OLAP OPTION TO THE ORACLE DATABASE

USE OLAP

- To upgrade SQL based business intelligence applications with improved query performance and rich content
- As a summary management solution for SQL based business intelligence applications
- As a dimensionally aware OLAP server.
- To centrally manage data, the business model and calculations in the database.
- To eliminate the need for stand-alone multidimensional databases

A SUPERIOR OLAP ARCHITECURE

- Supports SQL and dimensionally aware applications with a single cube
- Manages OLAP data in the Oracle database; avoids data replication
- Cost effective: uses the database, servers, DBAs, skills and applications you already have
- Enterprise ready: scalable, secure and resilient

The OLAP Option to the Oracle Database is a full-featured on-line analytical processing (OLAP) server embedded within the Oracle Database. The OLAP Option can be used to improve SQL-based business intelligence tools and applications by improving query performance and enriching them with analytic content. As an OLAP solution that is deeply embedded in the Oracle Database, the OLAP Option allows centralized management of data and business rules in a secure, scalable and enterprise-ready platform.

Upgrade performance and analytic content with the OLAP Option

To understand whether the OLAP Option to the Oracle Database can benefit your organization, ask the following questions:

- Does your organization use business intelligence tools such as BusinessObjects, Cognos ReportNet, MicroStrategy or Oracle Business Intelligence Suite Enterprise Edition?

- Would users of these applications benefit from significantly improved query performance?

- Would business users benefit from richer analytic content being made available within these applications?

- Would business users benefit from the ability to update data sets more frequently? Would the IT organization benefit from the ability to update the data sets more efficiently?

- Would the organization benefit from the ability to manage data and calculations centrally in the database and share these assets among any number of different tools and applications?

- Does the IT organization currently support a stand-alone multidimensional database to delivery a dimensional query experience, improved query performance and rich analytic content to business users?

If the answer to any of the above questions is 'Yes', the OLAP Option to the Oracle Database has the potential to improve your business intelligence solutions with OLAP and summary management capabilities embedded into the Oracle Database.

Embedded, manageable, enterprise-ready OLAP

 The OLAP Option to the Oracle Database is a full featured OLAP server embedded in the Oracle Database Enterprise Edition. The OLAP Option is designed to provide excellent query performance, fast incremental updates of data sets, efficient

ORACLE®

management of summary data and rich analytic content. A SQL interface to OLAP cubes allows SQL-based applications to query cubes within the Oracle database and benefit from the performance and analytic content of the OLAP Option.

As an embedded component of the Oracle Database, the OLAP Option benefits from the scalability, high availability and security features that make the Oracle Database the market leading enterprise-ready database:

- The OLAP Option is embedded into the Oracle Database kernel and runs in the same service as the relational database. There is no separate database service to manage.

- OLAP cubes and dimensions are stored safely and securely in Oracle data files. There are no separate data files to manage.

- As a feature of the Oracle Database, the OLAP Option fully leverages large scale computer hardware. It is fully supported by scalability and high availability features such as Real Application Clusters and Grid Computing.

- OLAP cubes are secured by Oracle Database security features.

- OLAP cubes are easily accessible using SQL. Both dimensional and relational applications can easy query the same cube.

From a total cost of ownership perspective, Oracle OLAP represents an incremental investment over the Oracle Database your organization already owns. The OLAP Option does not require separate server computers. It allows your organization to utilize the database administrators (and their skills) that it currently has. It allows re-use of existing SQL based applications with OLAP cubes.

Improving the business intelligence solutions you already own

The vast majority of business intelligence applications query relational databases using SQL. This is only natural given that most data is already stored in the relational database and that organizations find it cost effective to leverage the relational database towards business intelligence.

The OLAP Option has been designed to be compatible with SQL-based business intelligence applications. The SQL interface to OLAP cubes allows SQL-based applications to efficiently query cubes and gain access to their rich analytic content. End users benefit from excellent query performance and enhanced content in business intelligence applications.

The OLAP Option presents cubes and dimensions as relational views. All measures, whether they are simple stored measures or sophisticated custom measures, are presented as fact columns in a cube view. Applications can easily query them by simply selecting from columns in the view; they do not need to understand or express aggregation or calculation rules. As a result, even applications that have absolutely no knowledge of the OLAP Option and have no ability to express calculations within their queries can become highly effective business intelligence tools.

From the IT or application developer perspective, the OLAP Option is designed to

ORACLE®

allow organizations to easily substitute OLAP cubes and their views for relational tables. This allows the IT organization to switch to cubes and cube views with minimal costs and no disruptions to the end user community. The end user experience is enhanced with improved performance and additional analytic content. The organizations investment in business intelligence tools is preserved.

Centralized management of key business intelligence assets

Data, meta data and calculation rules are key assets of a business intelligence solution and the organization that owns it. The OLAP Option allows organizations to manage data, metadata and business rules within the Oracle Database and share these assets among any number of business intelligence tools. This strategy allows the Oracle Database to be a single version of the truth.

Data is stored in high performance cubes for fast incremental update, summary management and fast query. Business model meta data and calculations rules are centrally managed in the database; applications can query the data dictionary to discover the business model and the relational views that represent the cube.   Any SQL based application can leverage these assets to improve their performance and analytic content.

OLAP in the data warehouse

The OLAP Option allows organizations to gain maximum benefit from the investment in the OLAP cube by allowing the cube to service several different styles of query simultaneously:

- The cube can be queried directly using SQL against cube and dimension views.

- The cube can serve as a summary management solution to relational OLAP (ROLAP) applications by allowing summary data to be queried indirectly using SQL with query rewrite and cube-organized materialized views.

- The cube can be queried in a multidimensional style using the OLAP API.

Direct SQL query of the cube

The full content of the cube – including summary data and calculations – can be queried by SQL-based applications that select directly from cube and dimension relational views. Dimension views, hierarchy views and cube views are provided for this purpose. The analytic content embedded in the cube and revealed through views allow even the most basic SQL-based reporting tools to deliver high-end OLAP content.

The SQL used to query cubes is very easy to write because calculations rules are embedded into the cube and. As a result, do not need to be expressed in the query. For example:

- Measure calculations are embedded into the cube and are simply revealed as additional fact columns in the cube fact view. The application can query sophisticated calculations by simply selecting the column of the cube fact view.

- Aggregation rules are embedded into the cube and are simply revealed as additional rows in the cube fact view. The application just needs to select data

ORACLE®

at the correct level of summarization; it does not need to include aggregation functions and GROUP BY in the query.

- Partitioned outer joins are automatically and efficiently executed within the cube as needed by calculations embedded into the cube. For example, time series functions such as leads, lags and parallel periods are automatically 'densified' in the cube, thus eliminating the need for complicated outer join syntax in SQL queries

SQL query of the cube provides some important opportunities that are not usually available to business intelligence tools that query relational tables. For example, because joins are very efficiently executed in the cube it is very reasonable to issue multi-way joins, including queries that join to multiple fact views. Also, it is very easy to drill from aggregate level data in the cube to detail data in relational tables.
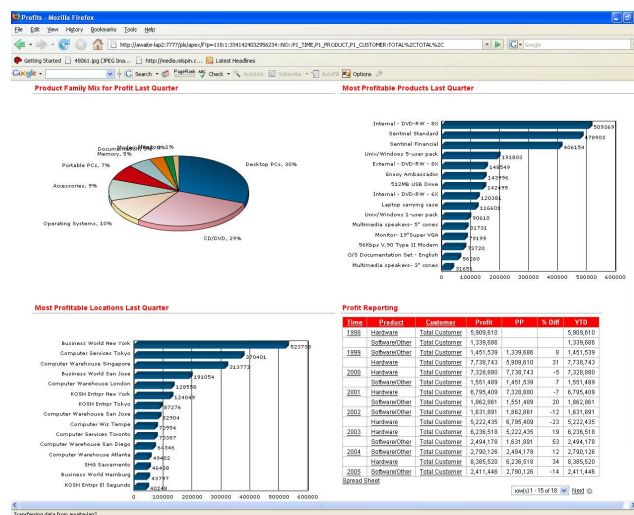
Oracle Application Express querying an OLAP cube with SQL

Cube organized materialized views – the cube as a summary management solution

SQL-based application can also use the cube as a summary management solution. In this use of the cube, summary data is managed within the cube and revealed to the application as a cube-organized materialized view. The application continues to query the detailed level data in relational tables, expressing queries for summary level data with an aggregation function and GROUP BY. The automatic query rewrite feature of the Oracle Database automatically rewrites the query to the cube organized materialized view. This application benefits from improved query performance.

Dimensional query of the cube

The OLAP option supports dimensionally aware applications with the OLAP query API. The OLAP API presents cubes and dimensions to applications in the context of the dimensional model (dimensions, hierarchies, cube and measures rather than columns and rows) and allows those applications to query in the cube with dimensional style queries. This allows the cube to service applications that present a dimensional query experience – with drill and pivot, multidimensional query filters

ORACLE®

and multidimensional calculations – to business users. The same cube that services the SQL based application can be queried with the OLAP query API.

Oracle Discoverer Plus OLAP, an example of a dimensionally aware business intelligence tool querying the Oracle OLAP Option

Main components of the OLAP Option

OLAP cubes are the core of the OLAP Option. Cubes, managed with the Oracle Database, provide the core OLAP capabilities of the database: data storage, fast update, fast query, analytic calculation functions and (along with the Oracle Data Dictionary) meta data.

OLAP cubes provide support for a wide variety of calculations including hierarchically aware time series, shares, indices, financial functions, systems of interdependent equations (models), non-additive aggregations (varying by dimension), statistical functions, statistical forecasting and allocations.

The **SQL interface** to multidimensional data types presents cubes and dimensions as relational views and allows them to be queried by SQL based applications.

Both stored and calculated measure measures, at detail and summary levels, are revealed as columns in cube views. SQL based application can query complex calculations that have been defined in the cube simply by selecting a fact column.

Dimension views reveal the rich structure of the dimensional model and make them available for SQL query. SQL-based applications can take advantage of columns that express the hierarchical nature of the data (for example, parentage, ancestors, descendants and attributes) and use them within query filters or attribute based aggregations.

The OLAP Option provides excellent support for value based (also known as child-parent based) hierarchies for which there are no levels. SQL based applications can easily query such hierarchies using OLAP dimension views.

The **OLAP API** has two purposes. First, it is used to define to define and maintain the cube. The OLAP API is used to define the structure (cubes, measures, dimensions, levels, hierarchies and attributes) of the dimensions and cubes,

ORACLE®

OLAP IN THE ORACLE DATABASE

OLAP cube and dimensions enhance the database warehouse and SQL based business intelligence applications with fast, query fast update and analytic content.

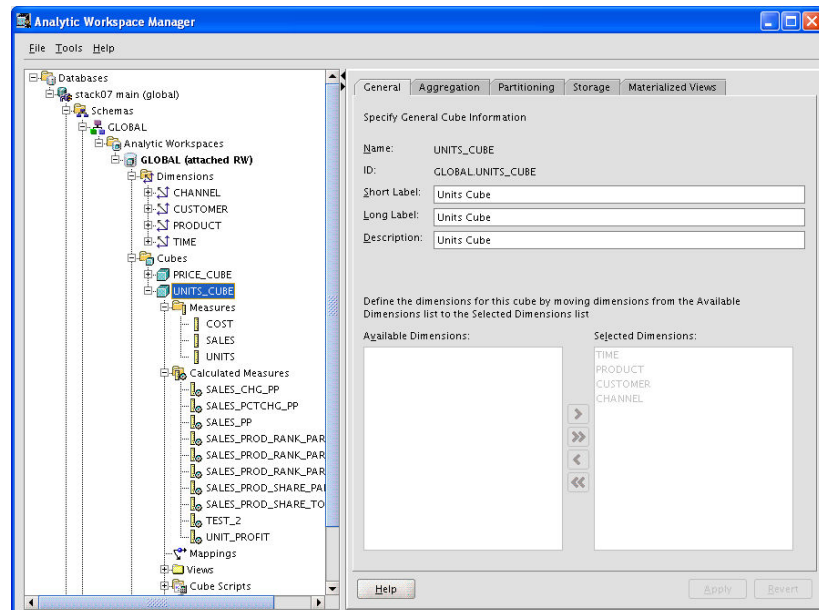The SQL interface to OLAP cubes allows any SQL based application to query OLAP cubes.

Centralized management of data, meta data and business rules lowers the total cost of ownership of business intelligence solutions.

mappings to source relational tables and calculation rules within the cube. Second, the OLAP API can be used to query cubes and dimensions in a multidimensional context. The OLAP API is a Java API.

Cube-organized materialized views are materialized views that can be used to manage the periodic refresh of cubes and dimensions and to allow SQL based applications to transparently use the cube as a summary management solution. Cube based materialized views are managed using the DBMS_MVIEW.REFRESH program, just like table based materialized views. Summary data in the cube is automatically accessed by SQL based applications using the query rewrite feature of the Oracle Database.

Analytic Workspace Manager is an administrative tool that is used to design and manage OLAP cubes and dimensions. Using Analytic Workspace Manager, the DBA or application developer designs dimensions, hierarchies, cubes, stored measures, calculated measures, aggregation rules, forecasting rules, allocations and security policies for cubes and dimensions. As part of this process, dimensions and cubes are often mapped to source relational tables.

The user may also use Analytic Workspace Manager to manage periodic refreshes of dimensions and cube, to view data within the cube, to view relational views of the cube and to managed cube-organized materialized views.

ORACLE®