

Technology Audit

Business Intelligence

Oracle Business Intelligence and Warehousing Product Family

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Abstract

Oracle has significantly improved its Business Intelligence (BI) offering over the last few years, and this has been brought to fruition in the 10g release. The BI and Warehousing (BIW) product family is based on the Oracle 10g database, with Online Transaction Processing (OLTP) and Online Analytical Processing (OLAP) combined in the one database. This level of integration makes Data Warehousing easier to build and manage, and with just the single data repository, organisations will find their data loading operations simplified, more easily secured, and less prone to fragmentation of data sources – i.e. maintaining the single version of truth. All the features of the latest generation 10g database, such as scaling with Oracle Real Application Clusters (RAC) are available for BIW. The BIW family spans end-to-end BI and Data Warehousing, with out-of-the-box solutions, as well as tools and Application Programming Interfaces for custom development in Java. Where once Oracle's BI solution was tied to its full licence Application Server (AS), customers can now choose BIW in an open way, with Oracle AS technology embedded for sole use by that solution. This strategy strengthens Oracle's position in the BI market.

KEY FINDINGS

Key: ✓ Product Strength ✗ Product Weakness i Point of Information

✓	Advanced Data Warehousing solution for very large data sizes.	✓	Suitable for both out-of-the-box solutions and custom BIW application development.
✓	Combined OLTP and OLAP in one database.	✓	Oracle is growing its vertical, pre-built analytic solutions.
✓	End-to-end BI solution, on an integrated platform.	i	The solution is available on a wide choice of OS platforms.
✓	Advanced range of data mining solutions.	✗	For end-user reporting it lacks the versatility of the top end reporting specialist BI tools.

LOOK AHEAD

Oracle has a number of additional applications in the pipeline to sit within the BI family, such as XML Publisher, but the Oracle Business Activity Monitoring (BAM) package will be the most significant forthcoming release. Butler Group expects Oracle's new open BI strategy to help it gain market share.

► FUNCTIONALITY

Product Analysis

Oracle's Business Intelligence and Warehousing (BIW) offering is naturally based on the latest Oracle 10g database, but in a departure from its previous position, there is a greater openness in the current generation of tools. Business Intelligence (BI) is an important strand in Oracle's portfolio and the choice now available can give non-Oracle application server customers the option of adopting its BI solution, which will contain application server components exclusively for the BI operations. This change from Oracle's previous generation of BI products positions it as a much stronger player in the BI market. Having said that, many large enterprise customers are already Oracle houses, so they will be all the more recipient to Oracle's BI message.

Oracle 10g takes up the strategy first seen in 9i, which is to offer both Online Transaction Processing (OLTP) and Online Analytical Processing (OLAP) in one platform: this makes it a lot easier to perform OLAP without having to move vast quantities of data around. In Oracle 8i the data stores were kept separate, with Oracle Express database used for OLAP. In 9i a single server and security model combined traditional OLTP tables and views with Analytical Workspace (AW). AWs are collections of multidimensional cubes stored in the Oracle database. These cubes are similar in purpose and content to the multi-dimensional database files of Oracle Express Server. In 10g the integration that was started in 9i has been significantly enhanced: there is SQL access to relational and multi-dimensional data, and there is also an OLAP Application Programming Interface (API) that offers powerful slice and dice functionality against either data source – with 10g there are major performance improvements of speed and data volumes, as well as easier administration. With a single point-of-administration, Oracle makes managing a data warehouse and multidimensional data much easier. The level of integration that started with 9i is thus complete in 10g, with relational and OLAP tools integrated at the same time as the data sources are integrated.

Product Operation

The architecture of the BIW solution (see Figure 1) starts with ETL: Oracle Warehouse Builder provides an ETL tool to load data from legacy, ERP, and other databases, including non-Oracle sources. The data is gathered and stored as Data Warehouses, Datamarts, or OLAP cubes, and can be used with the data mining technology. Under the Application Server family, Oracle provides the tools to analyse the data in a manner appropriate for the user's needs. Oracle BI includes Oracle Reports for enterprise reporting, Oracle Discoverer for ad hoc analysis and query of relational and OLAP data, Oracle Spreadsheet Add-In incorporating OLAP data into Excel spreadsheets, and Oracle BI Beans for creating custom BI applications. In addition XML Publisher is soon to be released allowing users to create highly formatted reports through the familiar environment of Word documents. Oracle has announced the release of Oracle BAM, extending the functionality of BI to operational BI and provides real-time analysis of events and their impact on the organisation. Incorporating real-time workflows and alerts with Key Performance Indicators, customers are able to get immediate insight into their organisation. All of the BI Tools can be used with Oracle Portal providing a simple-to-use, easily customisable dashboard to incorporate all BI data, facilitating greater adoption and use of BI throughout the organisation.

Developing applications against OLAP is possible using Java and Oracle development tool JDeveloper. The OLAP API is available for programmers, and at a higher-level BI Java Beans are exposed. This means that users can access multidimensional views of data, create OLAP reports, based on user-defined metrics. OLAP reports offer line-of-thought facilities to change the data being viewed and allow users the opportunity to discover new information in real-time. On top of these facilities, Oracle can offer Corporate Performance Management features such as forecasting, planning, and 'what-if' scenario modelling.

Oracle's OLAP option contains a multidimensional engine with multidimensional datatypes to support the analysis of business users, offering consistent, high-speed performance from simple to complex queries. It includes an OLAP API for Java application development, a SQL interface, which allows standard SQL tools to access the OLAP data, as well as an XML API for defining OLAP multidimensional objects and cubes in AWs. AWs are stored as binary objects within the database. In Oracle 10g, OLAP cubes can also be partitioned, making the storage and access far more efficient, with objects partitioned by range or list.

Commands can be executed in parallel on partitioned variables resulting in significant performance improvements in processing large volumes of data, for example, updating data loads and aggregations. 9i focused on the initial integration of the multidimensional cube in the database, e.g., storage and SQL interface. 10g focused on performance (build and query), scalability, and ease-of-administration. The old Oracle Express 4GL Data Manipulation Language (DML), has been retained and enhanced. The Express 4GL, now known as the OLAP DML is a stateful, dimensionally aware procedural programming language for data manipulation and query. Thus the DML UPDATE command will run in parallel on partitioned variables. In contrast, SQL is a stateless language for query and DML functions. OLAP DML can be likened to PL/SQL in that they are both programming languages.

Oracle cites the following examples to illustrate the new performance improvements: a seven dimensional Oracle Express cube with 350,000 composite values (composite values are the combination of dimensions where there was actual data) was built 16 times faster with 10g OLAP. A seven dimensional Express cube with 35 million composites was built nine times faster, and an eight dimensional cube with 1.25 billion composites partially aggregated was fully aggregated four times faster.

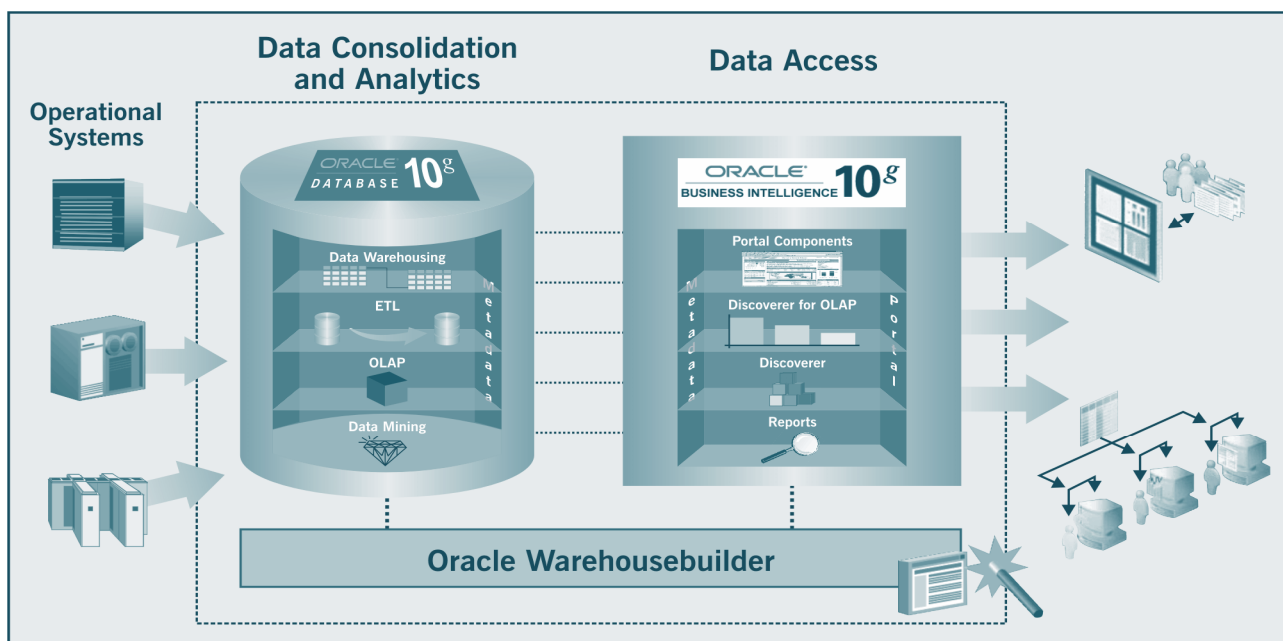


Figure 1: Oracle BIW Architecture

OracleBI Discoverer is an intuitive ad-hoc query, reporting, analysis, and Web-publishing tool, enabling advanced analyses on both operational and OLAP data sources. Discoverer has been rewritten using Oracle BI Beans, which in turn use the OLAP API or the End User Layer to access the 10g database. Data Mining results, such as the discovery of patterns and relationships in data and exploiting that information, is possible through Discoverer, for example, historic data is used to build a model and run on new data to predict individual behaviour, segment a population, or determine relationships within the population.

Oracle has tackled the bottlenecks that afflict Data Mining, so for example, if a new variable is to be added to a Data Mart, then the traditional process of adding this information may involve the database administrator, who will authorise the request, involving delays, and the Data Mining model will have to be re-built, or the data miner may wish to increase the sample size, i.e. input more rows, so this increases the processing time. Running the model itself in a single thread environment also consumes processing time. In deploying the model the users will ask for propensity scores and risk profiles for marketing campaigns and fraud investigations, and this information will often be requested for real-time customer interaction. Oracle 10g has improved the usability of Data Warehouses for Data Mining by offering parallel processing, multi-threading, allowing users greater ease in adding new data to models, and to run many more models in a reasonable time frame.

Oracle Data Miner is a GUI tool featuring data manipulation, such as random and stratified sampling, normalisation, discretisation, table splits, and filtering. It features new advanced algorithms such as Support Vector Machines for regression and classification, Association Rules, Adaptive Bayesian Networks and Naïve Bayes, Cluster Analysis, Non-negative Matrix Factorization (NMF) for feature extraction, Blast for Similarity searches, and Decision Trees. Data Miner can mine unstructured text data, so it can analyse large volumes of inbound customer e-mails, and analyse clusters within fault reports that contain free format text fields.

In addition to advanced algorithms, all the traditional statistical analysis methods are available, including: correlations Pearson's, Spearman's and Kendall's; cross tabulations using chi squared, phi coefficient, Cramer's V, contingency coefficient, Cohen's kappa; hypothesis testing using t-test, F-test, ANOVA, Chi-square, Mann Whitney, Kolmogorov-Smirnov, Wilcoxon signed ranks; distribution fitting using normal, uniform, Poisson, exponential, Weibull; and SQL pattern matching using regular expressions.

Using the technology stack Oracle provides pre-built applications ranging from operationally oriented Daily Business Intelligence for its e-Business Suite to strategically focused Corporate Performance Management applications, including Enterprise Planning and Budgeting, Activity Based Management, and Balanced Scorecard.

Failover and backup provisioning of Oracle BI is based on the Oracle database, all of these database features are available to the BI application. There is also protection from unexpected system failures with Oracle Real Application Clusters it is possible to build high availability, scalable database servers across multiple systems. Oracle also provides an extensive Data Protection and Disaster Recovery solutions portfolio configurable to suit all individual business needs, for example, human error is among the leading causes of downtime, so a powerful, easy-to-use Flashback technology can quickly diagnose and recover from human error. The need for planned downtimes is also minimised in Oracle 10g.

In addition to the database, Oracle Application Server 10g Release 2 has extended the High Availability features of previous releases to provide a reliable and fault-tolerant application server platform for the Grid. Most of the tasks and configuration work required for the deployment and administration of a highly available system have been automated. The inclusion of OracleAS Guard for disaster protection, Oracle Flashback Database for fast-undo and human error protection, and a resilient cluster framework for Identity Management services and J2EE applications, make OracleAS 10g Release 2 a high-availability application platform suite.

Product Emphasis

Oracle's emphasis in the 10g BIW family is on consolidation, achieving a more scalable and cost-effective Data Warehousing solution; by bringing the algorithms to the data rather than the other way round, there is less need for special purpose ETL and OLAP engines – these are now embedded in the consolidated database. 10g also offers common consoles for the suite, so the end-user experience is also improved. What is often the most costly part of the BI/Data Warehouse process chain – the data input – has been improved with better ETL, metadata management, and data quality services. Finally, the enabling part of the BI chain has been enhanced with integration of CPM and Business Activity Management (BAM) products.

Another key theme is integrated capabilities within OracleBI components, for example, Oracle Warehouse Builder can generate Oracle Discoverer reporting metadata; Oracle Discoverer can embed content in Oracle Portal to construct dashboards, or can hand content to Oracle Reports for further refinement prior to enterprise wide publishing. With lineage capabilities, users in Discoverer can drill back to the underlying data warehouse to understand which columns or ETL transformations were applied to derive a given report item.

The complexity of Data Warehousing is considerably reduced by virtue of the consolidated Oracle 10g database, reducing maintenance costs associated with separate server products. Security is improved because the data never leaves the database, and the issue of one version of the truth is easier to adhere to with a single main repository.

In addition, Oracle is providing a growing number of vertically-based BI applications including Oracle Financial Services Application, Oracle Marketing, and Oracle Demand Planning.

► DEPLOYMENT

Oracle BI solutions are built on Oracle technology, which is well established in the market place, for example, the vendor claims that the majority of Data Warehouses in the world are built on it. So there is a wide choice of partners and SIs to implement solutions and there is a considerable amount of expertise available, thus providing customers with reassurance that an Oracle solution is tried and tested.

Implementing the software is typically a small part of the job, around 20% of the total effort, with the vast majority of work for a BI or Data Warehousing system is spent on the softer issues of data quality, data ownership, and processes. Oracle Consulting Services' Oracle Warehouse Method provides an incremental delivery of a solution helping to reduce risk and costs, as well as ensuring early success. Thus Oracle BIW products can be implemented independently, and evolve by adding modules as requirements expand or change.

Oracle is continuously innovating solutions to reduce overheads and costs associated with managing the database, for example, in the past, managing Oracle databases needed a more hands-on approach by the database administrator. Today many daily admin tasks are automated and a greater use of automation is available for some of the more sophisticated operations. Oracle 10g has taken this trend further with new self-managing features, such as an intelligent self-management framework, self-diagnostic engine, Automatic Tuning Optimizer, and automatic memory management capability. Thus, according to Oracle, its existing customers would see little incremental effort involved in implementing an Oracle BI solution, as it capitalises on skills and knowledge already held within the organisation.

Oracle training is available in different formats to satisfy different educational needs. Course are offered in traditional instructor led courses, live Web classes, self-study via CD ROM, or self-study on-line. In addition there are samples and tutorials that students can work through, as well as discussion forums to seek advice.

Oracle Standard Product Services for Oracle products includes Software Updates License & Support, giving access to Oracle expertise where and when it is needed. This service provides customers with rights to Oracle product upgrades, maintenance releases, patches, documentation, and access to Oracle's knowledge-base of solutions at OracleMetaLink. In addition to this, Software Updates License & Support provides customers with around the clock technical assistance for all Oracle products via telephone or on-line at OracleMetaLink.

Oracle's BI technology is available on all platforms where the Oracle database and application server are available, including Fujitsu PrimePower, Linux, IBM AIX, HP-UX HP Tru64, Sun Solaris, and Microsoft Windows.

Legacy system integration is possible through Oracle Warehouse Builder, which enables data to be extracted from legacy systems and used in a BI solution. In addition, Oracle Application Server Integration BAM provides facilities to monitor business activities across the enterprise. Both BAM and Oracle Warehouse Builder leverage the integration components available with Oracle Integration – InterConnect, BPEL Process Manager, BPM, B2B, and adapters.

The pricing structure is given in the following table:

Product Name	US\$ Price per CPU	US\$ Price per Named User
Oracle Database SE One	4,995	149
Oracle Database SE	15,000	300
Oracle Database EE	40,000	800
EE Options:		
OLAP	20,000	400
Datamining	20,000	400
Oracle Portal	10,000	200
Oracle BAM	20,000	400
Oracle Business Intelligence:	20,000	400
Oracle Discoverer		
Oracle Reports Server		
Oracle Spreadsheet Add-in		
Oracle Warehouse Builder		
Oracle Business Intelligence Beans		
XML Publisher	30,000	–
E-business Intelligence		3,995/user
Balanced Scorecard		1,995/user
Financial and Sales Analysers		2,195/user
Enterprise Planning and Budgeting	595/Read-only User	2,995/user
Activity Based Management		1,995/user
Various Vertical Applications		

► PRODUCT STRATEGY

Oracle's strategy with its BI solutions has been in the past firmly based around the Oracle database and the Oracle Application Server (AS). This created a problem for the BI and DW group, in that it tended to exclude any potential customer heavily invested in non-Oracle Application Servers. The latest generation of Oracle's BI tools are either part of an enterprise bundle of Application Server Enterprise Edition, which also includes Oracle Portal and Oracle BAM, or can be purchased as a separate package: Oracle Business Intelligence. Oracle BI includes Oracle Discoverer, Oracle Reports, Oracle Warehouse Builder, Oracle BI Beans, and Oracle Spreadsheet Add-In. A full licence Oracle 10g is necessary, although Oracle Generic Connectivity and Oracle Transparent Gateways make it possible to connect to a heterogeneous environment. However, customer demand has led Oracle to offer an option that allows BIW to work with existing non-Oracle AS investments, essentially by using a dedicated, embedded Oracle AS at no additional cost. This places Oracle BIW as an open BI solution, and is a superior strategy to take to market.

Oracle BIW solutions are appropriate for small-to-medium enterprises and departmental solutions right through to large-scale enterprise Data Warehouses. The expected Return On Investment (ROI) can vary from project-to-project. According to Oracle, one of its customers, a UK retailer, achieved 100% ROI while the BI solution was still in the beta stage. In another case, a German adhesives company, achieved 100% ROI in just a year on their 1.7TB Data Warehouse.

Oracle sees market opportunities in three areas: complete BI and Data Warehousing solutions; in BI tools; and in BI applications where the intention is to develop pervasive embedding of BI in end-user applications. Oracle has established a Partner Network for supporting its BI solutions, and works with SIs to implement customer solutions if necessary.

Oracle can offer perpetual or term licensing: A five-year term license is available at 70% of perpetual license; a four-year term license at 60% of perpetual license; three-year term license at 50% of perpetual license; two-year term license at 35% of perpetual license; and one-year term license at 20% of perpetual license. Support is 22% of perpetual license, which includes software upgrades. Oracle BI and Data Warehousing products, solutions, and applications are released in conjunction with Oracle Database, Oracle Application Server, and Oracle Applications cycles. There is a major release in these areas typically every 18 months. Interim releases are made available every four to six months as required.

Given the intense competition in the software business, Oracle aims to maintain a first or second position in each of its software product categories chiefly through lowering the total cost of ownership of its software products by improving integration, decreasing installation times, lowering administration costs, and improving the ease-of-use. In turn this improves the ROI for its customers and drives greater demand.

► COMPANY PROFILE

Oracle Corporation (NASDAQ:ORCL), headquartered in Redwood Shores, California, with 300 offices worldwide in 145 countries, is the world's second largest independent software company, specialising in information management. Product lines cover database, tools, and enterprise application products. The company also offers consulting, education, and support services. Of the 49,872 full-time employees, roughly evenly split between the USA and internationally, Oracle employs 13,114 people in research and development, 11,445 in sales and marketing, 4,937 in license updates and product support, 14,125 in services, and 6,251 in general and administrative positions. Oracle technology can be found in nearly every industry worldwide and in 98% of Fortune 100 company offices.

The company was originally founded as Software Development Laboratories Inc. (SDLI), by Larry Ellison, Robert Miner, Edward Oates, and Bruce Scott in 1977. In the early days, the company built a commercial database management system for IBM, in a project commissioned by the Central Intelligence Agency (CIA) with the code-name ORACLE. In 1982, this became the new name for SDLI, and the company pursued the development and distribution of database software, with Miner, Oates, and Scott concentrating on the database development side, while Ellison was, and still is, responsible for the vision of the organisation and for bringing clients on board. Oracle went public in 1986.

The company has made a number of acquisitions in its history, the most significant of the recent ones are PeopleSoft and Siebel (in progress), pitching Oracle firmly in the Enterprise Applications market.

Revenues and Net Income for the last three financial years, ending 31 May, were as follows:

	2005 (US\$ million)	2004 (US\$ million)	2003 (US\$ million)
Revenue:	11,799	10,156	9,475
Change on previous year:	16.2%	7.2%	(2.0%)
Total Net Income/(Loss):	2,886	2,681	2,307

The geographical split of revenues by region is Americas – 49%, EMEA – 36%, and Asia-Pacific 15%. Oracle has over 18,000 Discoverer customers alone, representing a small subset of its total BI and Warehousing customer base.

A highlight of some of Oracle's solutions, cited by the vendor, are as follows: Amazon.com's rapidly growing 10 terabyte Data Warehouse paid for itself in six months; ABSA increased availability of a three terabyte Data Warehouse from 75% to 100% with Oracle; Henkel Consumer Adhesives saved more than US\$1 million and builds competitive edge on a 1.7 terabyte Data Warehouse with Oracle Business Intelligence solutions. Yahoo!'s 100 Tb Data Warehouse is the world's largest independently verified Data Warehouse, according to the 2005 Winter Corp Top Ten survey of very large databases.

► SUMMARY

Oracle provides tools, technologies, and pre-built applications to satisfy the BI and analysis requirements of the enterprise. Supplying tools for ETL, OLAP, analytics, data mining, and legacy integration, combined with Oracle's database technology, Oracle can offer an integrated and end-to-end BI platform, including Oracle Reports and Microsoft Excel compatibility in the final BI segment. In addition, Oracle technology is used to create solutions from operational, real-time BI through to strategic analysis with CPM and pre-built analytics. Its commitment to open standards does not lock customers in to a single choice and allows them to freely mix and match solutions to suit their requirements.

The single database for both OLTP and OLAP will make using Data Warehousing a lot easier and increase its use within the organisation. In Butler Group's opinion, the Oracle BIW family will help make BI more pervasive within the enterprise, in end-user applications.

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