Oracle OLAP 11g and Oracle Essbase

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Who Am I?

- Oracle BI&W Architecture and Development Specialist
- Co-Founder of Rittman Mead Consulting
  - Oracle BI&W Project Delivery Specialists
- 10+ years with Discoverer, OWB etc
- Oracle ACE Director, ACE of the Year 2005
- Writer for OTN and Oracle Magazine
- Longest-running Oracle blog
  - [http://www.rittmanmead.com/blog](http://www.rittmanmead.com/blog)
- Chair of UKOUG BIRT SIG
- Co-Chair of ODTUG BI&DW SIG
- Second year of OU BI Masterclasses
  - 18 countries visited in 2006-7
Rittman Mead Consulting

- Oracle BI&DW Project Specialists
- Consulting, Training, Support
- Works with you to ensure OBIEE project success
- Small, focused team
- OWB, Oracle BI, DW technical specialists
- Clients in the UK, Europe, USA
Why this Presentation?

- Most of you will use a data warehouse as part of your BI architecture
- Many of you will use ad-hoc query tools such as Discoverer to query your data
- You are probably aware that Oracle has something called the OLAP Option
  - Supposed to improve query performance, uses a different storage type
- You have also heard that Oracle now owns something called Essbase
  - Acquired as part of the Hyperion acquisition
- This presentation will explain what they are used for
  - The background to Oracle OLAP, and how it can boost your data warehouse
  - An introduction to Oracle Essbase, and how it differs to Oracle OLAP
  - A comparison of the two, and which to use and when
Oracle’s In-Database OLAP Engine: The OLAP Option

- An option to Oracle Database Enterprise Edition, now at version 11g
- A **summary management** solution for SQL-based business intelligence applications
  - An alternative to table-based materialized views, offering improved query performance and fast, incremental updates
- A fully-featured **multidimensional OLAP server**
  - Excellent query performance for ad-hoc and unpredictable queries
  - Enhances the analytic content of business intelligence applications through new calculation capabilities
  - Fast, incremental updates of data sets
Oracle OLAP Storage Characteristics

- Unlike relational storage, OLAP servers store data in multi-dimensional arrays
  - Structured around business rules and business concepts
  - Dimensions, facts, hierarchies, aggregation rules etc
- Can be faster to access “cells” of data for ad-hoc analysis
- Summary data stored in the cube, along with detail
- Offset addressing, no need for joins
- OLAP engines provide advanced analytics
  - Time-series analysis
  - Non-additive calculations
  - Financial calculations
  - Statistical forecasting, Models
Traditional Way of Accessing a Data Warehouse

- Query tools access star schema stored in an Oracle data warehouse
- Most queries at a summary level
- Summary queries against detail-level data can be expensive to process
  - Aggregation
  - Calculations
Materialized Views and Automatic Query Rewrite

- Most DW customers use materialized views to improve summary performance
- Define appropriate summaries based on query patterns
- Each summary is typically defined at a particular grain
  - Sales by month and category
  - Profits by city, quarter and channel
- The CBO automatically rewrites queries to use materialized views as appropriate
The Materialized View Challenge

- Creating materialized views 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 the number of MVs you can manage, the CBO can consider and you can built in time
New in 11g: Cube Organized Materialized Views

- Summaries can now be stored in a single Oracle OLAP multidimensional cube
- A single cube can contain the equivalent of thousands of summary combinations
- The Oracle 11g CBO treats OLAP cubes as MVs and rewrites queries to access cubes transparently
- Cubes refreshed using standard MV procedures
Positioned as the Oracle Data Warehouse Enhancer

- Transparent integration with SQL
- Swap-in replacement for MVs
- OLAP dimension, fact data also accessible directly via SQL views if rewrite is not appropriate
  - Calculations in cube not present in relational source data
  - CBO is aware of nature of SQL OLAP views, joins data in the OLAP layer

```sql
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, 
  customerShipments_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;
```
Oracle OLAP within Oracle BI EE

- Oracle OLAP 11g can be used along with Oracle BI EE
- Either through Cube Organized Materialized View, or through SQL Views
- Cube Organized MVs are simple to set up, but do not expose calculations
  - No relational column to rewrite from
- SQL Views provide full capabilities
  - Tricky to manipulate though
- At present, no metadata import
  - Coming in OBIEE 11g+
Demonstration

Accessing OLAP Data using Oracle Database 11g
An Alternative to In-Database OLAP : Oracle Essbase

• Oracle’s in-database OLAP has lots of advantages
  ‣ Single application to manage, leverage SQL knowledge and Oracle scalability
  ‣ A very good way of boosting the performance and capability of your Oracle DW
• That is not the only use for OLAP
• Some users required full multi-dimensional access to OLAP data
  ‣ MDX, XML/A, OLAP-aware query, planning and forecasting tools
  ‣ SQL is not appropriate to these sorts of uses
• Some users have not centralized on Oracle Database as their DW engine
  ‣ Finance departments
  ‣ Heterogeneous environments
• For these customers, Oracle Essbase is an interesting alternative
Essbase Overview

- Standalone OLAP server now owned by Oracle
  - Acquired as part of the Hyperion Acquisition
- Adds a fully-featured OLAP server, separate to the database, as part of the Fusion Middleware family of products
- End-User focused, very popular with business users
- Used to power many of the Hyperion performance management applications
- Similar capabilities to Oracle OLAP
- Supports MDX and XML/A rather than SQL access
Essbase Architecture

- ODBC connectivity to all major RDBMSs, plus SAP B/W
- Multi-dimensional OLAP engine
- Java and XML/A mid-tier
- Essbase query tools or OBIEE+

- Essbase
- Essbase Integration Services
- Analytic Provider Services
- Essbase Administration services
- Smart View for Office
- Search
- APIs and toolkits
- Workspace
- Web Analysis
- Financial Reports
- Interactive Reporting
- Visual Explorer
Essbase Analytic Capabilities

- Like Oracle OLAP, it has full OLAP capabilities
- Drill, pivot, select, compare, rank, sort, filter, group, stack, calculate, annotate, write-back....
- Reporting tools enabled by database “outline”
- Very easy to add financial-style calculations, forecasts, allocations etc
- Slightly more emphasis on the business/finance user, rather than the DBA (as with Oracle OLAP)
Cubes Accessed using MDX and XML/A

Unlike Oracle OLAP, the primary query language for Essbase is MDX
XML/A used for web-based access (very easy integration with OBIEE)
MDX is supported by Microsoft, SAP, Hyperion, the “standard” for OLAP access
  - Pros : exposes full capabilities of the OLAP model
  - Cons : a new language to use, SQL-based tools are incompatible

With

```
set [CUSTOMER_DIM3] as '[CUSTOMER_DIM].Levels(2).members'
set [PRODUCT_DIM3] as '[PRODUCT_DIM].Levels(2).members'
set [TIME_DIM3] as '[TIME_DIM].Levels(2).members'
set [Q] as 'crossjoin ({[CUSTOMER_DIM3]}, crossjoin ({[PRODUCT_DIM3]},
{[TIME_DIM3]}))'
select
  { [Accounts].[SALES]
  } on columns,
  NON EMPTY {[Q]} properties ANCESTOR_NAMES on rows
from
Essbase Development & Support Tools

- Analytic Administration Services
- Analytic Integration Services
- Analytic Provider Services
- Hyperion Shared Services
Accessing Essbase Data

• MDX is a common standard and most OLAP query tools support it
• Essbase comes with a set of query and development tools that are fully OLAP-capable
  ‣ Web Analysis
  ‣ Workspace
  ‣ Excel Add-in
• Many of Hyperions EPM tools use Essbase as the OLAP engine
• OBIEE can connect to, and report against Essbase data automatically
Oracle OLAP and Oracle Essbase within Oracle BI EE

- Both OLAP servers can provide data for OBIEE
  - Oracle OLAP through Cube Organized MVs and SQL view access
  - Essbase through XML/A
- Essbase can also use the OBIEE logical model as a data source
- Both add performance and analytic capabilities to OBIEE and the Oracle BI stack
Demonstration

Oracle Essbase Administration and Reporting
Comparing Oracle OLAP and Oracle Essbase

<table>
<thead>
<tr>
<th>Feature</th>
<th>Oracle OLAP 11g</th>
<th>Oracle Essbase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Method</td>
<td>Multidimensional Arrays</td>
<td>Multidimensional Arrays</td>
</tr>
<tr>
<td>Query language</td>
<td>SQL, via query rewrite or SQL views</td>
<td>MDX and XML/A</td>
</tr>
<tr>
<td>Process Type</td>
<td>In-database, embedded process</td>
<td>Stand-alone server</td>
</tr>
<tr>
<td>Product dependency</td>
<td>Oracle Database Enterprise Edition</td>
<td>Any relational database</td>
</tr>
<tr>
<td>Primary use</td>
<td>Enhancing SQL-based Data Warehouses</td>
<td>Supporting OLAP analytical applications</td>
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Summary

• Oracle OLAP and Oracle Essbase can both enhance your application analytic capabilities
  ‣ Oracle OLAP through enhancements to SQL-based analysis
  ‣ Oracle Essbase through OLAP analytical applications

• Choice of which to use is based on your scenario
  ‣ Do you wish to improve the performance, capabilities of your data warehouse?
  ‣ Are you an Oracle-only environment?
  ‣ Do you wish to provide access to advanced OLAP applications?

• Could potentially use both
  ‣ Oracle OLAP to improve DW capabilities and performance
  ‣ Oracle Essbase to provide MDX-based analytical capabilities

• Oracle’s future BI platform will probably make use of both products
Oracle OLAP 11g and Oracle Essbase

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