

Oracle Business Intelligence Reporting and Analysis

An Oracle White Paper

December 2004

Oracle Business Intelligence Reporting and Analysis

Introduction	3
Trends	3
The OLAP Reporting Challenge and the Oracle solution	4
OLAP and relational: when to use which	5
How recent does the report need to be?	5
How much flexibility do your users expect when reporting?	5
Do you need to answer a series of questions before answering your ultimate question?	6
Do you need to control the sequence of conditions for your query? ...	6
Do you need to define and track a certain grouping of data as a single entity?	6
Do you need to report against certain types of hierarchies?	7
Conclusion	7

Oracle Business Intelligence Reporting and Analysis

INTRODUCTION

The real value of a database is not in collecting data about your business. *It is in reporting against the data that you have collected.* Knowledge comes not from pushing operational measures into a database, but in pulling them out for analysis and projection. The two prime ingredients of any business decision are an executives experience and the quality of the report in his hand. While there is no substitute for an experienced executive it is clear that a strategy to deliver quality reports in a timely, easily accessible fashion can enhance the decision making capability of an organization at all levels.

TRENDS

Over decades of helping many companies with their reporting needs we have noticed several developments:

Quality reports are key. Having spoken with many customers, we have noticed a growing trend for executives to arrive at meetings armed with spreadsheets only to find that each has different values for the same metrics. The rest of the meeting is then spent arguing over whose numbers are correct, rather than in actual decision making based on consistent numbers. This malaise is largely an offshoot of *data fragmentation*, the fracture of a single version of operational truth into multiple data sources, often not correlated with each other. The most significant part of providing quality reports is the choice and architecture of your reporting solution. As we will see below, Oracle's Business Intelligence solution is intrinsically architected to present a high quality reporting environment, because it combines both reporting and analysis technology into a single database.

Quality aside, another important facet of reporting is delivery. Users want reports to be personalized, organized, timely, easily accessible and in their preferred format. For example, in today's business environment it is desirable to be able to e-mail reports to colleagues, create spreadsheets from report results and access reports securely over the internet.

One aspect of reporting that is frequently overlooked is its integration with other IT infrastructure elements. We have seen some customer departments so completely focused on "solving the reporting problem" - evaluating checklists of features from various vendors, reading analyst reports on each vendors - that they fail to coordinate this effort with the bigger company wide picture of how that

reporting piece fits into other infrastructure (such as the central security repository or caching strategy) These customers then find themselves in the position of having to stitch together their data warehouse, reporting, security and portal solutions and own the problem of identifying the correct vendor to call should a problem arise. Oracle's integrated reporting solution provides not only feature rich reporting and analysis components, but also all the necessary infrastructure that is necessary for smooth operation: and enterprise class portal, a high performance cache, an LDAP server and secure single sign-on capabilities.

THE OLAP REPORTING CHALLENGE AND THE ORACLE SOLUTION

Many companies today face the hurdle of determining when and how to use OLAP multidimensional engines with their relational database systems. In particular, reporting against these two environments has typically meant the introduction of disparate reporting systems, one for the relational side and another for OLAP. Both users and administrators have to learn to navigate two different sets of tools, each built for one or the other technology. Oracle's approach to reporting and analysis is simple: first combine both OLAP and relational engines into a single container (starting with the Oracle 9i OLAP option) and then offer a single, integrated reporting experience against both engines. The benefits which accrue from this approach are numerous:

- Intrinsically this approach lends itself to data fragmentation reduction. There is a single source of truth, which immediately improves report quality.
- End users benefit from the ease with which they can drill down from aggregated OLAP reports down to the transactional details in the relational database.
- A single OLAP/relational database makes it easy for administrators to apply consistent security and access rules to both relational and OLAP data, rather than duplicating and maintaining two copies of the same in the traditional multi-engine approach.
- Extract, transform and load (ETL) processes to build the OLAP cubes from a relational source is run more efficiently within the same database, rather than the traditional multi-engine approach which forces the extract from the source relational system and then a load into a separate OLAP engine. A single tool, for example Oracle Warehouse Builder, can be used to both perform the extraction and populate the cube, while the traditional approach typically requires more than one administrative tool for the job – an ETL tool to extract and scrub the data from the relational source and a separate import utility for the OLAP engine.
- By providing a consistent user interface for report creation and delivery, both report authors and consumers are assured of a consistent user experience when interacting with either relational or OLAP reports. In

fact, report consumers will find it transparent to them whether reports are derived from an OLAP or relational data source when using OracleBI Discoverer. Custom BI reporting applications built using the OracleBI Beans also automatically inherit the same user interface that the pre-packaged OracleBI Discoverer solution provides.

OLAP AND RELATIONAL REPORTING: WHEN TO USE WHICH

Customers often ask about the appropriateness of one technology versus the other when it comes to reporting. The best guidance to answering this question boils down to the business question you would like to answer. Detailed, real-time operational data with little analytic computation (how many parts are in stock today?) is often best queried using relational technology. Forecasting and other highly analytic computation (how many parts will I need next season?) are often best done with OLAP technology. Between the two lie an area of reporting with overlap. Business questions in this overlap area can be answered effectively with reports based on either technology, so your choice can be influenced by the following factors:

How recent does the report need to be?

As mentioned above, reporting at the level of an atomic transaction (a single customer order in a particular warehouse on a particular day) is often best queried with a relational reporting tool such as OracleBI Discoverer. OLAP data may lag behind relational data on a set schedule if you are planning to populate your cubes with relational data.

With the Oracle OLAP option it is possible to *materialize* your cube on top of a star-schema structure, giving you the benefits of maintaining a relational structure while presenting an OLAP structure for reporting.

How much flexibility do your users expect when reporting?

When you build an analytic workspace you are defining a structured reporting environment ahead of time for your users to explore. This dimensional modeling of your business - for example quantity of goods sold (measure) by time, geography and sales channel (dimensions) - is an intuitive way for end users to think when posing business questions. However they are “fixed” to the cubes you have built and populated ahead of time. It depends on your schema design, but with relational reporting end users are free to include items in their report which may not have been anticipated by the administrator – if a join relationship exists to an item of interest, it can be sensibly included in a report, which is much more flexible.

Related to flexibility is the size of the reporting environment you make available. It is relatively cheap in terms of computing resources to add a new table or a new record into a table for a relational system. It is also relatively easy to create reports which access extremely large tables, with billions of records. On the other hand it is more expensive to add a new dimension to a cube. The addition of each new

dimension exponentially creates more computation required to “solve” for a particular cell in a cube.

Do you need to answer a series of questions before answering your ultimate question?

One area that relational and OLAP engines differ is in the way they handle conditions. Say for example you would like to run a report which answers the question “what are my top three business units?” At this stage, either relational or OLAP reporting could answer this question effectively. Suppose further that you realize that some of your business units are brand new, so you would like to exclude them from consideration and only consider your more established business units. Your report is now refined to “what are my top three business units, excluding those units that did not generate more than \$100,000 of revenue last year?” With the addition of this caveat, OLAP reporting begins to have an edge over relational. In order to answer this question using relational technology, you would first need to create a query which determined which business units earned over \$100,000 last year, and then pass those results into a second query which ranked them according to revenue. This *nested subquery* can be complex, and its performance may not match the OLAP equivalent of such a query. The more predicates that need to be answered before the final question can be, the more desirable it is to use OLAP technology to answer the question.

Do you need to control the sequence of conditions for your query?

Related to the point above, the OLAP model presents the user with an easier ability to sequence the order in which query steps are performed. For example, asking “who are the employees in my San Francisco business unit who are below the average age” will return two different answers depending on whether you first calculate the average age of all employees (nationwide) and then filter the list by San Francisco employees or if you first filter the list by San Francisco employees and then calculate their average age. OracleBI Discoverer with an OLAP connection makes it easy to compute this answer, while it is possible but more challenging to construct this query using OracleBI Discoverer with a relational connection.

Do you need to define and track a certain grouping of data as a single entity?

It may be convenient for reporting purposes to group the San Francisco and New York business units together as a single entity. All the normal metrics and conditions that you could associate with either individual business unit you want to apply to the newly defined *custom aggregate*. If this is your need, the OLAP model provides an easier means of creating and managing this new entity than the relational one.

Do you need to report against certain types of hierarchies?

One area where OLAP is better suited for reporting occurs when the data has *unbalanced hierarchies* (also known as *value based hierarchies*). A common example of this is the organization chart for your company. Some managers at a given level may have hundreds of employees, while others at the same level may have none. If you wish to create a report which computes the salary totals for all managers at a given level, you will find this question more efficiently answered with an OLAP reporting system than with a relational one.

However, if your hierarchies are symmetric then arguably either type of technology is equally capable of providing the answer. For example, the time hierarchy is completely symmetric. Each year has the same number of quarters and each quarter has the same number of months in it.

Final Thoughts

One powerful benefit of the Oracle Business Intelligence reporting solution is that it combines the presentation of both OLAP and relational reports to end users via a single interface. For example, it is easy to combine both relational and OLAP reports into a single Oracle Portal page for a unified presentation of business metrics in a dashboard. End users will not be aware of whether a given report is derived from an OLAP or relational source, but are free to perform analysis activities (pivoting, drilling, sorting and so on) on these reports transparently. Further, it is easy to construct OLAP reports which drill out to relational reports for additional detail.

In short, no matter whether you choose relational, OLAP or a hybrid strategy to answer your business questions, you can be assured of a clean presentation and report development environment which makes it easy to ask and answer your business questions.

CONCLUSION

A variety of guidelines have been presented which will help determine the best technology to use to answer a given business question efficiently.

Oracle's Business Intelligence reporting solution offers several unique capabilities to make sure that extracting actionable meaning from your data is as easy and productive as possible. The Oracle Business Intelligence reporting and analysis value proposition can be summarized as:

- A complete solution, providing components which span the spectrum of all activities related to reporting, from data scrubbing to final delivery in an executive dashboard.
- A unified experience, offering the same user experience regardless of whether reporting is done against an OLAP or relational datasource. This is a unique capability that guarantees a transparent report interaction

experience regardless of whether you use OLAP, relational or both technologies for reporting.

- Simplified administration, as the Oracle OLAP option combines the world's leading relational database with a powerful OLAP engine, so duplication of security rules and access privileges is not necessary, and cube generation and maintenance is much more efficient than with a separate OLAP engine.
- Scalable, reliable and performant: not only is Oracle's renowned scalability and performance expertise engineered into its reporting solution, but it is designed to take advantage of the latest technologies and features afforded by the database.
- A single vendor to call: Oracle's Business Intelligence reporting is an integrated part of an entire *reporting process*. You never have to spend IT resources to debug and determine which tool provider to call for support.



Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
+1.650.506.7000
Fax +1.650.506.7200
<http://www.oracle.com/>

Copyright © Oracle Corporation 2004
All Rights Reserved

This document is provided for informational purposes only, and the information herein is subject to change without notice. Please report any errors herein to Oracle Corporation. Oracle Corporation does not provide any warranties covering and specifically disclaims any liability in connection with this document.

Oracle is a registered trademark of Oracle Corporation.

All other company and product names mentioned are used for identification purposes only and may be trademarks of their respective owners.