Oracle OLAP

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Business Analytics, OLAP
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Aim or yahoo chat: ofaguru
The Business Requirements
Who generates them?

Just about everyone in the company!!
OLTP vs. OLAP

Transactional
Who?
What?
Where?
Report data

Analytical
Why?
How?
What if?
Analyze & use data
Pedigree (short) ...
OLAP is alive and well at Oracle

- Over thirty years of innovation yields a complete and compelling OLAP platform
  - Express, the first multidimensional database
  - Oracle 9iR2, the first (and only) relational-multidimensional database
  - Oracle 10g
    - The first (and only) Grid capable OLAP platform
    - All new administration
    - All new data access tools
    - All new applications
What if …

- A single database offered the openness of a relational solution?
- … and provided the calculation power of a multidimensional engine?
- The calculations could be defined as easily as spreadsheet formulas?
- The system was efficient to build and maintain?
- Users experienced excellent query performance?
The Business Requirements
Why do they need OLAP?

Businesses need OLAP because:

• **Multidimensional model**: They want to inspect their data in a multidimensional format that includes dimensions, levels, hierarchies and attributes.

• **Calculations**: They want to define calculations that adhere to the proprietary rules that govern their particular multidimensional view of the data. For example, as in aggregation.

• **Processing efficiency**: Since analysis is an intensively re-iterative process, the query response time must be sub-second. OLAP engines are better designed to meet this requirement.

• **Transaction model**: A read-repeatable transaction model that supports what-if analysis.
Design – Logical models

```
coc_Officer_Dim
PK ASSOC_ID
PK ROLE_CD

PK FK1 ASSOC_ID
PK MEASURE_ID

PK FK ASSOC_ID
PK ROLE_CD

PK FK1 CST_ID
PK FK2 ASSOC_ID
PK FK2 ROLE_CD
PK FK3 PRD_CD
PK FK3 SYS_ASOF_DT
PK FK3 PERIOD_CD
PK FK3 SOURCE_DT

PK FK1 CST_ID
PK FK2 ASSOC_ID
PK FK2 ROLE_CD
PK FK3 SYS_ASOF_DT
PK FK3 PERIOD_CD
PK FK3 SOURCE_DT

PK FK1 ASSOC_ID
PK ROLE_CD

PK SY ASOF DT
PK PERIOD_CD
PK SOURCE_DT

pk PRD CD

pk SYS ASOF DT
pk PERIOD CD
pk SOURCE_DT
```
Select a purely relational implementation when ...

- The analytic requirements of the business are met by the capabilities of SQL.
- There are appropriate in-house SQL skills.
- The relational engine provides satisfactory query performance.
A purely relational implementation is designed and optimized to support the efficient movement and calculation of large volumes of data.
Select a **ROLAP** implementation when ... 

- The analytic requirements of the business are met by the capabilities of SQL.
- User is looking for an easier way to formulate complex queries.
- The detail data is very sparse.

★ Use Materialized Views to optimize performance.
This is a ROLAP IMPLEMENTATION.
Select a MOLAP implementation …

• When the analytic requirements of the business need the extended analytic, forecasting and planning functionality of Multidimensional Database Technology.

• When the analysis includes lots of calculated and aggregated Key Performance Indicators

• Need an easier way to define complex or proprietary calculations.

• Need a transaction model that supports what-if analysis.
Purely Relational, ROLAP, or MOLAP?
Multidimensional Technology

This is a MOLAP implementation
Some benefits of the multidimensional processing model . . .

- A separate query is formulated and executed for each dimensional component of the query.
  - *Ease of use feature!*

- No JOIN is required when using the multidimensional technology.
  - *Improved performance!*

- “Aggregate then filter” methodology is used.
  - *Consistent, correct results.*
  - *Intelligent drill!*
Components include:

- A powerful SQL calculation engine
- A powerful multidimensional calculation engine
- Multidimensional data storage and retrieval
- Programming APIs for SQL, PL/SQL, and Java
- Dimensionally aware data manipulation language (OLAP DML)
- SQL access to multidimensional data
Prior Architecture

Operational Sources -> Data Warehouse

DB2, SQL Server, Oracle, etc. 

Data Marts 

Multidimensional Databases 

Runtime

Warehouse ETL

OLAP ETL
Current Architecture
The OLAP Option in the Oracle Database

Oracle Database
- Oracle Call Interface
- JDBC
- Metadata
- OLAP API
- Relational Technology
  - SQL Engine
- Object Technology
  - Table Functions
- OLAP Technology
  - Multidimensional Engine

Storage
- Relational Data
- Multidimensional Data
Because no single tool will satisfy all of the users in an organization …

… Oracle has products that represent every class of reporting tool.
8. Any SQL interface or query tool

1. Simple reporting tools that execute pre-defined SQL statements, and has no knowledge of OLAP

2. OLAP-aware tools that generate SQL

3. Multidimensional object-aware OLAP-aware tools that generate SQL

4. Tools that provide the ability to define highly formatted reports in multiple formats

5. OLAP-aware application building tools

6. Spreadsheet tools

7. Custom built applications

5. OLAP Java API

6. Oracle Excel Add-in

7. OLAP Java API
Every Oracle tool can access the power of the Analytic Workspace.

1. Simple reporting tools that execute pre-defined SQL statements, and has no knowledge of OLAP
   HTML DB

2. OLAP-aware tools that generate SQL
   Discoverer Plus

3. Multidimensional object-aware OLAP-aware tools that generate SQL
   Discoverer Plus OLAP

4. Tools that provide the ability to define highly formatted reports in multiple formats
   Reports

5. OLAP-aware application building tools
   BI Beans

6. Spreadsheet tools
   Oracle Excel Add-in

7. Custom built applications
   OLAP Java API

8. Any SQL interface or query tool
   SQL, PL/SQL
In fact, the power of the Analytic Workspace can be accessed by any third-party tool that emits SQL!
This object represents the **Analytic Workspace**

Let’s take a closer look at the AW.
An Analytic Workspace is a container that holds multidimensional data and objects.

The data in the AW is manipulated by the multidimensional calculation engine that is imbedded in the RDBMS.

AWs and the multidimensional engine were designed for efficient processing of multidimensional calculations.
A Closer Look
Analytic Workspace

- CUBES -

Definitions for logical groupings of data

OLAP DML

Hierarchy definitions

Formulas and equations

While A
Do B
End

Program source code

Dimension definitions
Measure definitions

Data relationships

Dimension data
Measure data
Use these tools to design and build your OLAP data warehouse:

• **Oracle Warehouse Builder** – *End-to-end ETL tool*

• **Enterprise Manager** – *Describe the star or snowflake logical data model*

• **Analytic Workspace Manager** – *Build AW from star schema*

• **DBMS_AWM APIs** – *Build AW from star schema*

• **OLAP DML** – *Programmatically build the AW and all of its objects*
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<thead>
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<th>Sales</th>
<th>Product Share of Sales to Parent</th>
<th>Product Share of Total Sales</th>
<th>Sales YTD</th>
<th>Sales YTD Year Ago</th>
<th>Sales YTD PctChg Year Ago</th>
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<td>100%</td>
<td>3,824,970</td>
<td>3,961,768</td>
<td>-4%</td>
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<td>91%</td>
<td>3,469,625</td>
<td>3,811,487</td>
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<tr>
<td>Memory</td>
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QUESTIONS & ANSWERS