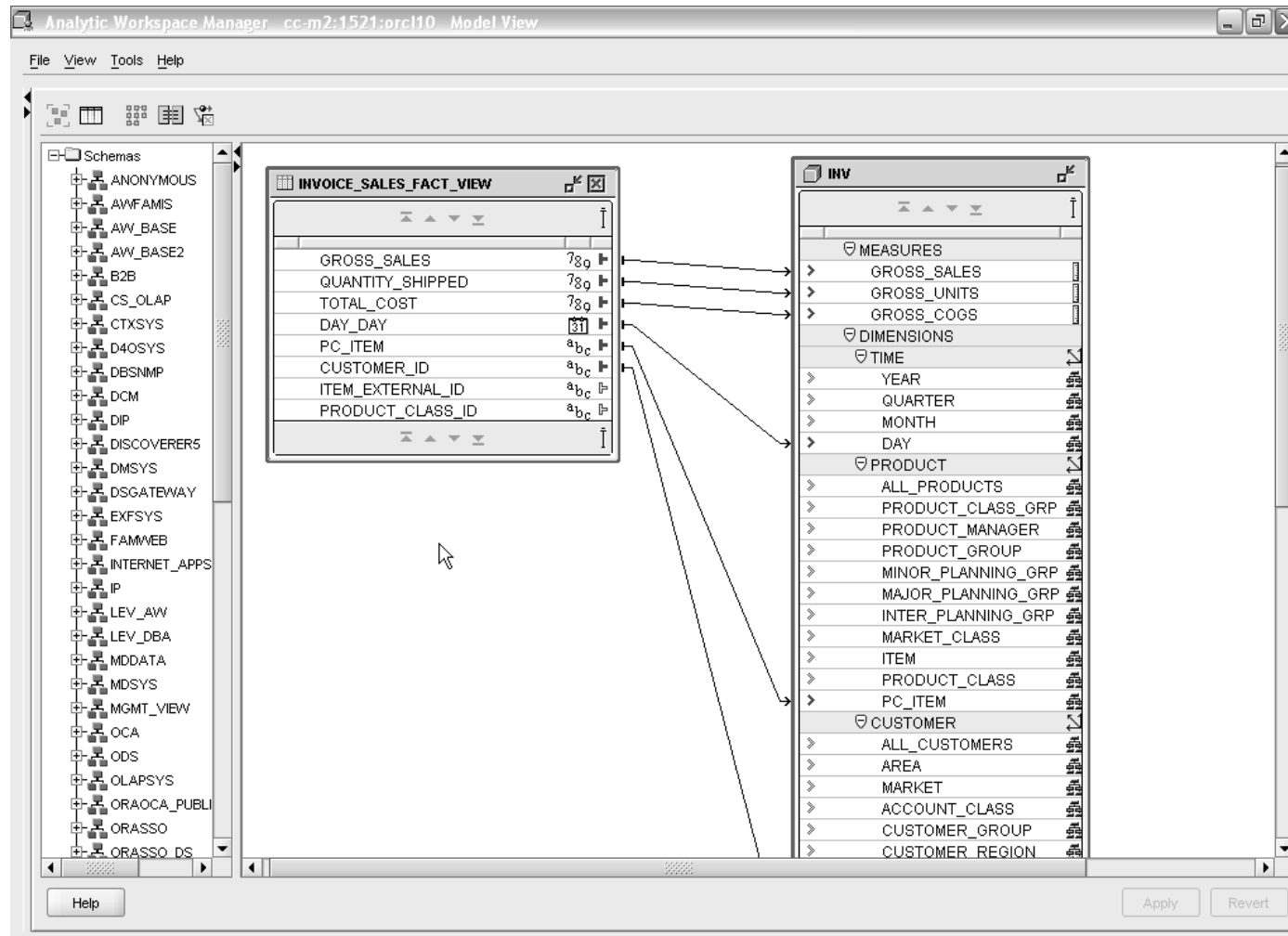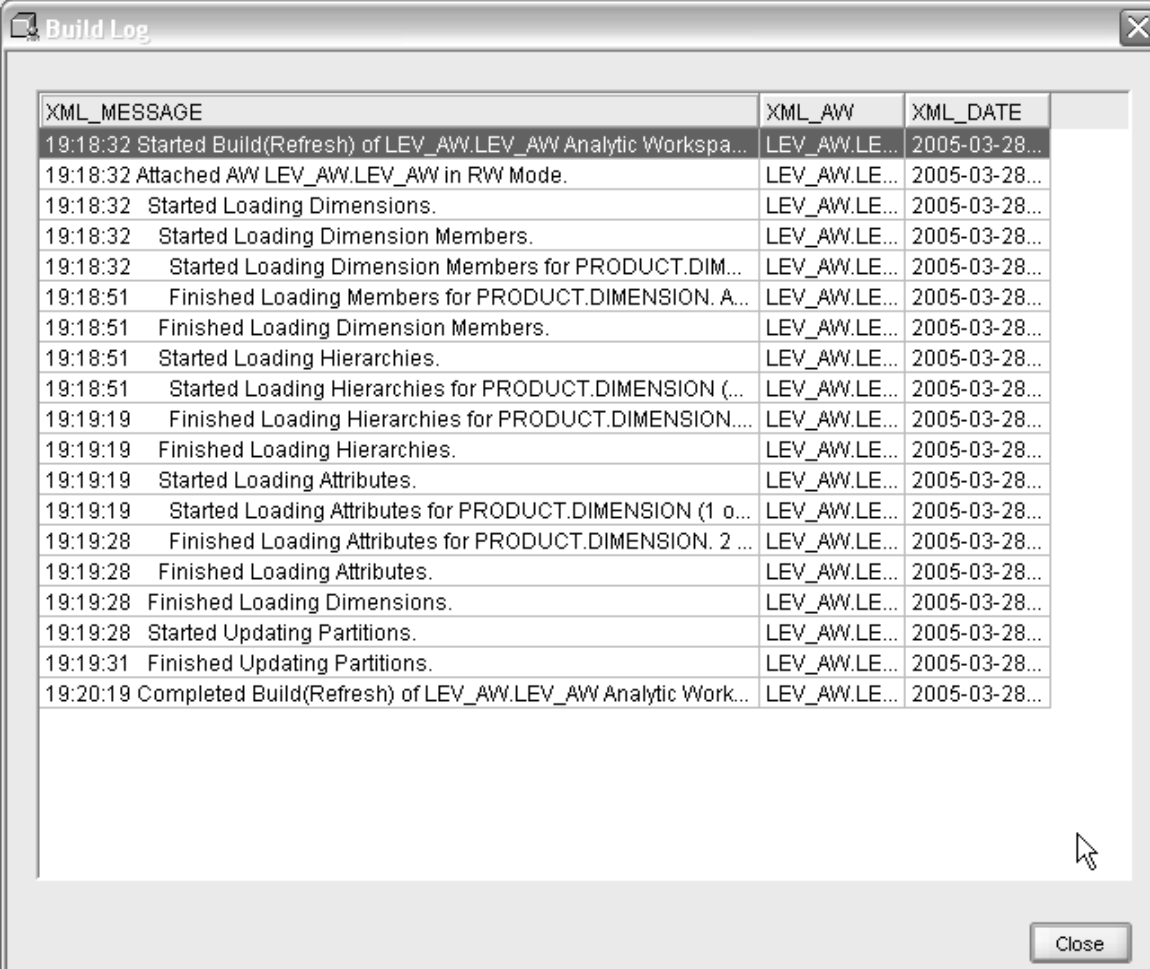
Maintaining Dims/Cubes

Maintaining Dims/Cubes

Build Log

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...

Close

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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)

Standard Disclaimer – Beta software! No promises!

OLAP 11g Changes

- Views automatically created for SQL access to AWs – Dimensions and Cubes!
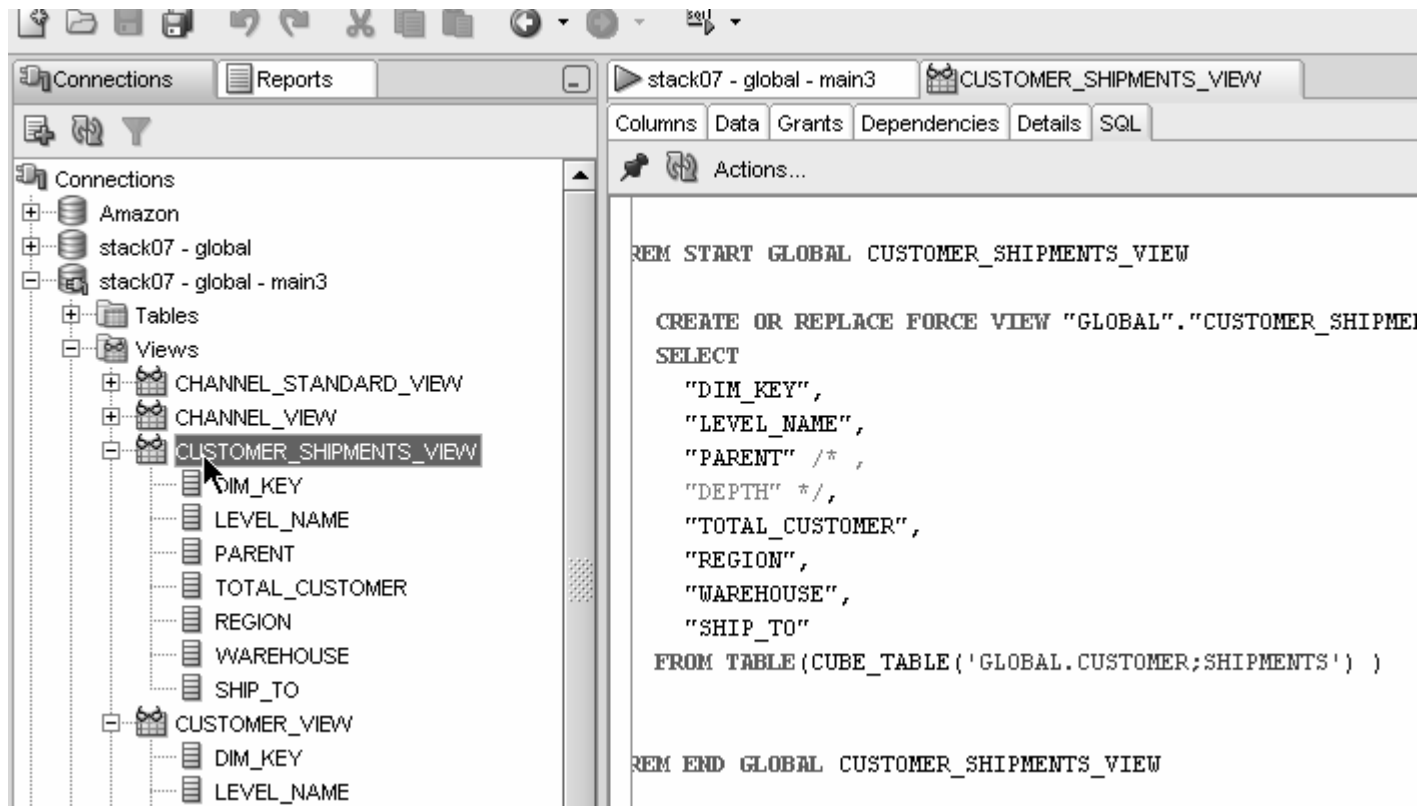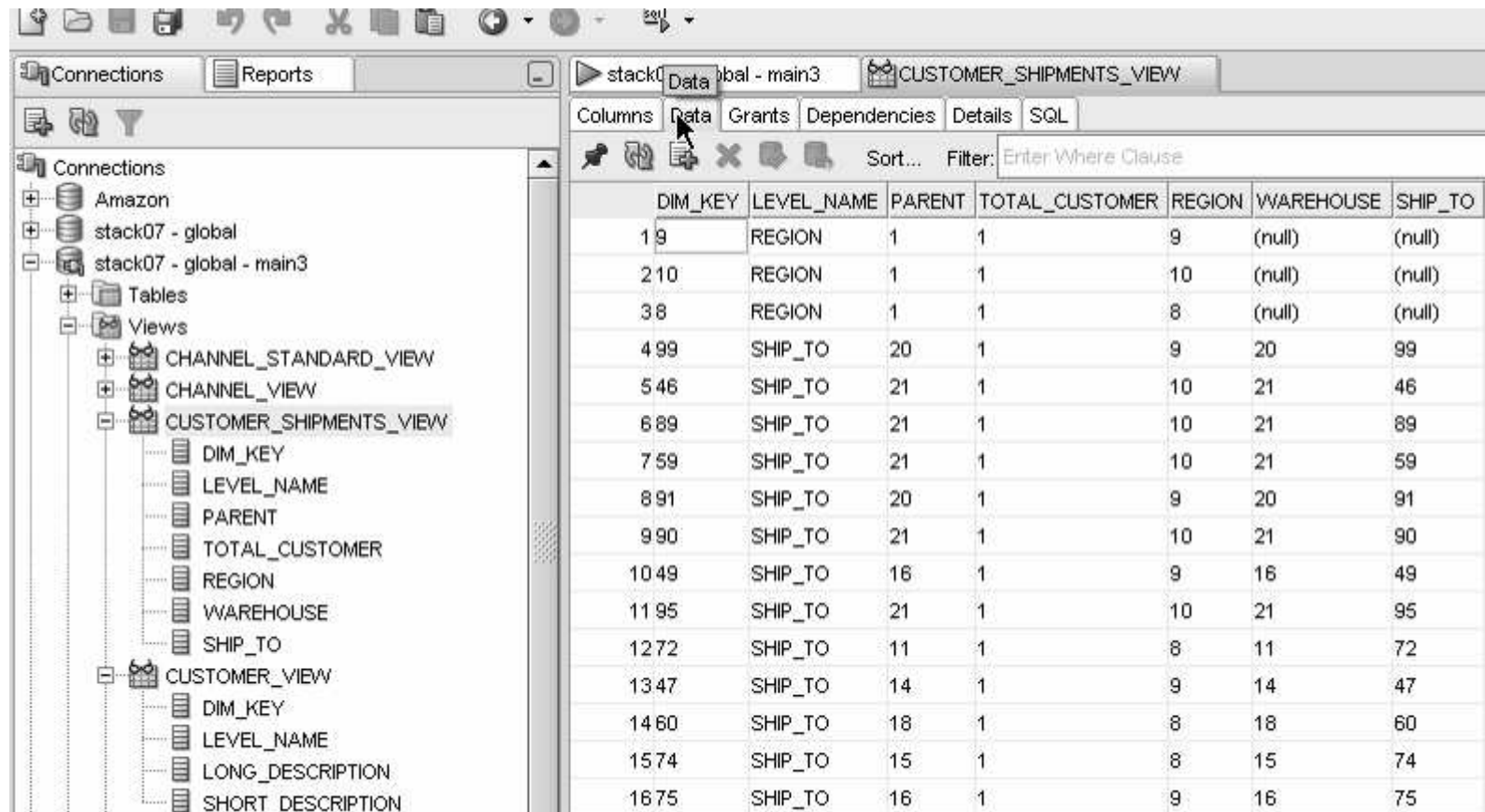
Standard Disclaimer – Beta software! No promises!

OLAP 11g Changes

- Views easily accessed from SQL Developer

Standard Disclaimer – Beta software! No promises!

OLAP 11g Changes

- Automatic views accessible from AWM

OLAP 11g Changes

- Query Rewrite knows about AWs now

OLAP 11g Changes

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

OLAP 11g Changes

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

OLAP 11g Changes

- Cost-based presummarization balances aggregation time with performance

OLAP 11g Changes

- Native support for AWs with skip level and ragged hierarchies

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OLAP 11g Changes

- Create security policies based on hierarchies

Standard Disclaimer – Beta software! No promises!

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"

Choose a calculation type:

Rank

Calculation:

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 .

member's level
member's parent
member's ancestor

Expression:

RANK() OVER HIERARCHY (GLOBAL.PRODUCT.PRIMARY ORDER BY GLOBAL.UNITS_CUBE.UNITS WITHIN LEVEL)

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
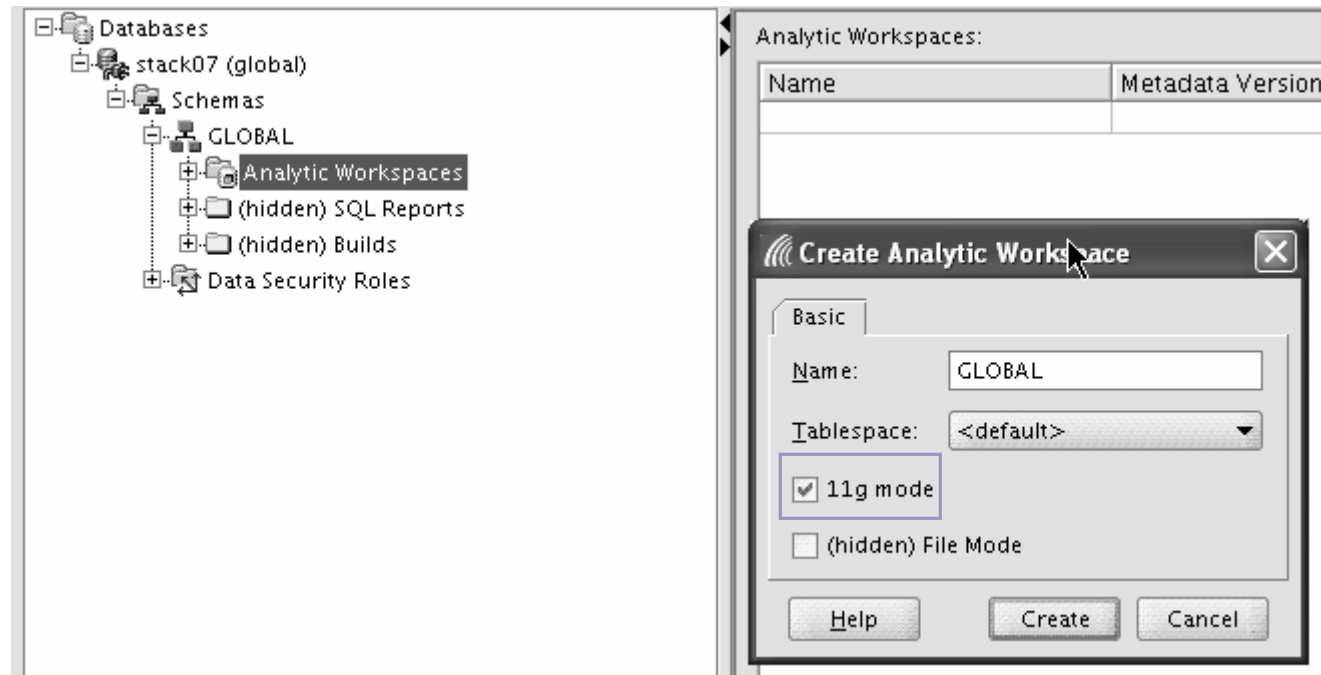
Building Cubes in AWM
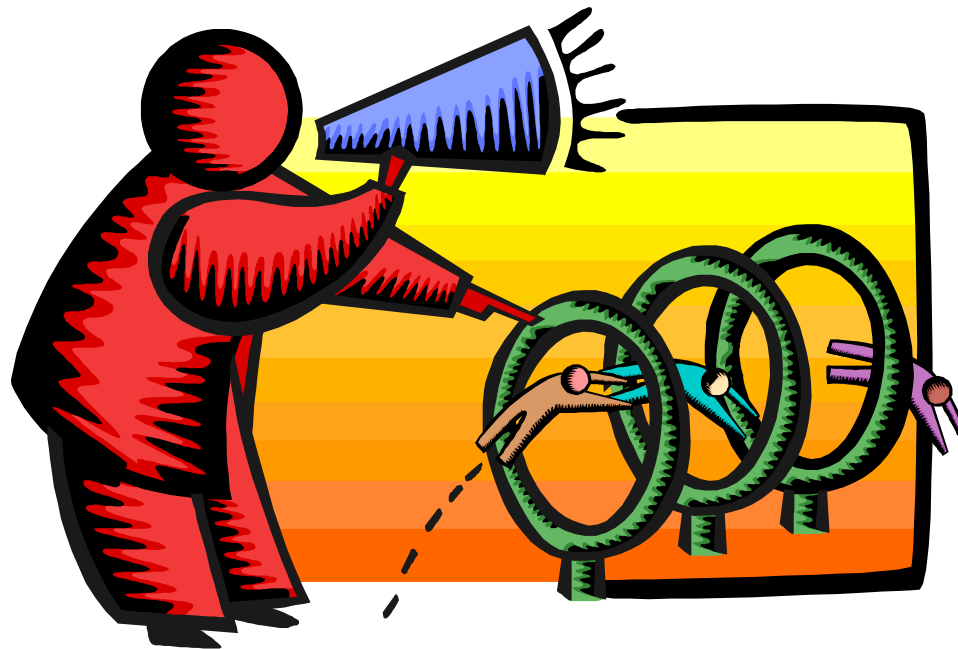
AWM Cube Builder Tips

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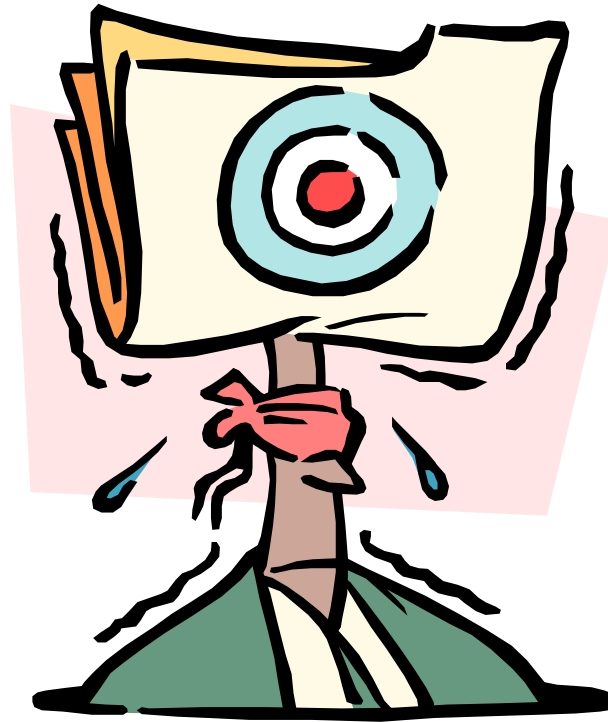
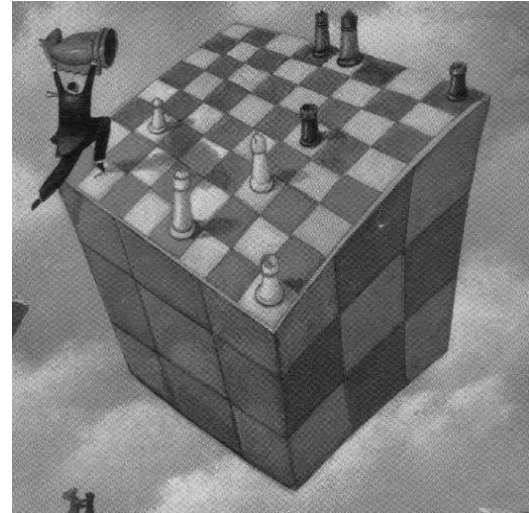# Oracle Essbase & Oracle OLAP: A Guide to Oracle's Multidimensional Solution

- 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
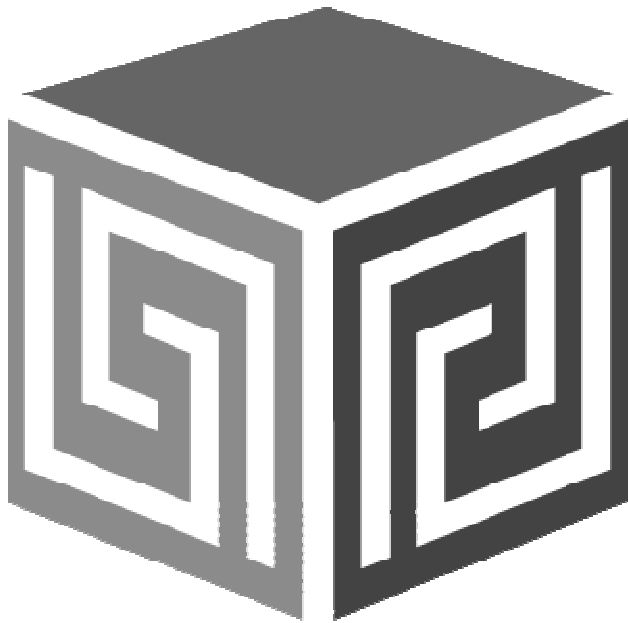
- Special Thanks to Kathy Horton

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

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