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Oracle E-Business Suite Projects for Engineered Systems
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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.

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.

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 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.

Figure 1: Engineered Systems: Exalogic, Exadata, Exalytics; Applications, Database and Analytics. The fastest, easiest path to unbeatable application performance

Technical Benefits of Oracle’s Engineered Systems

Summary

Internal benchmarking indicates that Oracle E-Business Suite running on Oracle’s Engineered Systems performs 3 to 10 times faster for forms and self service applications depending upon the concurrency load profile. In addition, linear scaling allows for very large deployments and multiple applications to run simultaneously while maintaining consistent response times. Oracle’s Engineered Systems are architected to deliver maximum availability, high performance, and scalability helping Oracle E-Business Suite customers to consolidate environments, and reduce server footprint resulting in an overall reduction in cost of application ownership.

Here are some of the technical benefits delivered by Engineered Systems:

- Oracle E-Business Suite applications consists of many batch processing programs that create large workloads. These workloads are highly CPU intensive. High concurrency of these workloads requires systems with large memory capacity with
large Systems global area (SGA) and Program global area (PGA) capable of processing high speed disk input/output (I/O). Oracle’s Engineered Systems are architected to deliver these superior technical capabilities to manage such large workloads.

- Engineered systems can handle twice as many users per core compared to other servers delivering the scalability required to add more application users during growth and expansion.

- Linear Scaling easily supports very large deployments.

- Resource Manager can help consolidation of database and application environments by controlling CPU usage, managing CPU contention via instance caging, controlling disk I/O usage, and managing contention via IORM’s inter-database resource plans. Customers can achieve higher throughputs as more transactions can be processed using single Exadata core compared to other servers.

- Exalogic has been engineered to leverage a technique known as Single-Root I/O Virtualization to eliminate virtualization overhead and deliver maximum performance and scalability. Mission-critical server virtualization offers a completely new level of consolidation where multiple virtual machines are sharing a single physical server in order to maximize the utilization of server hardware, while minimizing associated cost.

- Oracle VM template for Exalogic reduces installation and configuration time and allows rapid deployment of Oracle E-Business Suite applications.

- Oracle E-Business Suite customers can load balance web and forms servers, configure parallel concurrent processing and configure Oracle RAC and Oracle Data Guard for high availability.

- Oracle Enterprise Manager Cloud Control (EM) helps with Exadata manageability and provides a composite view of all health indicators of a cell or cell group to diagnose and troubleshoot performance problems efficiently.

- Oracle E-Business Suite customers will benefit from using following unique features of Exadata Database Machine:
Exadata Smart Flash Cache

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, maximizing the amount of space in Flash for active data.

- Internal bench marks for Oracle E-Business Suite have shown following results as a result of Smart Flash Cache:
  - Average I/O latency reduced by 58% and no special tuning is required to achieve I/O performance improvement.

Log file sync events improved by 5% and no special tuning is required to achieve log file sync event improvements

Exadata Smart Scan

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 often complete 10 times faster than conventional systems.

InfiniBand

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 from InfiniBand. Oracle E-Business Suite benefits resulting from InfiniBand are:

- 30-40% lower CPU utilization and 100% or more throughput compared to Gigabit Ethernet

- 20% improvement in online transactions response times

- Easier scaling of E-Business Suite online transactional processing through low latency
Exadata Scale-Out Storage

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. As a result,

- Backups and Clones can be executed at a rate of 20TB/hour
- Faster incremental backups can be performed

I/O Resource Manager (IORM)

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. As a result, customers can consolidate database and application environments without worrying about resource contention and performance degradation.

Oracle E-Business Suite customers benefit from using following unique features of Exalogic:

Exalogic Exabus

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 the database tier on Exadata, Exabus delivers faster I/O, reduces CPU usage on both the mid-tier and DB-tier and providing higher connection pooling efficiency.

Oracle VM for Exalogic

Exalogic Oracle VM can 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.
Technical Benefits of Oracle’s SPARC SuperClusters

Similar to Engineered Systems such as Exadata, Exalogic, Oracle E-Business Suite can be deployed on Oracle’s SPARC SuperCluster to achieve high availability, performance, scalability and environment consolidations. Here is a brief description of Oracle’s SPARC SuperCluster’s technical capabilities.

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. Deployment speed, application performance, and availability can all be optimized with the multiple layers of enterprise application infrastructure consolidated onto a high-performance, highly available SPARC SuperCluster system. 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 Oracle E-Business Suite environments with minimum disruption, without fear of performance degradation, and the ability to achieve required service levels.
Benefits of Deploying Oracle Projects on Engineered Systems

All project related transactions flow through Oracle Projects to accurately track the health of a project, recognize revenue or bill customers. This means time cards from your employees and contractors, payroll transactions, purchase orders for commitments, accounts payable for expenses, inventory transactions for materials and goods, even service transactions for performing maintenance, all come through Oracle Projects to help you manage project costs, revenues and performance (see Figure 2). The count of these transactions can run into tens or hundreds of millions over the life of your project portfolio.

![Figure 2: Oracle Projects Transaction Model](image)

Not only do these transactions need to be imported from their sources, but they may also need to be burdened with overhead costs, accounted for, and in many cases billed to the project customer. Oracle Projects then summarizes all transactions for the project hierarchy to compare actual totals to budgets, generate project forecasts and calculate earned value measures to judge the overall health of the project.

Project information is extremely time sensitive. The sooner the project manager or project controller can identify risks to their project, the sooner they can take corrective action. This requires performance in Oracle Projects transforming source transactions into project financial data and financial measures the project manager or controller can use to manage their projects.

Due to the high number of potential source transactions affecting a project and the number of integrated source modules along with the fast processing needed to turn this raw information into something actionable, Oracle Projects needs to perform well, and be responsive and scalable for high volume environments.
“Plans are useless, but planning is indispensable”, Dwight D. Eisenhower, 1957

The key to excellence in projects execution is the ability to identify the variables that affect your plans early, and take action as fast as possible to stay on course.

Most project-centric organizations monitor the health of their projects on a daily basis. Cost engineers review project tasks daily looking for risks and proactively taking actions to stay on schedule and on budget. They need to quickly identify risks and investigate transactions causing reduction in margins, profitability or an out-of-budget situation. Recognizing these problems early mean cost engineers or planners can take corrective action before it is too late. The consequences of a delay or cost overrun can range from absorbing a minor cost to tarnishing the reputation of the company, stiff penalties or legal ramifications.

The tools used by teams to monitor the project include multiple types or levels of budgets, forecasts and earned value metrics. There can be multiple budgets types, such as an operating budget, a control budget and cost/revenue budgets. Project managers use forecasts to monitor how the project is performing and to ensure completion within budget. Additionally, organizations rely on many project performance metrics such as actual effort and cost, actual and estimated dates, earned value, estimate to complete (ETC) for effort and cost, and physical percent complete.

Areas with the most to gain from fast performance include processes like cost burdening and project performance reporting. The burdening process applies overhead multiplier rates to the amounts (raw costs) for every project cost transaction originating from a source module to calculate a total burdened cost. The project performance reporting process transforms source transactions into a multi-dimensional data structure for reporting by project, period, currency, resource, work plan version, budget version or planned vs. actual cost. Both features require fast processing and must scale to extremely high volumes.

An example where an Engineered System can make a significant difference is a large services company that manages events such as conferences and banquets. This customer creates a separate project for each event and has 10-12 thousand events (active projects) at any point in time. Each of their projects averages three to nine months and contains 150-200 tasks. The company must process 20-25 million records in the Project Performance Reporting module just to update budgets, forecasts and performance metrics to reflect recent transactions. As result, their project managers and controllers have to plan carefully the frequency with which they update their project performance data.
Testing shows an Engineered System solution consistently provides faster performance than the corresponding commodity environment. The project performance reporting summarization completes faster than the commodity hardware, giving project managers and controllers faster access to the data they need to adjust their projects.

Responsiveness for Increased Throughput of Project Changes

Project work plans are complex and change constantly. As a project progresses, project managers identify additional needs, identify risks, and track progress or the lack of it. These needs and risks require project managers to take proactive action including adding, moving, deleting, and changing resources and tasks.

These changes can have a fundamental impact on the project. A simple change to a task may require re-summarization of dates and progress up the project hierarchy. With multiple users using the product, it is imperative the updates are quick so the information others see is reliable and trustworthy.

Furthermore, more tasks on a project usually equates to more users maintaining the tasks. It also means more frequent changes, making it even more critical to have the responsiveness provided by an Engineered System. Providing more throughputs of project updates reduces the time and effort in managing a project, while ensuring the data is up to date and accurate for decision making and additional planning.

Another example where an Engineered System could provide benefits is a large telecommunications firm responsible for rolling out communication networks over large geographical regions. They organize their projects into multiple regions, and each region into sites with approximately 10-20 activities under each site (see Figure 3). This customer can have 5000 or more sites on a project, which could lead to over 100 thousand tasks.
For this customer, with the project in flux by moving a site from one region to another or deleting an activity, other team members quickly need to understand the changes and the impacts the changes have on the schedule, plans, and decision-making.

In a recent internal test, an Engineered System consistently provided faster response times than the corresponding commodity environment. The response time on Oracle Projects transactions improved on an engineered system allowing users to complete more transactions faster.

**Scalability to Manage Large Projects**

Project-centric organizations all over the world use Oracle Projects to manage projects in all sizes, from small marketing campaigns, mid-size software implementations, large construction projects, to very large telecommunication network rollouts. Due to volume and performance, however, the overall size of a project or number of tasks in the work breakdown structure might be a factor in how organizations create projects in the application. For the reasons mentioned earlier in this paper, such as the time to summarize data for a large project or the time required to process a project structure change, organizations may limit the size of the projects they enter in Oracle Projects.

In some cases, customers group projects in a single program when they expect to achieve a single goal or objective through multiple projects. In other cases, customers break their projects into smaller sub-projects and group them together using programs. A smaller project is typically easier to execute, while the program provides the required corporate level visibility and manageability, such as reporting, budgetary controls and approvals.
In either case, system scalability is critical. When rolling up amounts and progress for the corporate view, the application actually summarizes the data for all sub-projects in the program together. The same process creates the multi-dimensional data necessary for reporting the health of a project. The summarization process acts on all project or sub-project data together because of their relationship to the program.

An Oracle customer responsible for rolling out a broadband network has all of their projects under a single program. Although the number of projects is minimal for a large organization, they are under one program, where some key processes treat all projects as one project when processing summarized data.

As the organization continues to grow each month, scalability to process all the projects together in an appropriate timeframe is a major risk. In internal testing, an Engineered System consistently provides faster processing times than commodity hardware and reduces the risk future growth may have on the system.

**Conclusion**

*Oracle Projects* deployed on an Engineered System improves end user response times, batch processing times, and transaction scalability. Users see these benefits with up to date and reliable information even after completing many and complex project changes, or through quick visibility into changes in a project’s health after processing transactions from across the enterprise, or through support of future business growth with the scalability of an Engineered System.