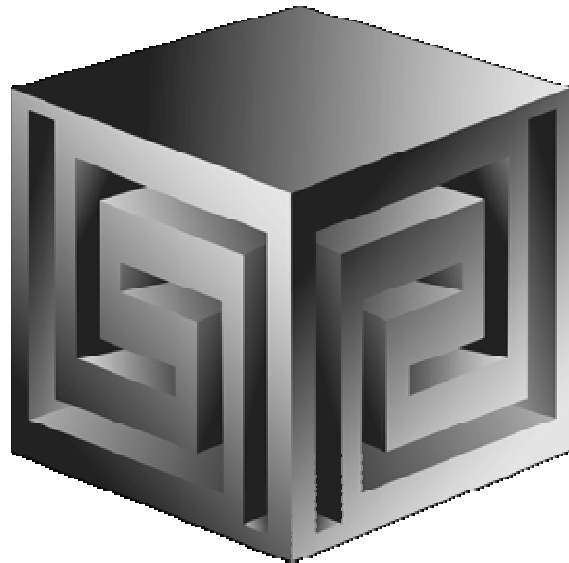


Faster and Smarter Data Warehouses with Oracle 11g

Oracle OpenWorld 2008



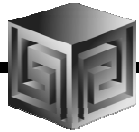
Dan Vlamis

dvlamis@vlamis.com

**Vlamis Software Solutions,
Inc.**

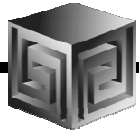
816-781-2880

<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**
 - ☐ **Multi-dimensional applications**
- **Delivers**
 - ☐ **Design and integrate BI and DW solutions**
 - ☐ **Training and mentoring**
- **Expert presenter at major Oracle conferences**



Vlami OpenWorld Presentations

Presenter	Time	Title
Dan Vlami	Sun 8:30-10:00	Building Cubes and Analyzing Data using Oracle OLAP 11g
Mark Thompson	Sun 2:30-4:00	Integration of OBIEE and Essbase
Dan Vlami	Sun 4:00-5:30	BIWA Panel: Why Do BI Projects Fail?
Dan Vlami	Mon 1:00-2:00	Faster and Smarter Data Warehouses with Oracle Database 11g

Dan Vlamis, President, Vlamis Software Solutions



- **Developer for IRI (former owners of Oracle OLAP)**
- **Founded Vlamis Software in 1992**
- **Wrote portions of Oracle Sales Analyzer**
- **Beta tester and early adopter of Oracle OLAP**
- **Expert speaker and author**
- **Recognized expert in Express and OLAP industry**
- **Bringing multi-dim experience to Essbase**

dvlamis@vlamis.com 816-781-2880



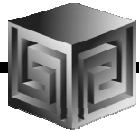
Thomas H. Davenport

Harvard Business Review

Competing on Analytics

January 2006

“Virtually all organizations we identified as **aggressive analytics competitors are clear leaders** in their fields, and they attribute their success to the masterful exploitation of data.”



Are you an analytics competitor?

Can you answer yes to these questions:

- ☐ **Compare performance across time periods?**
- ☐ **Access key performance indicators in near real time**
- ☐ **Identify top/bottom products, customers, employees, costs, channels?**
- ☐ **Understand share of category, product mixes, % sales contribution, % profit contribution?**
- ☐ **Can you benchmark your vendors, sales reps, customers?**
- ☐ **Do you move seamlessly between strategic analysis to tactical analysis?**
- ☐ **Does ad-hoc mean mouse-clicks? or phone calls to IT?**

What's stopping you from competing with Analytics?



- **Is the business:**
 - ☐ Lacking visibility into business performance?
 - ☐ Showing little confidence in the accuracy of reports?
 - ☐ Given point in time metrics, but asking for forward looking analysis?
 - ☐ Missing opportunities because of lack of ad-hoc reporting?
 - ☐ Operating in a constantly changing environment?
 - ☐ Using Excel and Access as their "reporting repository"?

- **Is the IT organization and infrastructure:**
 - ☐ Challenged with conflicting priorities?
 - ☐ Spending significant resources developing new reports?
 - ☐ Struggling to provide timely and accurate information?
 - ☐ Producing ad-hoc reports or extracts to business users?
 - ☐ Managing to service level agreements?

Oracle OLAP 11g – Relational and OLAP!



- An integrated component of Oracle Database 11g that enables companies to easily gain insights into business performance. It offers:

- ☐ Exceptional query, calculation and data preparation performance
- ☐ Rich analytic capabilities
- ☐ Simple user model that reflects business usage

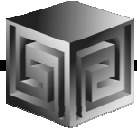
- Oracle OLAP is the only OLAP engine on the market

- ✓ This is fully embedded within a database
- ✓ That is fully accessible via SQL

Therefore it can provide advanced calculation capabilities to any business application



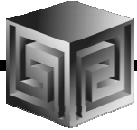
Business Advantages of Oracle 11g OLAP Option



- **Enhanced business analysis**
 - ❑ **Complex calculations**
 - **Compare things e.g. last year to now**
 - **More sophisticated analytical calculations**
 - ❑ **More interactive analysis of data**
 - **Advanced data selections using many combined criteria**
 - **Intuitive, hierarchical navigation**
- **More timely data**
 - ❑ **It's easier and faster to aggregate dimensional data**
- **Query performance is both faster and more consistent**

Business Advantages of Oracle 11g OLAP

Enhanced business analysis

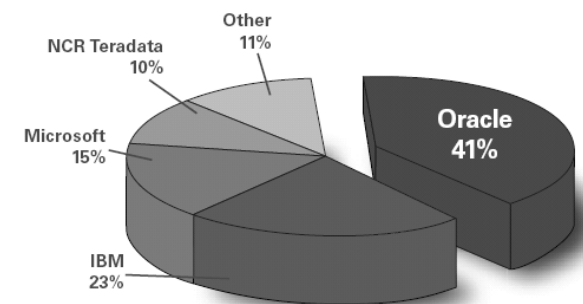
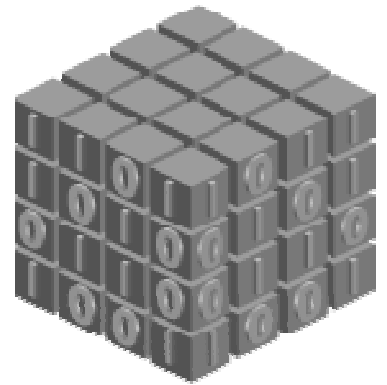


- **Example - Multidimensional Calculations & Complex Embedded Queries**
 - ☐ **Uni-dimensional**
 - “What are my top ten products?”
 - ☐ **Multidimensional**
 - ‘What was the percent change in market share for a grouping of my top 20% of products for the current three month period versus same period year ago for accounts which grew by more than 20 percent in revenue?’

Oracle OLAP Features and Benefits



- Core component of Market leading Oracle DB
- Highly scalable OLAP server
- Centralized Business Model view
- Sophisticated Calculation Engine with hundreds of pre-built functions
- Financial Intelligence, Time Series Intelligence, Business metrics
- Consistent, “Speed of Thought” response
- Real time loading capabilities
- Open SQL access or API
- High Concurrency, Partitioning, Clustering, Failover
- Mission Critical Performance and Scalability
- Unmatched data security

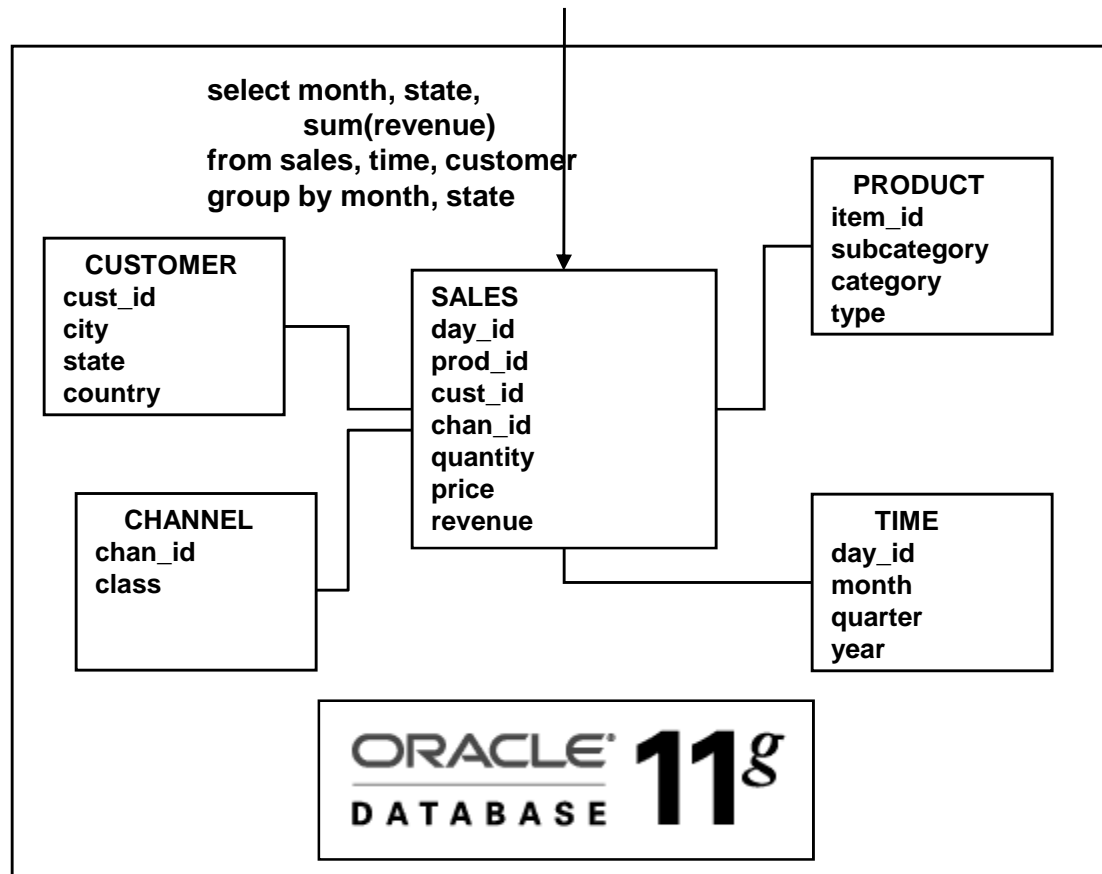


Worldwide Data Warehouse Management
Market Share, 2006

Source: IDC, 2007 – Data Warehouse Platform Tools 2006 Vendor Shares

Materialized Views

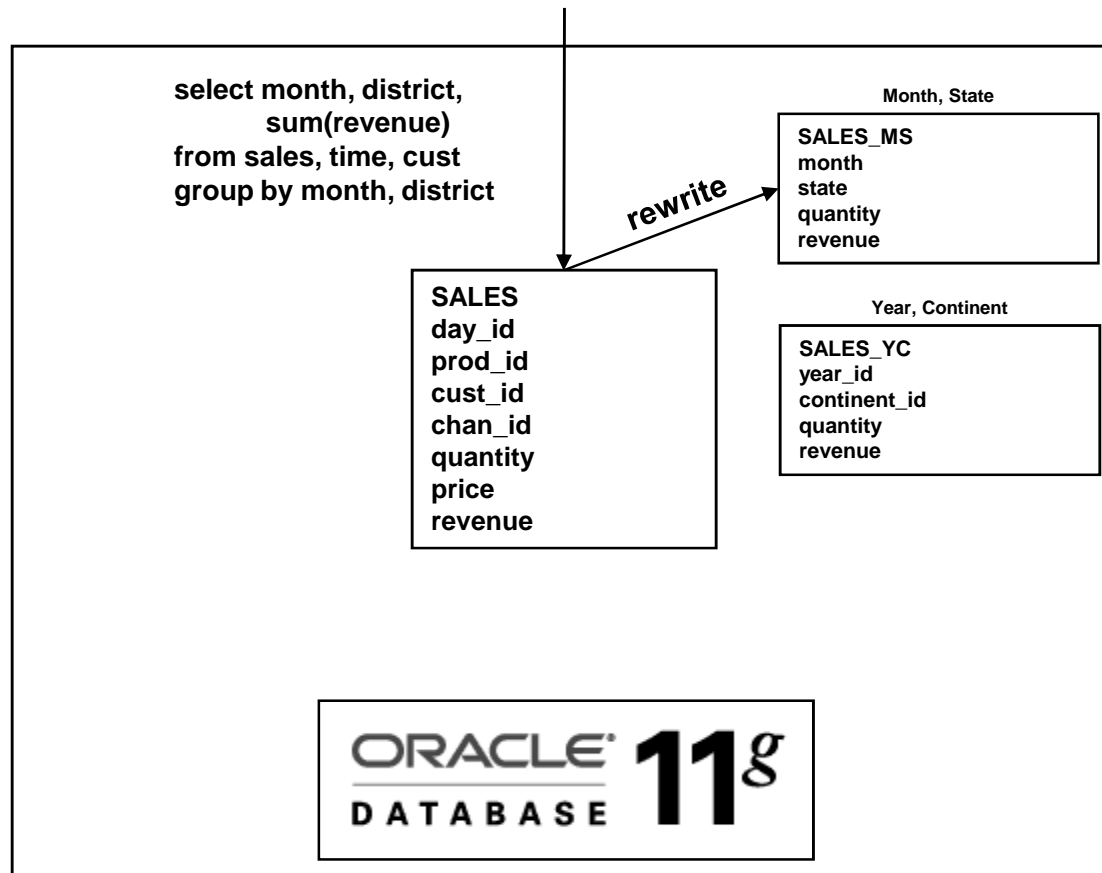
Typical MV Architecture Today



- Query tools access star schema stored in Oracle data warehouse
- Most queries at a summary level
- Summary queries against star schemas can be expensive to process

Materialized Views

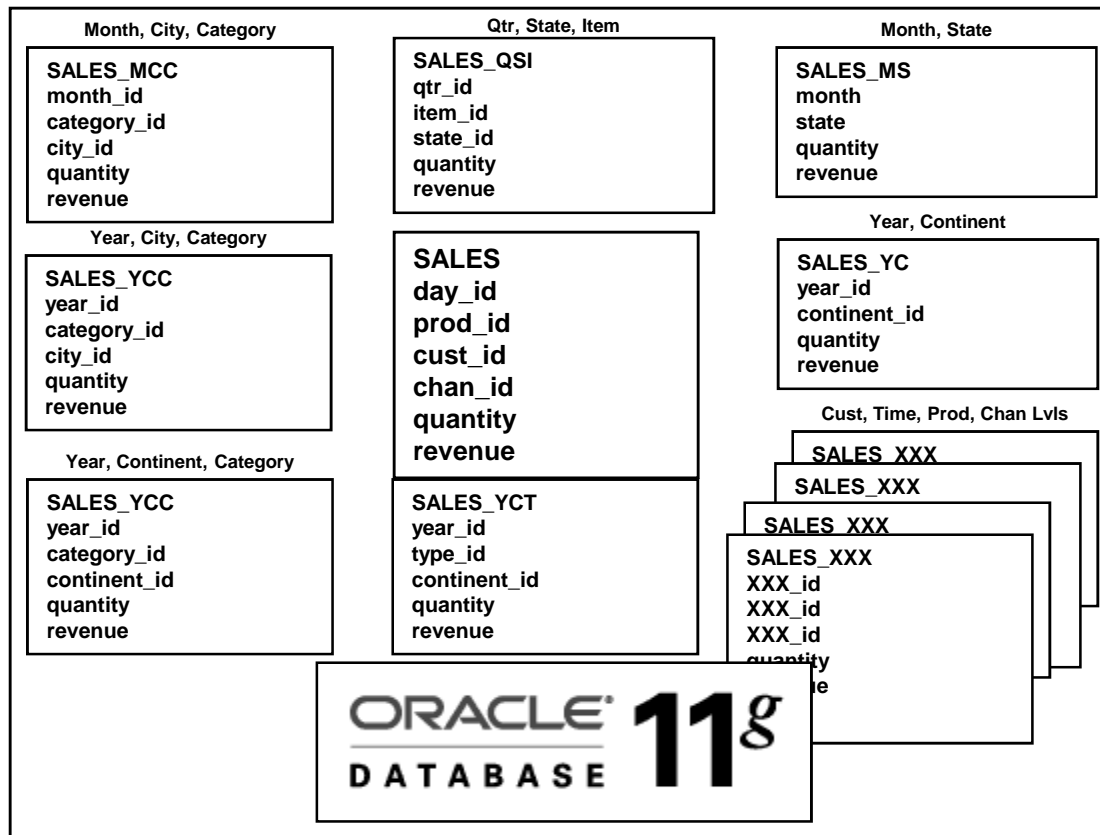
Automatic Query Rewrite



- Most DW/BI customers use Materialized Views (MV) today to improve summary query performance
- Define appropriate summaries based on query patterns
- Each summary is typically defined at a particular grain
 - ☐ Month, State
 - ☐ Qtr, State, Item
 - ☐ Month, Continent, Class
 - ☐ etc.
- The SQL Optimizer automatically rewrites queries to access MV's whenever possible

Materialized Views

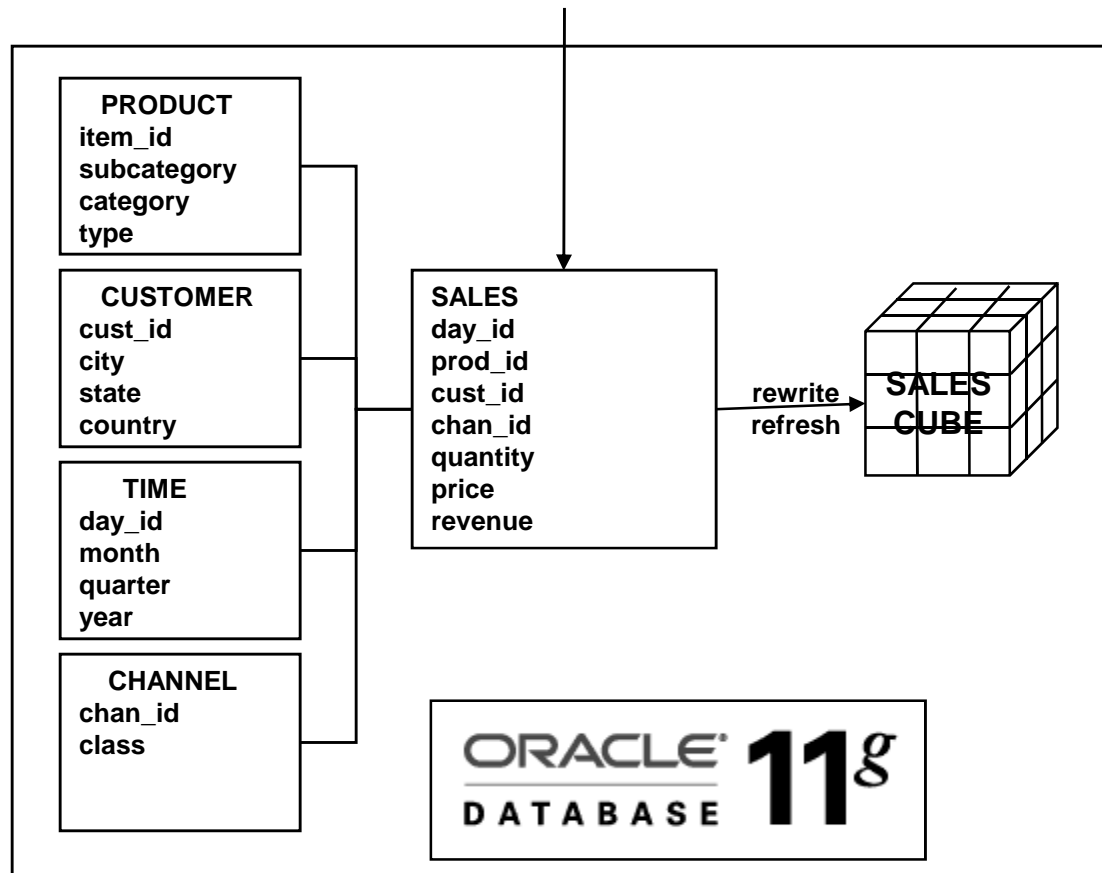
Challenges in Ad Hoc Query Environments



- Creating MVs to support ad hoc query patterns is challenging
- Users expect excellent query response time across any summary
- Potentially many MVs to manage
- Practical limitations on size and manageability constrain the number of materialized views

Cube-based Materialized Views

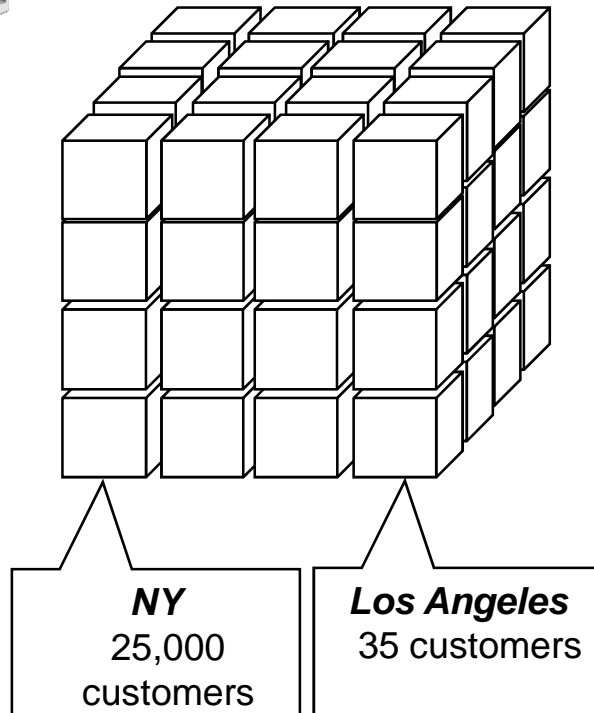
Breakthrough Manageability & Performance



- A single cube provides the equivalent *of thousands of summary combinations*
- The 11g SQL Query Optimizer treats OLAP cubes as MV's and rewrites queries to access cubes *transparently*
- Cube refreshed using standard MV procedures

Cost Based Aggregation

Pinpoint Summary Management

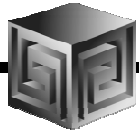


Precomputed



Computed when queried

- Improves aggregation speed and storage consumption by pre-computing *cells* that are most expensive to calculate
- Easy to administer
- Simplifies SQL queries by presenting data as fully calculated

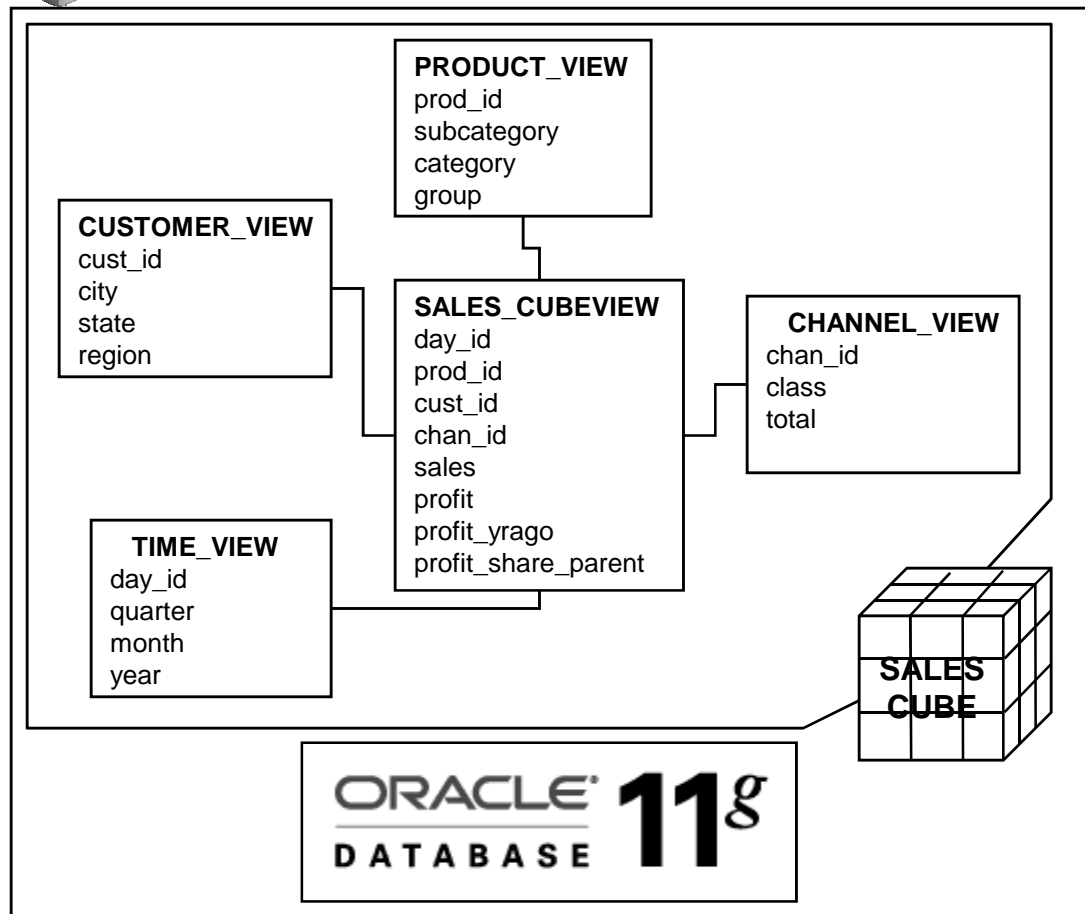


One Cube Accessed Many Ways...

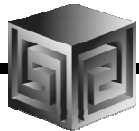
- **One cube can be used as**
 - ❑ **A summary management solution to SQL-based business intelligence applications as cube-organized materialized views**
 - ❑ **A analytically rich data source to SQL-based business intelligence applications as SQL cube-views**
 - ❑ **A full-featured multidimensional cube, servicing dimensionally oriented business intelligence applications**

Cube Represented as Star Model

Simplifies Access to Analytic Calculations



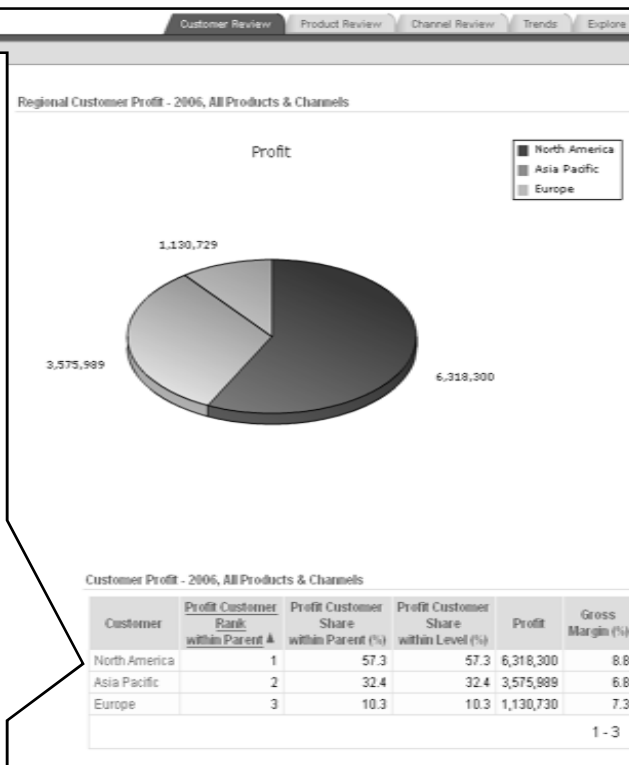
- Cube represented as a star schema
- Single cube view presents data as completely calculated
 - Analytic calculations presented as columns
 - Includes all summaries
- Automatically managed by OLAP

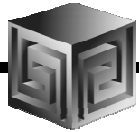


Empowering Any SQL-Based Tool Leveraging the OLAP Calculation Engine

Application Express on Oracle OLAP

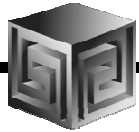
```
SELECT cu.long_description customer,  
       f.profit_rank_cust_sh_parent,  
       f.profit_share_cust_sh_parent,  
       f.profit_rank_cust_sh_level,  
       f.profit,  
       f.gross_margin  
FROM time_calendar_view t,  
     product_primary_view p,  
     customer_shipments_view cu,  
     channel_primary_view ch,  
     units_cube_view f  
WHERE t.level_name = 'CALENDAR_YEAR'  
      AND t.calendar_year = 'CY2006'  
      AND p.dim_key = 'TOTAL'  
      AND cu.parent = 'TOTAL'  
      AND ch.dim_key = 'TOTAL'  
      AND t.dim_key = f.TIME  
      AND p.dim_key = f.product  
      AND cu.dim_key = f.customer  
      AND ch.dim_key = f.channel;
```





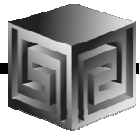
Faster and Smarter

- **Faster to aggregate – agg just what's needed**
- **Faster to maintain – incr. refresh, skip-level**
- **Faster to retrieve data – cube structure**
- **Simpler to manage – 1 materialized view**
- **Smarter in calcs – interrow calculations**
- **Smarter agg rules – centrally managed**
- **Smarter maintenance – in central repository**
- **Smarter forecasting – built into database**



Changes in OLAP 11g

- **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 interface. On the left, the 'Connections' tree shows a hierarchy: Amazon > stack07 - global > stack07 - global - main3 > Views > CUSTOMER_SHIPMENTS_VIEW. The main window shows the 'Enter SQL Statement' editor with the following query:

```
SELECT * FROM TABLE(CUBE_TABLE('GLOBAL.CUSTOMER;SHIPMENTS'));
```

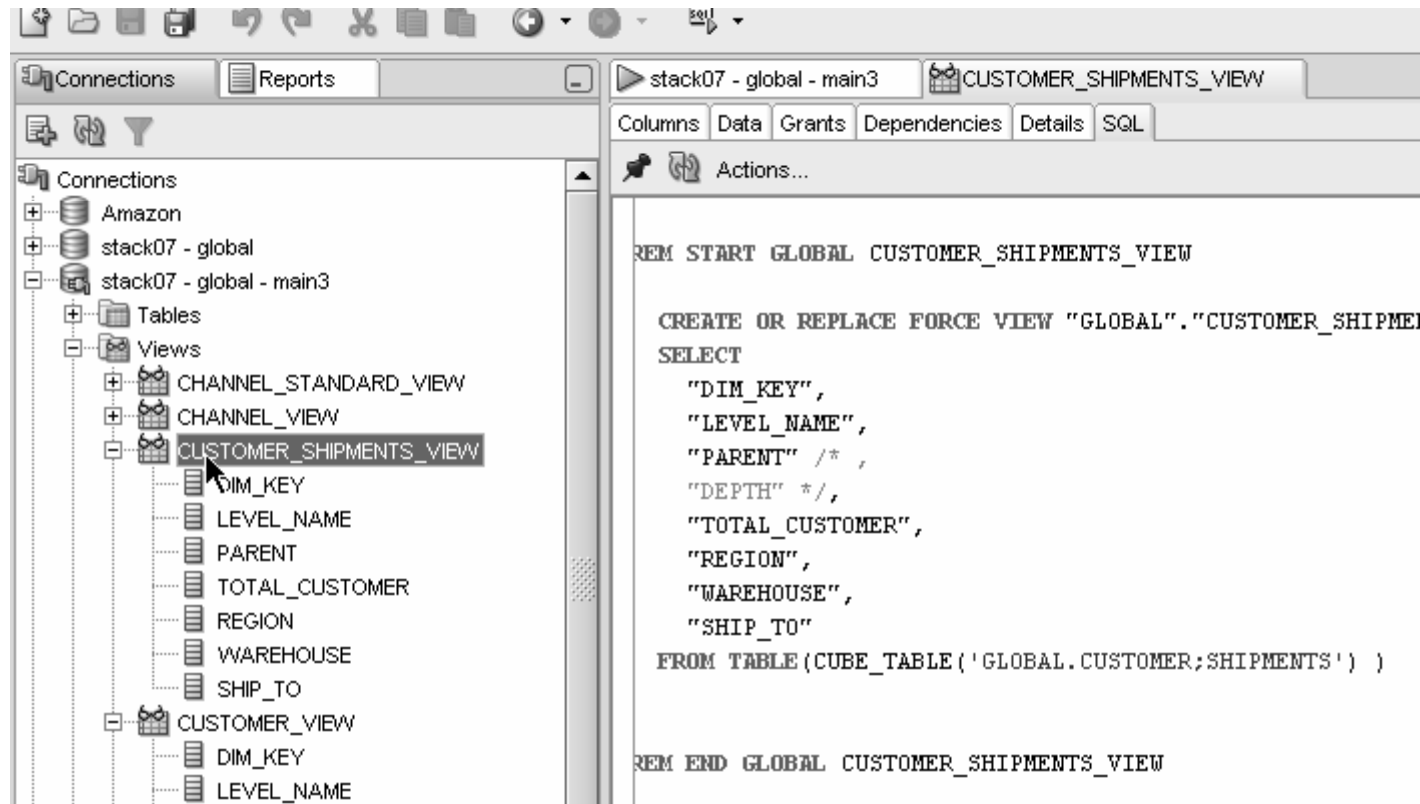
Below the editor, the 'Results' tab is active, showing a table with 6 columns: REGION, WAREHOUSE, SHIP_TO, LEVEL_NAME, and LONG_DESCRIPTOR. The table contains 4 rows of data.

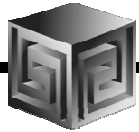
	REGION	WAREHOUSE	SHIP_TO	LEVEL_NAME	LONG_DESCRIPTOR
1	(null)	(null)	REGION	Europe	
2	(null)	(null)	REGION	North America	
3	(null)	(null)	REGION	Asia Pacific	
4	20	99	SHIP_TO	UK Env Dept Glasgow	



OLAP 11g Changes

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



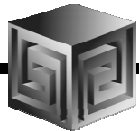


OLAP 11g Changes

- 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' > 'stack07 - global' > 'stack07 - global - main3' > 'Views' > 'CUSTOMER_SHIPMENTS_VIEW'. The main pane shows the 'Data' tab for this view, displaying a table with 7 columns: DIM_KEY, LEVEL_NAME, PARENT, TOTAL_CUSTOMER, REGION, WAREHOUSE, and SHIP_TO. The table contains 16 rows of data.

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



OLAP 11g Changes

- Automatic views accessible from AWM

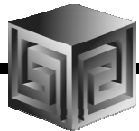
abases
stack07 (global)
Schemas
GLOBAL
Analytic Workspaces
GLOBAL (attached RW)
Dimensions
CUSTOMER
PRODUCT
TIME
CHANNEL
Levels
TOTAL_CHANNEL
CHANNEL
Hierarchies
STANDARD
Attributes
Unique Key Attributes
Mappings
Views
CHANNEL_VIEW - [Dimension ET]
VIEWNAME - [Hierarchy: STANDARD]
Data Security

General

Specify View Information

Dimension Name: CHANNEL
Hierarchy Name: STANDARD
View Name:

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



OLAP 11g Changes

- Query Rewrite knows about AWs now

Materialized Views Configuration

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: **Force** Refresh Mode: **On Demand**

Start With: **Modify...**

Next Refresh: **Modify...**

Constraints: ☒ Trusted ☐ Enforced

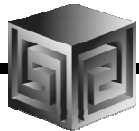
Choose this option to allow queries on the source tables of the Cube to be automatically rewritten to use summary data in the Cube

☒ Enable Query Rewrite

Materialized View Implementation Details

Compatibility Check list **Materialized View details**

Status	Required for	Object	Check
<input checked="" type="checkbox"/>	Rewrite	UNITS_CUBE	User must have create Materialized View privilege
<input checked="" type="checkbox"/>	Rewrite	UNITS_CUBE	Cube must be compressed
<input checked="" type="checkbox"/>	Rewrite	UNITS_CUBE	Cube must have one or more Measures



OLAP 11g Changes

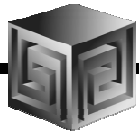
- Optimizer pushes joins down to AW
- Enables efficient non-OLAP-aware SQL queries

```
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'
```

DB Object Search

Results | Script Output | **Explain** | Autotrace | DBMS Output | OWA Output

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	

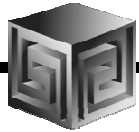


OLAP 11g Changes

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

The screenshot shows the Oracle SQL Developer interface. On the left, the 'Connections' tree is expanded to 'stack07 - global - main3' > 'Views', where 'CUSTOMER_SHIPMENTS_VIEW' is selected. The main window displays the 'Enter SQL Statement' editor with the query: `select * from sys.user_dimension_views;`. Below the editor, 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**

The screenshot shows the 'Create Cube' dialog box with the 'Aggregation' tab selected. The 'Rules' sub-tab is also active. The 'Precompute' sub-tab is visible but not selected. The 'Choose an aggregation method:' section has two radio buttons: 'Cost-based aggregation (recommended for compressed cubes)' which is selected, and 'Level-based aggregation (required for uncompressed cubes)'. Below the selected option is a 'Percentage' field with the value '20'. The 'Choose the levels of the cube to be aggregated and stored.' section has a 'Dimension:' label and a list of dimensions: 'TIME', 'CHANNEL', 'CUSTOMER', and 'PRODUCT'. To the right of this list is a 'Levels' field and a 'Select All' button.

Create Cube

General Aggregation Partitioning Storage Materialized Views

Specify the aggregation rules of the cube

Rules Precompute

Choose an aggregation method:

☒ Cost-based aggregation (recommended for compressed cubes)

Percentage: 20

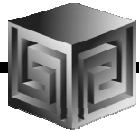
☐ Level-based aggregation (required for uncompressed cubes)

Choose the levels of the cube to be aggregated and stored.

Dimension:

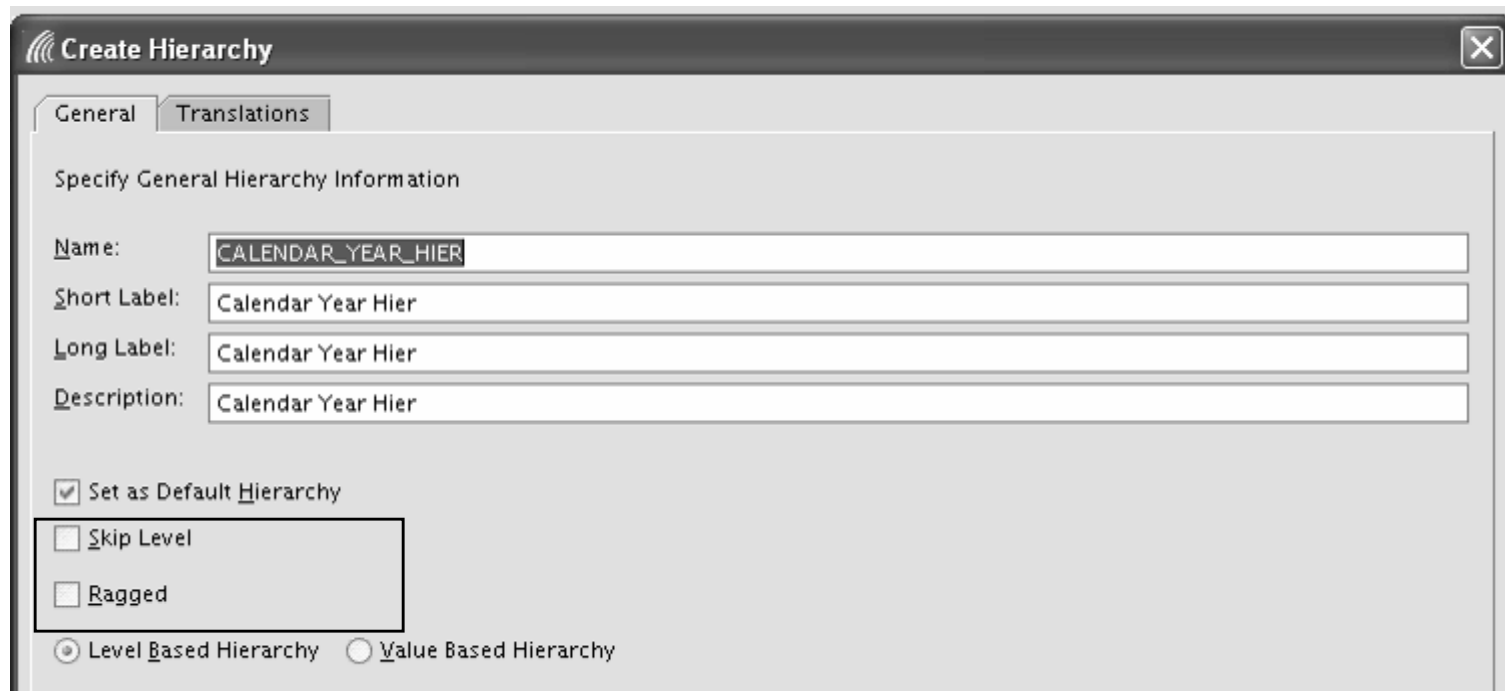
TIME	Levels
CHANNEL	
CUSTOMER	
PRODUCT	

Select All



OLAP 11g Changes

- Native support for AWs with skip level and ragged hierarchies



The image shows a screenshot of the 'Create Hierarchy' dialog box in Oracle OLAP 11g. The dialog has a title bar with the text 'Create Hierarchy' and a close button. It contains two tabs: 'General' and 'Translations'. The 'General' tab is selected, and the text 'Specify General Hierarchy Information' is displayed above the input fields. The fields are: 'Name:' with the value 'CALENDAR_YEAR_HIER', 'Short Label:' with the value 'Calendar Year Hier', 'Long Label:' with the value 'Calendar Year Hier', and 'Description:' with the value 'Calendar Year Hier'. Below these fields are three checkboxes: 'Set as Default Hierarchy' (checked), 'Skip Level' (unchecked), and 'Ragged' (unchecked). At the bottom, there are two radio buttons: 'Level Based Hierarchy' (selected) and 'Value Based Hierarchy' (unselected).

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

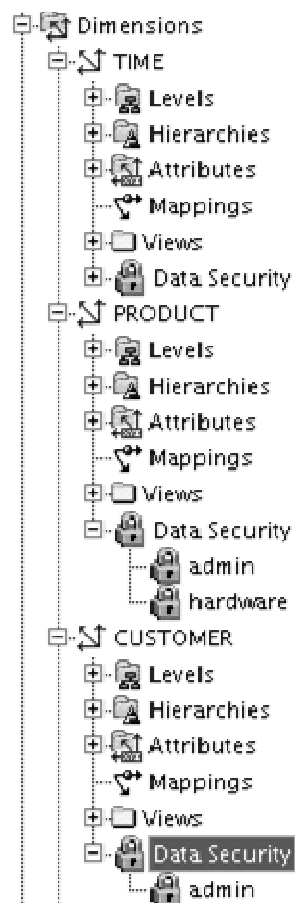
☐ Ragged

☒ Level Based Hierarchy ☐ Value Based Hierarchy



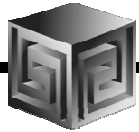
OLAP 11g Changes

- Create security policies based on hierarchies



The screenshot shows the 'Create Data Security Policy' dialog box. The 'General' tab is selected. The 'Choose' dropdown is set to 'Product' and the 'From' dropdown is set to 'Primary' hierarchy. The 'Available' list shows a hierarchy with 'Descendants of Hardware' and 'TOTAL_CUSTOMER'. The 'Selected' list shows '1. Start with Hardware' and '2. Add Descendants of Hardware'. The 'Condition Expression' field contains the text: 'GLOBAL.PRODUCT.DIM_KEY IN ('2') OR '2 GLOBAL.PRODUCT.PRIMARY LEVEL GLOBAL'. The 'Data Security Policy Name' field contains 'north america'. The 'Select the access privileges for each user or role below' section shows a table with columns: User or Role, Type, Select, and Insert. The table contains one row for 'SCOTT' with Type 'User', Select checked, and Insert unchecked.

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



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:

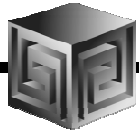
Rank members of the PRODUCT dimension and PRIMARY hierarchy based on measure UNITS_CUBE.UNITS (...)

. Calculate rank using RANK method with member's level in order lowest to highest.

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

Expression:

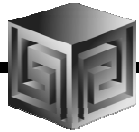
RANK() OVER HIERARCHY (GLOBAL.PRODUCT.PRIMARY ORDER BY GLOBAL.UNITS_CUBE.UNITS WITHIN LEVEL)



OLAP 11g Changes

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





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>



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<ul style="list-style-type: none"> • 3 Tracks of Technical Talks with More than 75 sessions running in 6+ parallel rooms 	<ul style="list-style-type: none"> • Solution Showcase
<ul style="list-style-type: none"> • Meet the Oracle Experts 	<ul style="list-style-type: none"> • Solution Providers Sessions
<ul style="list-style-type: none"> • Analyst/User Panel Discussions 	<ul style="list-style-type: none"> • ...And Much More!

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- **Detail are at:**

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