

ORACLE
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ENGINEERED SYSTEMS

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Oracle Business Analytics: Business Intelligence Applications on Oracle Engineered Systems

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Executive Overview

Business Analytics systems are required to get fact-based insight to compete effectively, and user expectations are escalating rapidly. Pre-built analytic applications, delivered quickly and cost-effectively with in-memory performance and enterprise scale are necessary. This white paper examines the advantages of pre-built analytic applications for a broad range of business processes, delivered on optimized Oracle Engineered Systems, and how they can be the cornerstone of a vibrant, growing analytic capability that will pay ongoing dividends.

Introduction

Ask anyone in the industry. Business analytics is a hot topic, and the business press is full of examples of leading organizations competing better through analytics. In fact, a study by researchers at MIT and Wharton finds that “firms that adopt data-driven decision making have output and productivity that is 5-6% higher than the competition.”¹

Extracting meaningful, actionable insight from corporate business systems is not option—it is a requirement in order to compete effectively. Those organizations that adopt a data-driven decision making culture are those best enabled to compete.

As the #1 vendor in Business Analytics, with the industry’s most complete and integrated range of enterprise analytic solutions, Oracle helps organizations to grow an analytic culture to

- **Increase efficiency**, by continuously monitoring and quickly reacting to correct or improve established business processes, and to do that by simplifying IT and managing risk,
- **Enhance effectiveness**, by identifying what to do more and what to do less, and
- **Be transformational**, by unleashing the creativity and power of everyone to create new levels of differentiation to enable superior performance.

¹ Brynjolfsson, Erik, Hitt, Lorin M. and Kim, Heekyung Hellen, “Strength in Numbers: How Does Data-Driven Decisionmaking Affect Firm Performance?,” April 22, 2011.

An analytic culture requires people, and the trends are clear for user expectations of Business Analytics: faster delivery of analytic applications, simple to use but enabling sophisticated analysis, interactive self-service exploration with fast performance, and available anytime, anywhere. This “Consumerization of BI” trend places increasing user expectations on Business Analytics systems, demanding that analytical insights are instantly accessible, visually compelling, delivered on mobile devices, all with responsive performance.

This white paper examines the difficulties companies face meeting the escalating expectations of analytic applications, it introduces Oracle BI Applications, the Oracle BI Foundation Suite, and Oracle Engineered Systems, and concludes with advantages of running BI Applications on Engineered Systems.

Why Analytic Applications? The Business Problem

Today, companies realize that the information locked in enterprise and legacy systems is incredibly valuable. Being able to analyze this information, combined with other corporate data sources is essential to drive the business forward based on facts, rather than intuition. Although most organizations have been investing on reporting, query tools and data warehouses for a long time, fewer than 30% of candidate business people use BI systems they have.²

Acronyms Defined

BI = Business Intelligence
CRM = Customer Relations Management
ERP = Enterprise Performance Management
ETL = Extraction Transformation Load
HCM = Human Capital Management
KPI = Key Performance Indicator
SCM = Supply Chain Management

Why so low?

First, it’s hard to build these systems and it requires specialized skills. It’s hard to build analytic applications, to integrate necessary technologies, to extract data from ERP and other enterprise system, to conform and model the data, to define best practice business metrics and Key Performance Indicators (KPIs), and to make all that compelling and easily usable by a range of business users. And those are just the basics.

Second, users are bringing whole new sets of expectations to analytics around relevance, ease of use, and responsiveness.

² James Richardson, Gartner, “The Consumerization of BI Drives Greater Adoption,” ID Number: G00212776 , June 3, 2011.

Traditional Build-Your-Own Business Analytics Systems Impose Constraints

Traditionally, analytic applications have been a build-your-own affair, with each company independently collecting requirements, extracting data, combining that data in a data warehouse, and then providing users query and reporting tools to build their own analyses.

- It is difficult for business users to voice their requirements for analytics. They don't know what is possible or what peer businesses are doing. Requests for requirements are often answered with "don't know" or "give me everything."
- Extracting data from complex transactional schemas of ERP, CRM, HCM SCM and other enterprise applications, consolidating and integrating data from heterogeneous systems and applications, and reconciling and validating data quality are all specialized skills and the work takes time. Skilled data architects, data warehouse designers and ETL programmers are needed to build from scratch.
- Often a selection of tools and technologies need to be integrated in order to fulfill the range of analytics needs.
- As data sizes and user volumes increase, ongoing administration and performance tuning is needed, else the system can get bogged down.

New Demands for Analytic Applications

Business users have higher expectations than ever before, as they experience the "Google effect" of searches being returned instantaneously, and consumer devices like the iPhone, which are easy to use and optimized for particular functions. Based on the experience of thousands of analytics implementations, both custom-built and using prebuilt analytic applications, the following requirements emerge:

These expectations include:

- **Integrate diverse corporate sources of information into an enterprise view.** The reality for almost all organizations is relevant data is stored in fragmented sources. Analytics on a particular silo of information is useful, but creating a consolidated enterprise-wide view is much more beneficial. With the consistency of an enterprise data model, business can perform analysis across subject areas, enabling, for instance, a company to detect customer satisfaction problems are tied to delayed shipments, which are in turn caused by slow accounts payable to critical vendors.
- **Trusted metrics, following industry best practices.** Monitoring metrics and Key Performance Indicators (KPIs) is the lifeblood of performance management. A palette of pre-defined industry best practices metrics, built off curated, trustworthy data sources, and presented in understandable, easy to navigate dashboards is a base requirement. And, businesses need to be able to configure these as necessary for their specific organizations.
- **Clean, clear dashboards and reports, designed for instant understandability.** A single metric or KPI is no use without context. How does the number compare with this period last year? How has market share shifted over time? What is the trend in on-time shipments? These typical business questions can require complex calculations, well-designed dashboard layout, context, and guided

analysis paths. This level of design is typically beyond the skills of most users and, even, most IT professionals.

- **Rich data visualization including location-based, geospatial views.** In order to gain the best understanding of the data being analyzed, and for people to engage their right brains, appropriate visualizations are needed.
- **Interactive, self-service exploration.** Once a problem is detected, business users want to “drill down” and perform additional analysis to uncover root cause problems. They may want also to specialize an existing report or dashboard, or to create their own analysis to reuse and share.
- **Model outcomes and run what-if scenarios.** After a problem is detected and diagnosed, then what? Businesses want to model what actions to take through scenario modeling, to answer questions like “What if I reorganized sales territories and comp plans? Which choices would lead to the best outcomes?”
- **See what’s happening now and what is likely to happen in the future.** As companies mature in their analytic capabilities, they desire to move beyond analyzing history—too late to affect the business results—and react in near-real time. As sophistication rises, they want to employ advanced predictive analytics to see what’s likely to happen. Advanced analytics like data mining and statistical techniques can project what is likely to happen in the future.
- **Mobile, anytime, anywhere.** Gartner estimates that 33% of BI content in 2013³ will be consumed by mobile devices. There is no doubt that demand for mobile intelligence is exploding. Today’s mobile workforce demands access to the information they need, wherever they are, securely with no additional development or compromise in functionality or form factor.
- **Combine structured with unstructured data and Big Data.** While analytics predominantly are used for structured, tabular data, there can be great business advantage to involve unstructured data that might include verbatim text in ERP or CRM systems, external social media feeds like Twitter and Facebook, or to access unstructured information stored in Hadoop.
- **Integrated technology and analysis tools.** Different users have different levels of analytic inclination and skills. Some want merely to consume pre-built analysis, and others want to develop what-if models, predictive models, or analytic applications for others to consume. Organizations’ analytic needs mature and broaden over time. Therefore, a range of analytic capabilities is needed, but in many instances, the customer’s IT department is left to integrate all the necessary technologies. Pre-integrated BI technology with a broad range of functionality for today’s and tomorrow’s requirements is preferable.

³Tapadinhas, Joao. "Critical Capabilities for Mobile BI." Gartner, Inc., ID Number: G00224286, 10 Apr. 2012.

This is a challenging list that requires a variety of skills and technologies. Thus, it is hard and expensive for organizations to tackle these items on their own, or just by hiring IT consultants.

The Solution: Oracle Analytic Applications with Engineered Systems

Prebuilt analytic applications, delivered on a complete and integrated BI technology foundation, and running in optimized Engineered Systems are the way to go. This combination assures the easiest, most risk free implementation, is proven to deliver strong business value, delivers speed-of-thought performance and massive scale, and is aligned with Oracle technology and applications strategies, while remaining open to work with each customer's individual IT environment.

Oracle BI Applications – Packaged Analytic Applications

Although every organization has some unique reporting and analysis needs that require custom applications, many requirements can be addressed through packaged analytic applications. The basic analytic requirements of common functional groups such as finance, human resources (HR), sales, and procurement are similar among organizations or industries. For example, finance departments in nearly all private and public sector organizations must continuously measure and monitor trends and variances of their general ledger accounts, accounts receivables, accounts payables, and fixed assets.

With Oracle Business Intelligence Applications:

- **Finance professionals** have visibility into cash flow, gross margins, operating expenses, account balances, and business unit profitability.
- **HR professionals** can gain insights into headcount trends, employee attrition rates, and the effectiveness of training programs.
- **Procurement and supply chain professionals** can track parts and material trends, supplier performance, trade discounts, and warranty return costs.
- **Marketing professionals** can monitor the efficacy of promotions and campaigns and make adjustments that maximize success rates.
- **Sales professionals** can more effectively forecast revenues and transactions, manage the pipeline, and track key opportunities.
- **Service managers** can optimize call center and depot staffing levels, identify problem areas that need attention, and respond more effectively to customer service calls.
- **Executives** can get cross-enterprise views of their businesses, incorporating metrics and KPIs from all the available BI Applications content.

Oracle BI Applications are complete, pre-built BI solutions that help people at all levels of an organization better understand how their business is performing. Because these applications are pre-built and pre-integrated with the leading transactional applications, they are far quicker to implement and deliver value with much lower risk. Once in place enable better decisions, confident action, and

more efficient business processes, often in just weeks. Oracle BI Applications provide a single, integrated view of enterprise information, enabling greater insight and alignment across business functions.

Each BI Application includes:

- **Pre-integration with Oracle Applications** JD Edwards EnterpriseOne, PeopleSoft, Siebel, E-Business Suite, and/or Fusion applications. The BI applications understand the source schemas of business applications and provide prebuilt logic to extract data from sources systems, and then transform and load into a data warehouse data model
- **A best practices enterprise analytic data model** consisting of star schemas with conformed dimensions. This means that a customer is a customer across all the family of BI Applications, and if several are installed together, analysis can be expanded across subject areas for an end-to-end view of corporate performance. All the major entities are covered, including Customers, Employees, Suppliers, Projects, Orders, GL entries, and many more.
- The ability to **work with multiple and disparate data sources**. Oftentimes companies might have a CRM instance for Europe, one for the Americas, and another one for Asia Pacific. BI Applications can combine these instances. As well, BI Applications can integrate data from heterogeneous systems. For example, a company might have Siebel CRM, PeopleSoft HCM, and E-Business Suite Financials.
- **Open access to all data sources**. The metadata-driven design of BI Applications allows implementers to integrate data sources for which Oracle doesn't offer pre-built adapters.
- **Role-based reports and dashboards** for all levels of employees in most departments. Dashboards include guided navigations, to enable casual users to find the insights they need.
- **Security integration to Oracle applications**, enabling leverage of roles, profiles, and security setups defined in transactional applications.
- Thousands of **pre-defined metrics and calculations** across the suite of BI Applications. This provides a palette of metrics to choose from, which is much easier than collecting user requirements. If the predefined calculation of a metric doesn't fit your business, it can easily be modified, from which point all affected dashboards and reports are automatically updated.
- **Anytime, Anywhere Mobile access**. The BI Applications are ready to deploy on iPad tablets with no further development.

With so much pre-built content, implementing Oracle BI Applications is an exercise in configuring and editing, rather than building from scratch. This has proven many times to deliver enterprise-grade analytics into production often in 6, 10, or 12 weeks, in contrast to year or longer enterprise data warehouse builds. See Figure 1.

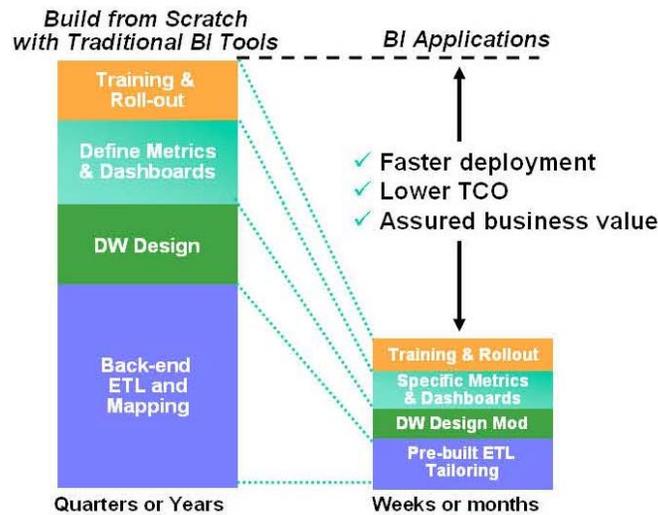


Figure 1. Using Oracle BI Applications significantly reduces the time to implement and deploy, resulting in faster time to value and lower risk. BI Applications often can be deployed into production in a matter of weeks, rather than half a year, a year, or more, for custom-built solutions.

In addition to rapid time to value, BI Applications embody analytic best practices—in the design of ETL, the data warehouse data model, metrics and KPIs, and dashboard design. In practice, it would be hard for an individual company to craft such a solution on its own.

Oracle BI Applications – Available Modules That All Work Together

Table 1 lists the core Oracle BI Applications.

TABLE 1. ORACLE BI APPLICATIONS

APPLICATION	DESCRIPTION
ERP Analytics	
Financial Analytics	Oracle Financial Analytics provides organizations detailed analysis into the factors that drive revenues, costs, and shareholder value. It helps front-line and financial managers improve financial performance with complete, up-to-the-minute information on their departments' expenses and revenue contributions, cash flow, and profitability, while maintaining more accurate, timely, and transparent financial reporting that helps ensure Sarbanes-Oxley compliance
HR Analytics	Oracle Human Resources Analytics provides organizations detailed analysis on HR programs and workforce performance. HR staff, business executives, and front-line managers have access to the critical workforce information required to analyze workforce staffing and productivity, and to better design compensation that rewards performance.
Procurement and Spend Analytics	Oracle Procurement & Spend Analytics helps organizations optimize their supply side performance by integrating data from across the enterprise value chain. Organizations benefit from increased visibility into Corporate Spend and complete source-to-pay process, including comprehensive sourcing and procurement

analysis, supplier performance analysis, supplier payables analysis, and Employee Expenses.

Supply Chain and Order Management Analytics	Oracle Supply Chain and Order Management Analytics delivers deep customer insight into sales orders and inventory data that empowers organizations to make better decisions in each stage of the supply chain management lifecycle. Organizations are able to assess inventory levels, likely product fulfillment needs, quickly identify potential order backlog issues, and stay on top of critical A/R and DSO issues.
Project Analytics	Oracle Project Analytics provides out-of-the-box, role-based dashboards that enable project managers, executives, and accountants to monitor projects and control the risks that lead to budget and schedule overruns. It enables robust analysis of important project-based forecast, budgets, cost, revenue, billing, commitments, cross-charges, profitability, resource management and sub ledger to general ledger reconciliation.
Student Information Analytics	Oracle Student Information Analytics helps academic institutions effectively manage student information, improve operations, and achieve institutional excellence. It provides an integrated view of admissions and recruiting, student records and student financials, enabling organizations to maximize student recruiting efforts, shorten time-to-graduation, improve retention rates, identify successful and unsuccessful courses and programs, and analyze faculty workloads
Manufacturing Analytics	Oracle Manufacturing Analytics helps manufacturing organizations optimize their supply networks by integrating data from across the enterprise value chain. Through complete end-to-end insight into the manufacturing operations and visibility across the plants and business units, organizations can significantly reduce costs; enhance profitability, increase customer satisfaction, and gain competitive advantage.
Enterprise Asset Management Analytics	Oracle Enterprise Asset Management Analytics provides visibility to enterprise-wide maintenance information. With pre-built reports covering Maintenance History, Maintenance Cost Analysis and Maintenance Work Orders, Oracle Enterprise Asset Management Analytics enables Maintenance Managers to maximize performance and opportunities, identify potential issues much in advance, and address them before they escalate into serious problems.
CRM Analytics	
Marketing Analytics	Oracle Marketing Analytics allows your organization to obtain maximum results from your marketing investments by providing your entire marketing team with a complete, up-to-the-minute picture of customer preferences, buying behavior, and profitability. Oracle Marketing Analytics helps you to develop closer, more valuable customer and prospect relationships and improve marketing effectiveness.
Sales Analytics	Oracle Sales Analytics provides hundreds of key performance indicators to improve the effectiveness of your sales people by providing real-time, actionable insight into every sales opportunity at the point of customer contact. With more accurate sales forecasts and enhanced identification of potential problems and opportunities, Oracle Sales Analytics helps close business faster and increase overall sales revenue.
Price Analytics	Oracle Price Analytics enables users to make insight-driven pricing decisions, to measure pricing effectiveness and to take improvement actions, informed by consistent data and the right business context. Users are armed with visibility into a single consolidated view of profitability and simple-but-sophisticated analytic tools and alerts.
Service Analytics	Oracle Service Analytics provides organizations with a comprehensive, up-to-date overview of customer service effectiveness. It enables companies to take targeted actions to improve productivity of Service

centers, reduce costs, and increase customer satisfaction.

Contact Center Analytics	Oracle Contact Center Telephony Analytics provides organizations with powerful insight that enables them to analyze all aspects of contact center performance. The solution provides best-practice metrics, alerts, and key performance indicators (KPIs), enabling companies to take targeted action to improve employee productivity, reduce costs, and increase customer satisfaction.
Loyalty Analytics	Oracle Loyalty Analytics is a comprehensive analytic solution that provides new levels of information richness, usability and reach to all employees engaged in the loyalty program lifecycle. This results in faster and more informed decisions that help the loyalty organization optimize its programs to drive member behavior, build value and reduce costs.

Benefits of Oracle BI Applications

Oracle BI Applications provide benefits in three key areas: deeper business insight, improved alignment, and greater leverage.

- **Insight.** Oracle BI Applications enable users to gain visibility and insight into business performance, processes, and customers. As a result they enable better decisions, actions and control at all levels. People can respond faster to opportunities and threats, and can identify and replicate best practices.
- **Alignment.** People in all roles gain a single, consistent view of enterprise information across functions and data sources. They are able to align strategy and execution across functions, and can use guided analytics and best practice analytic workflows to drive the most profitable or efficient actions.
- **Leverage.** Oracle BI Applications let people do more with less – to deploy BI more broadly across the organization with fewer IT resources than custom-built solutions. Oracle BI Applications accelerate time-to-value, lower TCO and risk, and increase the value of existing data and applications including CRM and ERP systems.

Oracle BI Foundation – Enterprise-Class Business Intelligence Platform

Oracle Business Intelligence Foundation Suite—recognized as a category leader by all of the major industry analyst research firms—represents the underlying BI technology for all of Oracle’s packaged analytic applications, as well as business applications such as Oracle E-Business Suite; Oracle’s PeopleSoft, JD Edwards, and Siebel solutions; Oracle Fusion Applications; and Oracle’s industry applications.

BI Foundation is a comprehensive architecture, which features best-in-class technology for reporting, analysis, and performance management applications. Based on an integrated, scalable, web-native architecture, Oracle’s unified and open BI Foundation reduces cost of ownership, efficiently accesses information from heterogeneous sources, and provides an enterprise semantic layer with multiple channels of information delivery to support self-service, pervasive BI.

Introduction to 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 your 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 Exalogic

Oracle Exalogic is an Engineered System on which enterprises deploy Oracle business applications, Oracle Fusion Middleware or third-party software products. Exalogic comes pre-built with compute nodes, memory, flash storage and centralized storage, all connected using InfiniBand in a high redundancy architecture delivering five-nines availability, with fault tolerance and zero-down-time maintenance.

Exalogic dramatically improves performance of Oracle Applications, Fusion Middleware and 3rd party applications without requiring code changes and reduces costs across the application lifecycle, from initial set-up to on-going maintenance, as compared to conventional hardware platforms. Oracle has made unique optimizations and enhancements in Exalogic firmware, Exalogic software, and in Oracle's middleware and Oracles applications. These include on-chip network virtualization based on near zero latency Infiniband fabric, high-performance Remote Direct Memory Access, workload management in Oracle Weblogic server and optimizations in Oracle Coherence and Oracle Traffic Director. Exalogic includes support for a highly optimized version of the Oracle VM, which significantly outperforms comparable virtualization solutions and is an ideal consolidation platform for Oracle Applications. Templates to simplify install, deployment and configuration of Applications on Exalogic are available.

What specific technical benefits does Exalogic deliver?

Applications using WebLogic benefit from a number of optimizations for thread efficiency, faster interprocess communication and higher message throughput. An optimized work scheduler for Exalogic balances the number of threads per core available on Exalogic systems, providing better application processing efficiency. WebLogic Server has changed to use shared byte buffers instead of array copies when passing data, improving application interprocess communication performance and a 66% reduction in number of objects created. This reduces heap usage and results in fewer expensive garbage collections for Applications. WebLogic also optimizes socket calls to reduce lock contention on Exalogic, allowing fewer threads to process a larger number of message requests.

Exalogic Oracle VM can be used to sub-divide a physical compute node into multiple virtual machines to increase application deployment efficiency while maintaining application performance. Oracle VM has been engineered for tight integration with Exalogic Exabus I/O backplane using a technique called Single Root I/O Virtualization (SR-IOV) ensuring Oracle VM significantly outperforms comparable

hypervisors from other leading vendors. The benefit of this approach is unmatched application performance. In an Exalogic configuration, the impact of virtualization on application throughput and latency is negligible.

Applications running on Exalogic utilize Exabus, the underlying Infiniband fabric, which provides low latency and high throughput eliminating I/O bottlenecks in every application layer. Applications components are typically deployed in more than one server and Exabus provides low latency for I/O across nodes on same Exalogic rack. Access to ZFS storage device over Exabus greatly reduces latency for log file writes and other file access operations. For applications running on Exalogic and accessing database tier on Exadata, Exabus delivers faster I/O, reduces CPU usage on both the mid-tier and DB-tier and provides higher connection pooling efficiency.

Oracle Exadata Database Machine

Oracle's Exadata Database Machine is Oracle's database platform delivering extreme performance for database applications including Online Transaction Processing, Data Warehousing, Reporting, Batch Processing, or Consolidation of mixed database workloads. Exadata is a pre-configured, pre-tuned, and pre-tested integrated system of servers, networking and storage all optimized around the Oracle database. Because Exadata is an integrated system, it offers superior price-performance, availability and supportability. Exadata frees users from the need to build, test and maintain systems and allows them to focus on higher value business problems.

Exadata uses a scale out architecture for database servers and storage. This architecture maintains an optimal storage hierarchy from memory to flash to disk. Smart Scan query offload has been added to the storage cells to offload database processing. Exadata implements Smart Flash Cache as part of the storage hierarchy. Exadata software determines how and when to use the Flash storage for reads and write as well as how best to incorporate Flash into the database as part of a coordinated data caching strategy. A high-bandwidth low-latency InfiniBand network running specialized database networking protocols connects all the components inside an Exadata Database Machine. In addition to a high performance architecture and design, Exadata offers the industry's best data compression to provide a dramatic reduction in storage needs.

What specific technical benefits does Exadata deliver?

Exadata Smart Flash Cache uses Flash memory to dramatically reduce the time to read and write database and log records. The intelligence in Smart Flash Cache transparently moves active database blocks from disk to flash in real time, thus ensuring that "hot" data is in Flash memory when the next access occurs. Blocks that should not be in Flash are similarly recognized; thus maximizing the amount of space in Flash for active data.

Exadata Smart Scan speeds up data-intensive queries by leveraging the processing power of Exadata Storage Servers to scan and filter out results. By moving queries to storage instead of moving the data to the database servers, long-running reports and queries often complete 10x faster than on conventional systems.

The use of InfiniBand as the networking fabric within Exadata ensures the lowest latency for messages and the highest bandwidth for data transfers. High-speed transactions as well as data-intensive queries and reports reap the benefits.

Exadata Scale-Out Storage enables the full performance of Exadata to be realized against large and growing databases, without fear of bottlenecks. As the database size grows and storage capacity is added to Exadata, storage performance and networking bandwidth scale in equal proportion.

IORM allocates I/O bandwidth across different applications and databases, based on a prioritized allocation plan, to ensure that the most important applications get the performance they need when they need it.

Hybrid Columnar Compression dramatically reduces the storage space consumed by the database, while at the same time speeding up queries against the compressed data through reduced I/O. Compression often reduces the data storage by a factor of 10x or more, storing a petabyte scale database in 100TB of disk. Since compressed tables remain compressed in Flash memory as well as on disk, very large databases often fit entirely in Flash memory when compressed.

Oracle Exalytics

As analytic applications become more sophisticated and calculation-intensive, the use of mobile 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. 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.

Oracle Business Intelligence Foundation Suite running on Oracle Exalytics has been specially enhanced to take advantage of large memory, processors, concurrency, storage, networking, operating system, kernel, and system configuration afforded by the Oracle Exalytics hardware. Oracle TimesTen for Exalytics has been specially enhanced for analytical processing at in-memory speeds. With lightening fast scan speed of up to 100 million rows/second and up to 10x columnar compression, TimesTen for in-memory analytics delivers faster reports & dashboards for departmental as well as enterprise wide consumption.

What is technically unique about Exalytics?

Exalytics is custom designed for In-memory Analytics. It packs at least a Terabyte of high speed memory and matches the memory backed by several terabytes of high-speed PCI-Flash that can support hundreds of thousands of IOPS per second as well as gigabytes of bandwidth per second. This flash layer is further backed by several terabytes of persistent hard disk storage. Exalytics also includes FibreChannel interfaces to further expand storage capacity.

In addition to memory and storage, Exalytics includes the best server processors in the market with at least 40 compute cores with several execution threads per core. Exalytics also provides numerous high speed networking options including 10Gbps and 1Gbps Ethernet. However specifically for Exadata connectivity, Exalytics also includes two 40Gbps InfiniBand interfaces and cables to ensure unparalleled latency and throughput between Exalytics and Exadata.

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.

Apart from performance, the unified lifecycle experience – from install, administration, and patching are optimized throughout the stack to provide the lowest total cost of ownership for deploying analytic applications – that cannot be achieved by building the entire solution stack piecemeal from multiple vendors.

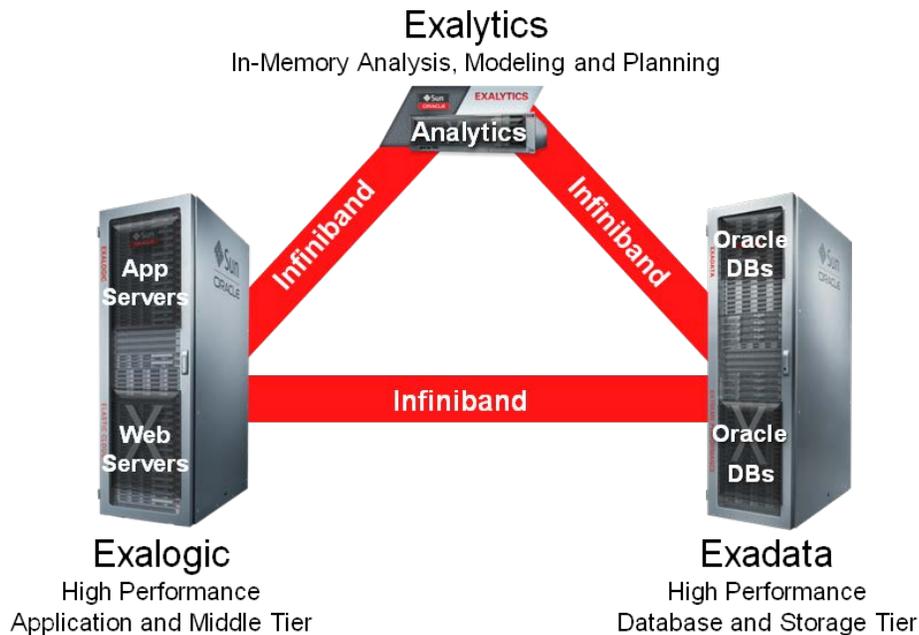


Figure 2: Engineered Systems: Exalogic, Exadata, Exalytics; Applications, Database and Analytics. The fastest, easiest path to unbeatable application performance.

References

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[Oracle Tech Network Oracle Exadata Database Machine](#)
[Oracle Exalogic Elastic Cloud Overview](#)
[Oracle Exalytics In-Memory Machine](#)

Oracle BI Applications Work Better with Engineered Systems

Oracle BI Applications are optimized to work with two key Engineered Systems: Exalytics and Exadata. Existing BI Applications customers can redeploy to Oracle Exalytics In-Memory Machine and Oracle Exadata without any changes, and new BI Applications implementations can deploy on Engineered Systems faster and with lower risk.



Figure 3: Oracle BI Applications and Oracle BI Foundation Suite run on Exalytics In-Memory Machine. Oracle Exadata Database Machine can be a data source for Exalytics and can contain the BI Applications data warehouse

These elements comprise the integrated solution:

- Prebuilt analytic applications content. Modules from Oracle BI Applications, and other Oracle analytic applications that run on Exalytics.
- Oracle’s enterprise-class Business Intelligence Platform. Oracle BI Foundation Suite.
- Oracle Exalytics In-Memory Machine. Runs the BI Applications on Oracle BI Foundation Suite.
- Oracle Exadata Database Machine. The data warehouse defined by BI Applications optionally can run on Exadata.

Business Benefits of Oracle BI Applications on Exalytics and Exadata

Benefit #1: Increased user satisfaction and adoption due to improved response times.

Users abandon analytic systems if response times are inadequate. With the “Consumerization of BI” trend, expectations for lightning performance are escalating. Exalytics in-memory processing can dramatically speed up response times.

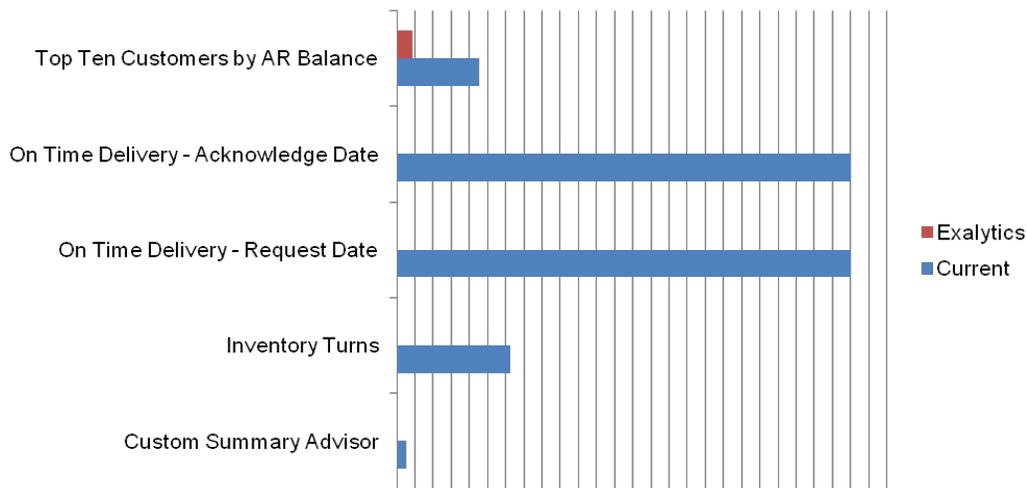


Figure 4: In a typical comparative analysis of slow-running customer dashboards, Exalytics improves response times 5x up to 720x. For example the On Time Delivery analysis reduced from 1 hour 12 minutes to 6 seconds. With this chart scale, the timings with Exalytics are barely visible. With BI Server cache additionally enabled, all these challenging queries further reduced to sub-second performance.

- Faster response time means some queries that were impossible before now return answers. Queries that were painfully slow and causing user dissatisfaction can be reduced to a few seconds or, even, sub-second.
- Response times that are more consistently sub-second means mobile users will not abandon the system, meaning the promise of anytime, anywhere insight can be realized.
- Executives are particularly impatient. Faster response times mean executives will use their own dashboards, rather than consuming only others' analysis.
- A special case to note is acceleration of federated, multisource queries. Federated queries are useful when data is not centrally organized; however joins across large sources are slow. Exalytics can greatly accelerate federated queries.

Benefit #2: Faster ETL for shorter load windows and more uptime.

Data warehouses need to be updated with refreshed data. Typically this is done at least daily, normally at night during a “load window” during which the system is not available for queries.

BI Applications’ ETL from source systems to Exadata can complete much faster, which leads to shorter load windows and more uptime. This is particularly helpful when data update volumes threaten to exceed the planned load window, intruding on users’ access to analytics. For global organizations with consolidated data, it is particularly painful to have a scheduled load window, since someone somewhere on the planet is shut out of using analytics during their business day.

Some businesses and applications demand frequent data refreshes, approaching continuous or “trickle feed” updates. Faster micro ETL from sources to Exadata, and from Exadata to the Exalytics in-memory store, enables near real time business decisions, such as 15 min updates during financial close.

Benefit #3: Better user scalability with Exalytics economically satisfies bursty use and enables broad mobile rollouts.

On standard hardware, usage of analytic systems easily can outpace system resources, leading to slower performance for everyone. As mobile adoption increases, this becomes even more problematic, since mobile access attracts more users, and the users tend to open up analytics more frequently, tap more to execute more analyses, and at the same time, expectations for responsiveness are severe.

Exalytics for BI has been benchmarked to handle up to 40,000 enterprise users and typically support 3x the number of users on similarly configured hardware.

BI Applications on Exalytics exhibit much faster response times and, simultaneously better user scalability. See Figure 5 for an illustration.

The additional capacity afforded by Exalytics means:

- Mobile BI use can grow as large as needed economically while preserving response times.
- Large user populations, such as all the people managers in a large global company can use HR Analytics with consistently good performance during crunch periods like annual budgeting and performance reviews.
- OLTP applications with high user counts can include rich embed analytics directly in business processes, without negatively affecting response times.

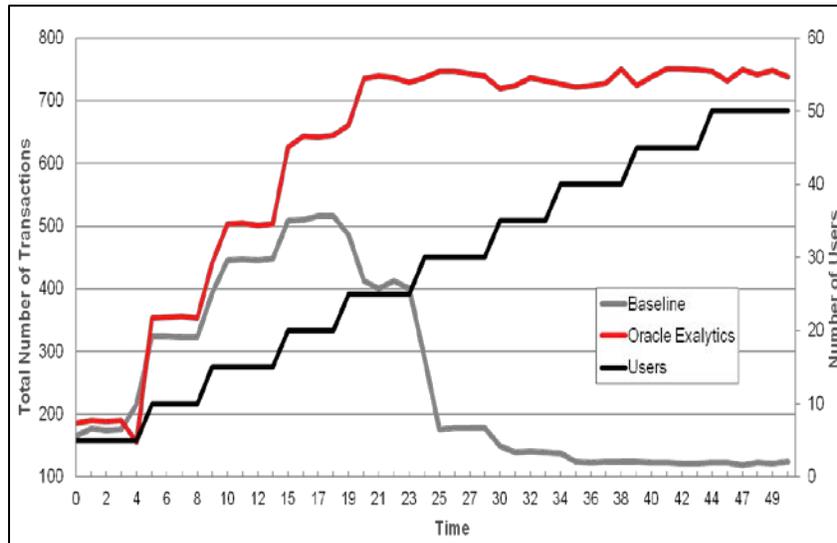


Figure 5: Exalytics shows significant scalability advantage over standard hardware (the baseline). The baseline is able to scale up to 15-20 CPUs, but then throughput drops. Exalytics scales perfectly to all available CPUs and then throughput stays flat with increasing load. Benchmarks forecast that a single Exalytics box can support up to 40,000 enterprise reporting users.

Benefit #4: Project risk reduction, by choosing packaged analytics, Exalytics, and optionally Exadata.

With a successful track record of many hundreds of customers over the past eight years, packaged BI Applications have proven to be quick and sure to implement into production. It is common for production implementations of one or a few BI Apps to be completed and rolled in 6-16 weeks.

Leading integrators estimate that a custom build approach costs 2.5 to 3.5 times that of deploying prebuilt applications.

One of the greatest challenges to BI and data warehousing projects is getting the user requirements right, since business users often have great difficulty specifying what they need. Missing requirements, or over-specifying them, leads to more drawn out, longer projects.

It is far easier for business people to critique and edit rather than to specify, starting with a blank sheet of paper. With the pre-defined metrics, calculations, KPIs and dashboards that come with BI Applications, IT can quickly stand up a system for end users to see clearly what they are getting and to specify how it should be adapted to meet specific business needs.

Oracle Engineered Systems have the advantage that every customer gets the same configuration, for which all the components are engineered and optimized together, tested together, installed together, patched together and updated together. This reduces risk, complexity and time to deployment, as well as to upgrade.

BI Applications on Exalytics and Exadata are fully tested and optimized, so there is less manual configuration, less manual tuning, and a better out of the box experience.

Benefit #5: Greater interactivity, more self-service, better visualizations

BI Applications running on BI Foundation Suite on Exalytics delivers greater levels of end-user interactivity and self-service analysis. As an example, data visualizations such as Trellis Charts, or grids of charts, are great for quick comparative analysis. See Figure 6.

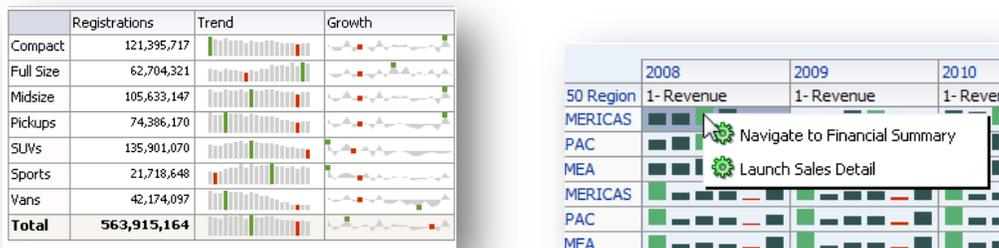


Figure 6: Dense data visualizations like Spark Lines and Trellis Charts present the results of many queries simultaneously, so comparative analysis and finding outliers is easier. At the same time, these kinds of visualizations are heavily taxing on analytic and data warehouse systems.

While highly valuable to end users, these kinds of visualizations challenge the capacity of normal analytic systems and the databases underneath them. With Exalytics, in-memory performance enables fast response time, even for these challenging visualizations that are constructed of many parallel queries. Only with an Engineered System featuring in-memory technology can these be effectively rendered, especially when there are large numbers of concurrent users.

The extra processing power of Exalytics can even be used for completely new capabilities like View Suggestions. Normal business users often have difficulty picking the best chart or visualization for their data. Think about opening a Microsoft Excel chart gallery and scrolling through the many options—most business people can barely cope. With Oracle BI running on Exalytics, the system automatically interrogates the data to understand how many values, its dimensionality (for example, is time represented), and the intention of the analysis to suggest the best visualization to use. See Figure 7.

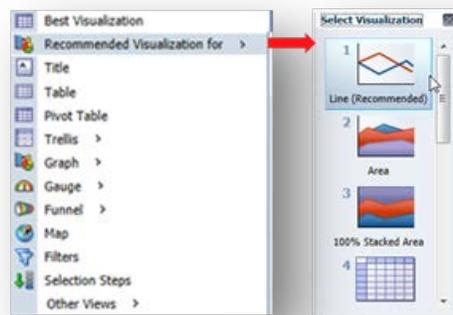


Figure 7: The View Suggestions capability of Oracle BI on Exalytics automatically analyzes the data to be presented and suggests the best visualizations considering the size, cardinality, distribution and dimensions of the data.

With Exalytics, better visualizations and better interactivity are delivered at the speed of thought, pleasing business users and encouraging adoption.

Benefit #6: “Future proof” against evolving analytic needs by choosing Exalytics.

As user adoption increases and organizational maturity evolves, companies want to move beyond query & reporting and dashboards to incorporate additional analytics, including what-if analysis, scenario modeling, planning, access to Big Data, predictive analytics and data discovery. BI Applications, BI Foundation Suite, and Exalytics are ready to offer users more capabilities when they need them:

- BI Foundation Suite includes Oracle Essbase, a leading multidimensional system that is necessary to perform what-if analysis and scenario modeling. On Exalytics, Essbase runs in-memory to deliver rapid load and calculation performance. BI Applications data can be used directly to run scenarios and this capability can be linked directly into dashboards.

- Some Oracle BI Applications have optional extensions that rely on Essbase. An example is Oracle Spend Planning, which builds upon Oracle Procurement and Spend Analytics to build accurate spend plans tailored to the operational needs of the business, use what-if models to identify high-opportunity spend reduction areas, proactively plan for supplier disruptions and changes in corporate strategy, and purchase the right products at the right price from the best sources.
- Oracle offers pre-built applications on top of Essbase, including Hyperion Planning and Hyperion Profitability and Cost Management. These can run together on the same Exalytics solution, extending the value of the investment and enabling direct linkage between plans and actuals.
- In addition to the core Oracle BI Applications, Oracle offers more than 60 additional pre-built analytic applications for various topics and industries. Vertical industry analytic solutions are available for Consumer Goods, Financial Services, Insurance, Public Sector, Retail, Tax, Utilities, Tax, and Telecommunications. Complements to core Oracle CRM, ERP, and SCM solutions include prebuilt analytics are available for: Advanced Planning Command Center, ATG Web Commerce, Demand Signal Repository, Environmental Accounting and Reporting;; Government, Risk and Compliance (GRC); Manufacturing Operations Center, Primavera; Product Lifecycle; and Transportation Management. These are all developed on Oracle BI Foundation Suite and consequently can run in-memory on Exalytics.
- Oracle Endeca Information Discovery is an enterprise data discovery platform for rapid, intuitive exploration and analysis of information from any combination of structured and unstructured sources. It enables organizations to extend their existing business analytics investments to unstructured data – such as social media, websites, content systems, files, email, database text and Big Data. Oracle Endeca Information Discovery allows analysis alongside Oracle BI Foundation, and both can run on Exalytics with in-memory performance.

Choosing BI Applications on Exalytics is, therefore, not a final step. Instead, as organization needs and maturity evolves, Exalytics In-Memory Machine deliver a wide and growing variety of analytic capabilities.

Technical Benefits of Oracle BI Applications on Exalytics and Exadata

As we have seen, BI Applications on Engineered Systems delivers great business value, but Exalytics has additional benefits for IT.

Benefit #1: Pre-integrated solution, saving time, cost, and headaches

- Deployment is simplified, since Exalytics configurations are pre-engineered and pre-tested. Everything is pre-determined to work together, and all runs in the Exalytics machine, eliminating complex system topologies.
- BI Applications are integrated with Oracle transactional applications. Oracle BI Foundation components are all integrated together, delivering a vast array of analytic capabilities for the various users and roles. The software is integrated with the Exalytics hardware. Exalytics integrates processors, disk, and networking.

With all this pre-integration, IT can spend less on integration and more on innovation.

Benefit #2: Superior performance with less admin work

Exalytics in-memory technology, based on Oracle TimesTen In-Memory Relational Database and optimized Oracle BI Foundation, provides superior performance with less tuning.

- Unique Exalytics capabilities like Summary Advisor simplify administration
- Moving an existing Oracle BI Applications or Oracle BI implementation from standard hardware to Exalytics requires no application redesign. The data sources remain untouched
- Oracle Exalytics can be deployed in existing IT environments by itself or in conjunction with Oracle Exadata and/or Oracle Exalogic to enable extreme performance and best in class user experience. Based on proven hardware, software and in-memory technology, Oracle Exalytics lowers the total cost of ownership, reduces operational risk and provides unprecedented analytical capability for workgroup, departmental and enterprise wide deployments.
- Can separate Business or BI team from DW operations -- BI team or can deliver performance without needing corporate Enterprise DW to be tuned.

Benefit #3: Not limited to the memory on board

Exalytics does away with the traditional limitation of desktop in-memory analysis tools and fully in-memory data warehouses. Classically, when the application and data size outgrow physical memory, you're done. There is nothing to do but get a bigger, more expensive machine, or compromise on the analysis you can do.

With Exalytics, users get speed-of-thought interactive visual analysis with no limits. Exalytics intelligently caches the hottest data in-memory using full available RAM and compression. For data not available in-memory, Oracle Exalytics transparently ships the queries to underlying data sources, enabling analysis over any size data and even Big Data stored in Hadoop.

Benefit #4: Built for the Enterprise

Mindful that Exalytics becomes a powerful enterprise resource, it is designed with enterprise needs in mind:

- Exalytics is designed with high reliability hardware and redundancy where required.
- Systems can be clustered for high availability.
- Scalability is superior. With a single Exalytics system benchmarked for up to 40,000 enterprise users capacity, it easily supports thousands of concurrent users. Since Exalytics scales users and queries linearly without sacrificing response times, there is built-in capacity to handle bursty usage, such as when all the field employees want to begin using the system at 9:00 am on Monday morning, or during critical periods like financial close.
- As users move to consume analytics by mobile devices, tolerance for sluggish response decreases, and at the same time frequency of usage tends to increase. Without a sizeable backend IT environment, user expectations cannot be met. Exalytics scalability provides the headroom to address growing expectations of mobile users.

- Subcapacity licensing is available, so if an Exalytics machine is too powerful for initial needs, a quarter, a half, or three-quarters can be configured and licensed, enabling partial use of the compute capacity but full use of the memory. This enables users and applications to grow over time.
- Quick Essbase backup/restore -- don't have to take Essbase down for extended periods

With these attributes, Exalytics fits well into the corporate data center.

Benefit #5: Consolidation

- Given its scalability, multiple instances of Oracle BI can be consolidated into a single instance on Exalytics. This reduces complexity, administration headaches, and cost.
- A single Exadata Database Machine can consolidate OLTP applications and also host the BI Applications data warehouse. Cost savings and complexity reductions through consolidation of independent databases are key reasons customers choose Exadata.

Benefit #6: TCO

So many of the business and technical benefits contribute to lower Total Cost of Ownership. To review, some of these are:

- Rapid, sure deployment of pre-built BI Applications and Engineered Systems, leading to fast time to value and earlier accrual of benefits.
- Lower development and deployment costs, due to the pre-built content of BI Applications and integration with Oracle transactional applications.
- Lower ongoing database administration costs to maintain performance, due to the Exalytics performance optimizing in-memory technologies.
- Cost savings through environment consolidation. For Exadata, its can combine OLTP and data warehouse databases on a single Exadata system. For Exalytics, any combination of Oracle BI, Essbase, and Endeca Information Discovery can run and work together. Individual instances of Essbase or OBI can be combined into larger single systems.

Conclusion

Investment in analytics is one of the leading priorities for a growing number of organizations. To gain fact-based insights from data locked in CRM, ERP, HCM and SCM systems, a data warehouse and effective analytics are required. However, custom building this is risky, slow, and costly.

A better solution is pre-built analytics applications leveraging powerful BI technology all running on Engineered Systems. This combination is compelling and delivers a long list of business and technical benefits:

- Increased user satisfaction and adoption due to improved response times
- Faster ETL for shorter load windows and more uptime
- Better user scalability economically satisfies bursty use and enables broad mobile rollouts

- Project risk reduction and faster time to value
- Greater interactivity, more self-service, and better visualizations
- “Future proof” against evolving analytic needs
- Pre-integrated solution, saving time, cost, and headaches
- Superior performance with less admin work
- Not limited to the memory on board
- Consolidation
- Lower Total Cost of Ownership



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Hardware and Software, Engineered to Work Together