Management Reporting on Oracle Exalytics In-Memory Machine
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Executive Overview

It isn’t enough to know how many widgets you sold last quarter, or to whom, or through what distribution channels. Today’s business leaders need to know how profitable widgets are, how optimized is the manufacturing process for widgets, and what is the price elasticity of the market for widgets. Also, they need to know not only for yesterday’s or last week’s sales, but also for the future. When do widgets become commodities or obsolete? Gone are the days of looking back. Delayed reaction to market changes costs organizations millions in sales, market share and leadership positions. They must be able to have a 360 degree view across their product lines, markets, distribution channels, production facilities, overhead, and so on. Exploiting the vast amounts of data contained in an organization’s operational systems is critical to implementing a world class management reporting system. But the mixed approach to tools, applications and infrastructure many take is not the answer. These organizations become bogged down with too many tools that, while perhaps functional to the end user, are not scalable across the enterprise. Each business function focuses on its immediate problem but then quickly finds that the next problem is out of reach of their existing solution.

Management reporting covers a broad spectrum of reporting such as: detailed report packages that include financial and non-financial data combined with business commentary, interactive reporting and dashboards that enable analysis and decision support, and monthly or quarterly report package distribution.

Only Oracle offers a true engineered solution specifically targeted to management reporting. From software to hardware, Oracle’s enterprise performance management system deployed on Oracle Exalytics In-Memory Machine (Oracle Exalytics) provides the ability to solve today’s and tomorrow’s management reporting needs across the organization to large numbers of users, across all business functions, scheduled or on-demand, with near-zero latency while also enforcing standard metrics, KPIs and calculations.
Introduction

Management reporting is often times a misnomer, as it implies that only key management/executives in an organization participate in or benefit from the process. Having an effective management reporting strategy entails more than simply an easy-to-use front end tool or elegantly designed data marts. To fully capitalize on the investments in hardware and software for achieving a world class management reporting solution, it is important to understand what makes management reporting fundamentally different from operational or transactional reporting.

- **Identify what drives your financial performance.** These drivers may be external or internal, controllable or uncontrollable, and most likely vary by market, product or geography in which a business operates.

- **Backward and forward looking.** It isn’t enough to understand what happened last month or quarter. It is also necessary to give visibility into future results. For example, given certain supply issues, labor/staffing difficulties or delays in a new facility coming online, how will that affect next quarter’s key metrics (i.e. revenue, profit, earnings per share, etc).

- **It’s about qualitative and quantitative information.** Understanding and communicating the “why it happened?” is often many times more important than the “what happened?” Being over budget or under plan by 5% is useful from a metric reporting standpoint. But was the variance due to increased discounting, higher cost of sales, higher cost of production, or an increased demand in lower margin products? Is this an isolated event, or will it be an ongoing concern that needs to be addressed by refocusing on a higher ASP, lower cost sales models, sourcing parts from alternate vendors or addressing the product mix? This requires the system be highly interactive with users able to easily navigate and analyze the information.

- **Focus on profitability.** Every business needs to optimize profitable activities and address unprofitable ones. Are the customers driving your support costs your most or least profitable? What is the earnings per share impact in engaging in an unprofitable activity? Where is each product at in terms of its maturity cycle? Are they in high demand and high margin, or in low demand and low margin? In other words, have they crossed the chasm to being mainstream in a highly competitive environment that brings pricing pressures, reduced differentiation, and declining margins? This often means being able to assign pools of revenue and costs to a product, customer or other measurable unit to get to a fully burdened P&L report.

While the above is a highly summarized list of the qualities of an effective management reporting system, there are key underlying themes that tie them all together. The larger and more diverse an organization is, the more users that need to participate in the management reporting cycle. A top-down approach to management reporting, or selecting a system that is not up to the task will be ineffective, and will yield costs that far outweigh the benefits. On the other hand, a system that provides self service to end users, robust analysis and reporting capabilities across various devices and front ends, enabled by a high performance infrastructure will yield untold benefits and nimbleness in the organization.
Oracle’s enterprise performance management system includes the leading suite of software for delivering management reporting. This includes powerful financial reporting with an annotations framework, data quality management for end user data integration and transparency, data relationship management for data governance and integrity, structured and ad-hoc analysis via Oracle Hyperion Smart View for Office, and Oracle Essbase (part of Oracle’s Business Intelligence Foundation) for powerful calculation and data infrastructure.

Oracle Engineered Systems

Oracle’s engineered systems combine best-of-breed hardware and software components with game-changing technical innovations. Designed, engineered, and tested to work best together, Oracle’s engineered systems can power the cloud or streamline data center operations to make traditional deployments even more efficient. The components of Oracle’s engineered systems are preassembled for targeted functionality and then—as a complete system—optimized for extreme performance. By taking the guesswork out of these highly available, purpose-built solutions, Oracle delivers a solution that is integrated across every layer of the technology stack—a simplicity that translates into less risk and lower costs for business. Only Oracle can innovate and optimize at every layer of the stack to simplify data center operations, drive down costs, and accelerate business innovation.

Oracle Exadata

The Oracle Exadata Database Machine is purpose built to run the Oracle Database. It is engineered to be the highest performance and most available platform for running the Oracle Database. Built using industry-standard hardware from Sun, and intelligent database and storage software from Oracle, the Exadata Database Machine delivers extreme performance for all types of database workloads including Online Transaction Processing (OLTP), Data Warehousing (DW) and consolidation of mixed workloads. The Oracle Exadata Database Machine is an easy to deploy system that includes all the hardware needed for running the Oracle Database. The database servers, storage servers and network are pre-configured, pre-tuned, and pre-tested by Oracle. All Oracle Exadata Database Machines are identically configured so customers benefit from the experience of thousands of other users that have deployed the Exadata Database Machine for their mission critical applications. The Oracle Exadata Database Machine runs the standard Oracle Database. Therefore, any application that runs with the Oracle Database today can be seamlessly migrated to the Exadata Database Machine with no changes to the application.

Oracle Exalogic Elastic Cloud

Oracle Exalogic Elastic Cloud is a datacenter building block designed to allow enterprises to rapidly deploy and provision mission-critical, high performance private and public clouds. Exalogic is an Engineered System, integrating compute, networking and storage hardware with virtualization, operating system and management software. Exalogic provides breakthrough performance, reliability, availability, scalability and investment protection for the widest possible range of business application workloads, from middleware and custom applications to packaged applications from Oracle and hundreds of third party vendors.
Oracle SPARC SuperCluster

Oracle’s SPARC SuperCluster is the world’s most efficient multi-purpose engineered system, delivering extreme efficiency, cost savings, and performance for consolidating mission critical applications and rapidly deploying cloud services. Oracle’s SPARC SuperCluster represents a complete, pre-engineered, and pre-tested high-performance enterprise infrastructure solution that is faster and easier to deploy than a collection of individual database and application servers. The system combines innovative Oracle technology—the computing power of Oracle’s SPARC servers, the performance and scalability of Oracle Solaris, the Sun ZFS Storage Appliance, the optimized database performance of Oracle Database accelerated by Oracle Exadata Storage Servers, and a high-bandwidth, low-latency InfiniBand network fabric—into a scalable, engineered system that is optimized and tuned for consolidating mission-critical enterprise applications.

Oracle’s SPARC SuperCluster provides both the capacity for growth, as well as the fine-grained server virtualization needed to isolate individual application components. With multiple layers of enterprise application infrastructure consolidated onto a high-performance, highly available SPARC SuperCluster system, deployment speed, application performance, and availability can all be optimized. Designed as a pre-configured, pre-tested, and ready-to-deploy SPARC SuperCluster engineered system, the solution provides a complete and optimized infrastructure solution for applications, built around robust compute, networking, storage, virtualization, and management resources. The result is a system that is orders of magnitude easier to manage, and up to five times faster to deploy than alternatives, all while occupying considerably less real estate requiring less power. Furthermore, the SPARC SuperCluster system provides full built-in redundancy resulting in a highly reliable infrastructure without single point of failure. An issue with one component will not impact other components of the system offering true isolation. Customers can consolidate multiple environments with minimum disruption, without fear of performance degradation, and the ability to achieve required service levels.

Oracle Exalytics

Oracle Exalytics is an engineered system for analytics delivering speed of thought performance and best visual analysis with no limits. It consists of a combination of a powerful hardware platform, Oracle BI Foundation Suite (OBI EE & Essbase) and In-memory Analytics software (Times Ten for Exalytics and Adaptive In-memory Tools). OBI EE, Essbase and Times Ten for Exalytics have all been adapted from their standalone state, and enhanced to run faster, more effectively and more efficiently upon the Oracle Exalytics platform.

Only Oracle can innovate and optimize at every layer of the stack to simplify data center operations, drive down costs, and accelerate business innovation. Together Oracle’s management reporting solution deployed on Oracle Exalytics delivers greater visibility, insight and control over operational and financial performance.

Management Reporting Challenges

While the complexity, depth and types of management reporting requirements vary among different organizations, most share the following challenges with their management reporting process:
• **Long and manual process around data and information gathering.** Data comes from various formal and informal systems in an organization. Management reporting can bring together data from operational systems (CRM, ERP, etc), enterprise performance management systems (Consolidation, Planning, Profitability and Costing), desktop based sources (Excel, Access, etc), relational sources and external data (currency rates, industry data, etc). In addition, descriptive business commentary is often required to describe the financial data, explain variances and discuss performance. Being able to bring this data and commentary together easily, applying standard structures (for example organizational or product hierarchies) and calculating metrics/KPIs (product revenue contribution, variances, inventory turns, days sales outstanding, etc), all while ensuring data integrity are necessities. The process of data collection and commentary gathering across an organization, followed by creating and maintaining standard management reports, can be a time consuming and manual process. Oracle Hyperion Data Relationship Management can centralize and standardize an organization's financial chart of accounts, cost centers and legal entities based on consistent definitions of financial and reporting structures across various source systems. Oracle Hyperion Financial Data Quality Management helps develop standardized financial data management processes to reduce data integration as well as data mapping complexities. Oracle Hyperion Financial Reporting's annotations feature allows end users to collaboratively create commentary via a web-based interface. Oracle Hyperion Financial Reporting can generate multiple reports from single report structures, also providing reusable report components with a centralized point of maintenance.

• **Timeliness.** Formal management reporting, such as board reports or quarterly perspectives, has a built-in latency from the period under review to when it is presented. However, an effective management reporting system also makes available critical information on a weekly, daily, hourly or more current basis, either via a regularly scheduled process or on-demand. The quicker the information can be presented with critical KPIs and metrics applied, the more nimble the organization can be to changes in the business environment. For example, being able to detect the effects of currency fluctuations due to political unrest in areas of significant operations as quickly as possible can reduce the impacts on the bottom line. Oracle Exalytics ensures timeliness and accuracy with real-time processing of transactional source data for almost immediate delivery. Oracle Hyperion Financial Reporting provides users with reports delivered on-demand or scheduled for later distribution.

• **Accountability where it counts.** Effective management reporting systems need to be accessible and useful to users across the organization. Different stakeholders require different information in different formats and with different delivery requirements. Whether a user’s device of choice is mobile or desktop, users need access to structured and ad hoc reporting in a highly self service model. Oracle Hyperion Financial Reporting produces book-quality financial reports that can be delivered in a variety of formats across a host of interfaces including HTML and PDF in a web browser or mobile device, and Microsoft Office on the desktop. With Oracle Hyperion Smart View for Office, users can create interactive ad-hoc reports.

• **Transparency.** Given the complexities in data collection, as mentioned above, organizations need to have visibility into all parts of the reporting process. This includes an audit trail from the reports back
to the underlying data source, as well as usage logging to track which users view and utilize specific reports. Oracle Hyperion Financial Data Quality Management eases integrating, tracking and validating financial data from source systems, allowing users to drill from the reporting tools back to transactional detail in the data source. Oracle Hyperion Financial Reporting also produces report usage logs that track all report execution information.

- **Security.** Management reporting needs to enforce comprehensive security across an organization, where users can only access the reports, data and metadata for which they have been granted permission. Reports should be stored in a centralized, secure repository where access permissions can be applied. Data and metadata access should also be controlled at the data infrastructure level. This ensures that sensitive data is only available to the intended user base. For example, Division Managers should only be able to see the profitability reports for their specific Division responsibilities. Management reporting data and reports can be centrally stored and maintained securely in Oracle’s enterprise performance management system. Users are provided access to the reports, data and metadata via defined access permissions.

- **Scalability and processing times for a large user base.** Deploying a management reporting system across an organization with many different types of users, potentially with many data sources and calculation processing requirements, requires the system to be highly scalable, available and performant, meeting the requirements for users to have the latest and most up-to-date data available. Oracle Exalytics delivers high speed performance for queries and calculations in a highly scalable manner across a large user base.

- **Business user report creation and maintenance.** Management reporting requirements vary among users across an organization. The ability for users to create new reports and dashboards on-the-fly to solve and respond to business questions and problems is a highly important function of the management reporting process. Business users should have the capability to create their own reports without reliance on the IT organization, for easy report creation with a fast turnaround time. Oracle Hyperion Financial Reporting provides an easy to use, drag and drop, object-based interface that enables the rapid creation of reports that combine grids of data and text, graphs, and images. Oracle Hyperion Smart View for Office allows users to create reports in a Microsoft Office environment.

**Benefits of Management Reporting on Oracle Exalytics**

It isn’t any surprise that finely tuned sports cars are designed for the ultimate driving experience, with brakes, wheels and tires that are specifically designed for the engine acceleration, turning radius, rider comfort, road grip and safety maneuverability. While software can provide users a rich functional experience, it is the hardware deployment that can make or break user adoption and success. Furthermore, when deployed on the wrong platform, it prevents companies from exploiting their software investment to its fullest potential. Too often software is deployed on hardware that fits the moment but cannot scale either in terms of more users, broader functional uses, increased data, or more complex business problems. This isn’t intentional, but rather enterprise performance management (EPM) deployments go thru a predictable cycle. They are initially deployed to solve more targeted problems,
such as corporate management reporting, financial planning, and corporate consolidation, and hardware selection is sized to fit the job at hand. As the benefits of the initial investment are quickly realized, the company’s ability to more broadly deploy to reap greater TCO is tied to an additional hardware investment. This cycle of hardware spend stigmatizes the software, and often times the business decides instead to continually implement point solutions. Unfortunately this feeds the very problem that the initial investment in software was meant to solve.

This is why hardware matters, and why IT and line of business need to know the benefits of an engineered system. As analytic applications become more sophisticated and calculation-intensive, the use of mobile Business Intelligence (BI) expands, user adoption increases, and data volumes explode, making the need for speed and efficiency more important than ever. In-memory technology can dramatically accelerate analytic performance. Oracle Exalytics In-Memory Machine is the industry’s first engineered system for analytics that combines market leading BI foundation, in-memory analytics software, and best-in class hardware engineered and optimized to work together to deliver extreme performance for Business Intelligence and Enterprise Performance Management applications. As a result, users can visually navigate and drill into information at the speed of thought, without limits on the complexity of their questions or the volume of the underlying data. Oracle Exalytics drives a new class of smarter and more powerful analytic applications that simply weren’t possible using conventional BI software and generic hardware configurations.

Exalytics offers a powerful hardware platform with notable computing, communications and storage capabilities. It has a 1 TB RAM and a 3.6 TB HDD capacity which can be effectively multiplied by linking Exalytics boxes together and exploiting the high speed communications. The network communications consist of 2 super-fast 40 Gbps InfiniBands, 2x 10 Gbps Ethernet ports and 4x 1 Gbps Ethernet port. Processing is via 4 Intel® Xeon® E7-4870 (40 cores total) and there is a 400 GB Flash memory.

Key to Oracle’s management reporting solution is Oracle Essbase. While Oracle Essbase can run on many different platforms and operating systems, it is engineered and optimized to take full advantage of the Oracle Exalytics architecture. There are a series of improvements to Essbase that are only available within Exalytics. Essbase also benefits through the Oracle hardware acceleration flag which provides the following technical benefits:

- Indexes and data blocks in memory
- Better cache coherency
- Improved index navigation
- Improved locking
- Better workload partitioning and distribution across threads

Comparing to a highly tuned non-Oracle Exalytics platform, Oracle Exalytics engineered system testing yielded the following end user results:

- With a more optimized usage of memory and decreased taxing of the CPU, Oracle Essbase on Oracle Exalytics delivers scalability for a large number of users across the organization with different types of report requirements, data and delivery needs.
Figure 1: Oracle Essbase Server CPU Utilization under Load

- Up to 93x response time improvement with individual queries under load gives users instant response to their queries, whether delivering single grids or reports of information, up to management report books and complex business reporting needs.

- Up to 15x response time improvement for procedural calculations (such as allocations) gives Oracle Exalytics the ability to process a large number of simultaneous calculation requests for aggregation and allocation purposes.

- Data Load time reductions of over 2x, coupled with the performance to queries and calculations (as listed above), provides for near real-time data to the user.

- Roughly 10x overall throughput improvement in mixed-load scenarios. This allows customers to scale to a large number of users across the organization with different types of report requirements, data and delivery needs.

Oracle Exalytics is specifically engineered to cater to high numbers of users asking complex business questions against large amounts of data and gives the ability for these tools to deliver best-in-class user experience, analytic insight, and visualization via:

- Optimizations to match system architecture resulting in higher query throughput, lower latencies in query processing. Also, there is enhanced memory usage for cache.

- Optimized default configuration to use large footprint memory to speed up page rendering and caching.

- Memory usage optimizations for loading entire data into memory, concurrency improvements to match Oracle Exalytics architecture, enabling efficient distribution of processing.
Conclusion

Management reporting in today’s business environment takes on a new importance. Organizations that do not have ongoing insight into their financial performance are most at risk in these changing times. Too often, the management reporting solutions in use today are narrowly focused and provide only a limited view. It is also restricted to specific individuals that requires inefficient means to do further analysis including re-keying of data, inconsistent business metric definitions, and processes that cannot be consistently reproduced from period to period. The result of all of this is the potential for uninformed decisions and the inability to monitor the impact of those decisions until it is far too late.

Oracle management reporting solutions bring together market leading Enterprise Performance Management and Business Intelligence applications and tools, deployed on Oracle Exalytics provides a single platform architecture built specifically for the task. Exalytics software components have been optimized tightly to match the hardware – all the way to specific hardware parts, their firmware, drivers and the operating system – a customized Oracle Enterprise Linux release with Unbreakable Enterprise Kernel. These low level optimizations have shown 3X better scalability and performance on benchmarks compared to similarly configured commodity servers. Some of the notable features that are available only on Exalytics are – columnar compression and OBIEE specific analytic functions for TimesTen, aggressive memory and concurrency optimizations in Essbase and OBIEE. These functions enable Exalytics to store more data, process queries faster, load and export data faster, and handle more users and concurrent workloads than identically configured commodity servers running commodity operating systems. Together, they are tested, certified, packaged, deployed, upgraded, managed and supported as a single complete engineered system. This unique combination ensures that users can get at the critical business information they need anytime, anywhere, and provides unparalleled performance, reliability, scalability and IT management capabilities.
For More Information

For more information on Oracle’s solution for management reporting, see the references in Table 1.

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