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RODOD Performance Test on Exalogic and Exadata Engineered Systems

Introduction

Oracle Communications Rapid Offer Design and Order Delivery (RODOD) is an innovative, fully integrated, productized solution that cost-effectively reduces time to market for new offer introduction and enables accurate order delivery across all customer service channels. RODOD helps service providers achieve an improvement in three key business metrics that are critical to their business and operational success:

- *Offer Time to Market*: the period of time required to create an offer and make the service available for sale.

- *Order Cycle Time*: the amount of time elapsed from order submission to when the customer can use the service.

- *Operational Efficiency*: a measure of productivity related to a service provider's operating expenditures including systems and people.

The RODOD solution consists of Oracle Product Hub for Communications, Siebel CRM, Oracle Communications Order and Service Management (OSM), Billing & Revenue Management (BRM), and Application Integration Architecture (AIA) for Communications. Optional products include ATG Web Commerce, Oracle Retail, E-Billing, RightNow, E-Business Suite, and the Information Framework (SID) certified Oracle Communications Data Model (OCDM). It is based on key design principles which form the foundation of the architecture. A detailed description of the design principles can be found in this whitepaper.
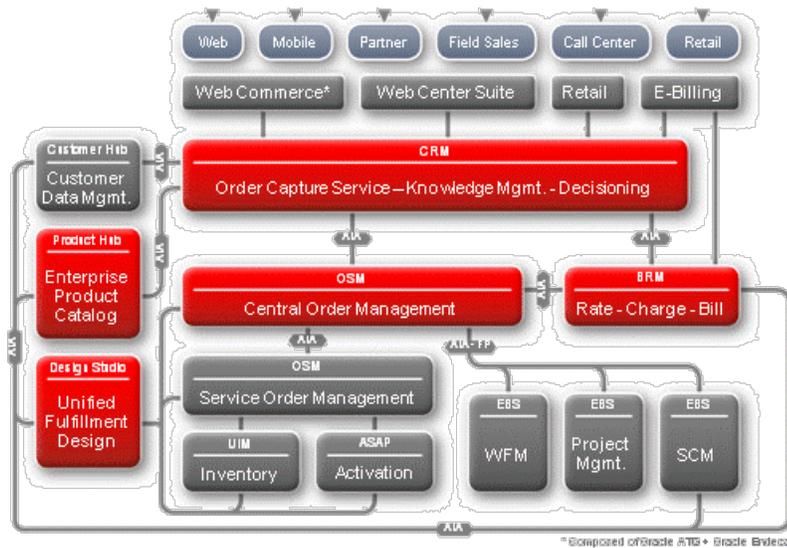
Figure 1. RODOD Architecture

The Rapid Offer Design and Order Delivery solution leverages the combined power the applications to provide the CSPs with:

- An adaptive, comprehensive order management solution that eliminates the need for custom development, silos, workarounds and reduces implementation risk.

- A flexible solution that automates processes, transactions and interfaces as demand grows.

- An integrated offer and fulfillment process design environment that spans and unifies front and back office operations to achieve quick time to market.

- Full order status visibility across the order life cycle keeps CSRs and customers informed of order progress.

- Accurate, predictable service delivery cost – there is no need to build in redundant resources and capacity to compensate for order fallouts.

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- Strategic order prioritization, orchestration and decomposition capability to reduce cycle time, error rate, extra truck roll, rework activities.

- An integrated customer care and support platform to efficiently and accurately service customer requests.

This whitepaper aims to describe a performance test of the RODOD solution on Oracle's Engineered System – Exadata sand Exalogic, and showcase the high business transaction throughput, scalability and compatibility of software and hardware that makes RODOD on Engineered System an attractive value proposition.

Engineered System Overview

Exadata

The Oracle Exadata Database Machine provides an optimal solution for all database workloads, ranging from scan-intensive data warehouse applications to highly concurrent OLTP applications. It is a complete package of software, servers, storage and networking that is easy-to-deploy, completely scalable, secure and redundant. Innovative technologies such as Exadata Smart Scan, Exadata Smart Flash Cache, and Hybrid Columnar Compression enable Exadata to deliver extreme performance for everything from data warehousing to online transaction processing to mixed workloads.

Exadata's unique grid architecture—featuring an InfiniBand network—ensures that the network will not bottleneck. Because Oracle Exadata is delivered as a complete pre-optimized and pre-configured package of software, servers, and storage, a significant amount of the integration work, cost and time typically required to deploy a database is eliminated.

The combination of Oracle Exadata's Smart Flash Cache feature, large memory capacity, fast performance for running multiple simultaneous workloads and fast IO capabilities, make it the ideal platform for deploying Oracle E-Business Suite. Additionally, as organizations look to improve efficiencies by consolidating OLTP databases and data warehouses, many are turning to Oracle Exadata for their infrastructure platform.

Exalogic

Oracle Exalogic is designed to meet the highest standards of reliability, serviceability and performance under widely varied, performance-sensitive, mission-critical workloads. Because the Exalogic system is

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fully pre-integrated by Oracle it is also easier to provision, manage and maintain, further reducing ongoing costs and shortening time to value for new projects.

Oracle has made optimizations and enhancements to Exalogic components and Oracle's middleware and applications that would be extremely difficult and time consuming for customers or any 3rd party to reproduce. These range from on-chip network virtualization to operating system and Java Virtual Machine support for extremely high performance Remote Direct Memory Access (RDMA) and Exalogic-aware workload management in Oracle's Java EE application server.

Test Configuration

Hardware

A quarter rack X2-2 ExaData and ExaLogic Engineered System is used to set up the RODOD environment. Detailed specifications can be found here and here, with highlight listed below:

- Quarter Rack Exalogic X2-2: 8 Compute nodes with 2 x Six-Core Intel® Xeon® X5670 Processors (2.93 GHz); 96 GB RAM

- Quarter Rack Exadata X2-2: 2 Database Server Nodes with 2 x Six-Core Intel® Xeon® X5675 Processors (3.06 GHz); 96 GB RAM; 3 Storage Cells with physical disk capacity of 10,800 IOPS

Note that this is two generations behind the current X4-2 Engineered Systems at the time of this whitepaper, so one could expect even better performance if the same setup is deployed on current hardware. Moreover, a Windows VM with eight virtual CPUs and 64GB RAM is allocated as Oracle Automated Test Suite (OATS) load driver.

Software

The table below lists the software and versions used for various components of the RODOD system:

COMPONENT	VERSION
AIA	11.1.1.6 (Foundation Pack 11.1.1.6.7)
AIA Communications PIP	11.3 (O2C: 16483496; AABC: 16489777)
Siebel	8.1.1.11 SIA 23030 ENU
BRM	7.5 SP3 (JCA 7.5 SP4 + patch 17378694)
OSM	7.2.2.2.2 build 393
Database	11.2.0.3.0 Bundle 17
JVM	1.7.0_40 (AIA); 1.6.0_45 (OSM)
Linux	OEL 5.8; 2.6.32-400.26.3.el5uek kernel
OATS	12.3.0.1.0 build 376

Topology

Two compute nodes are allocated for each edge application and AIA. The diagram below illustrates the topology:
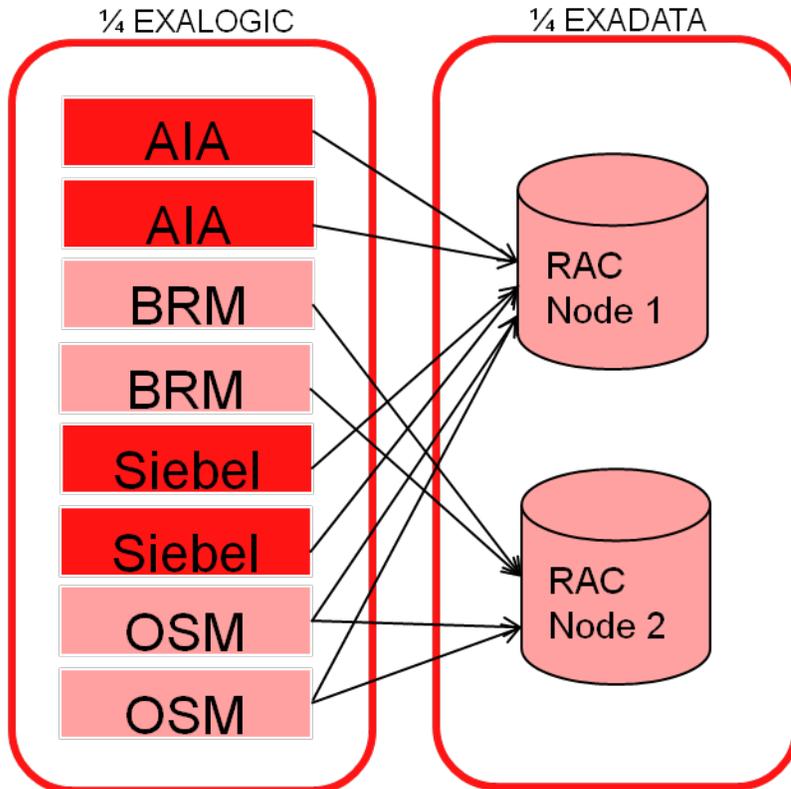

Figure 2. Deployment Topology

Test Scenario

Orders are a primary mechanism to do business and affect change in the providers' infrastructure. Businesses create orders for many purposes. An order created to sell goods and services to a customer is called a Sales Order. In the Create Order test scenario, a Sales Order is created in Siebel for a new account. The account is synced to BRM, the services are provisioned by the OSM and billable products are created in BRM. The number of order lines in a Sales Order depends on what is being purchased. For this performance test, a product that with seven order lines is selected in Siebel as an order that is typically considered small in size. Client interaction with Siebel is implemented via Siebel web service API invocations in OpenScript, and Oracle Load Testing is used for scenario definition and load generation.

Note that a throttling mechanism based on feedback is implemented in the script, such that each virtual user ensures the previous sales order is completed (by probing) before starting the next order. In other words, as end-to-end order completion time increases with more virtual users (due to higher degree of parallelism), for example a 200-user test run is expected to have a workload, and thus throughput, slightly less than two times that of a 100-user run.

Test Results

Sales order creation workloads of up to 300 users are tested, and a maximum throughput of **27,114** orders created per hour is achieved, with an average order completion time of 35.4 seconds. As a comparison, a typical hourly volume of order creation for a major service provider is in the range of 10,000.
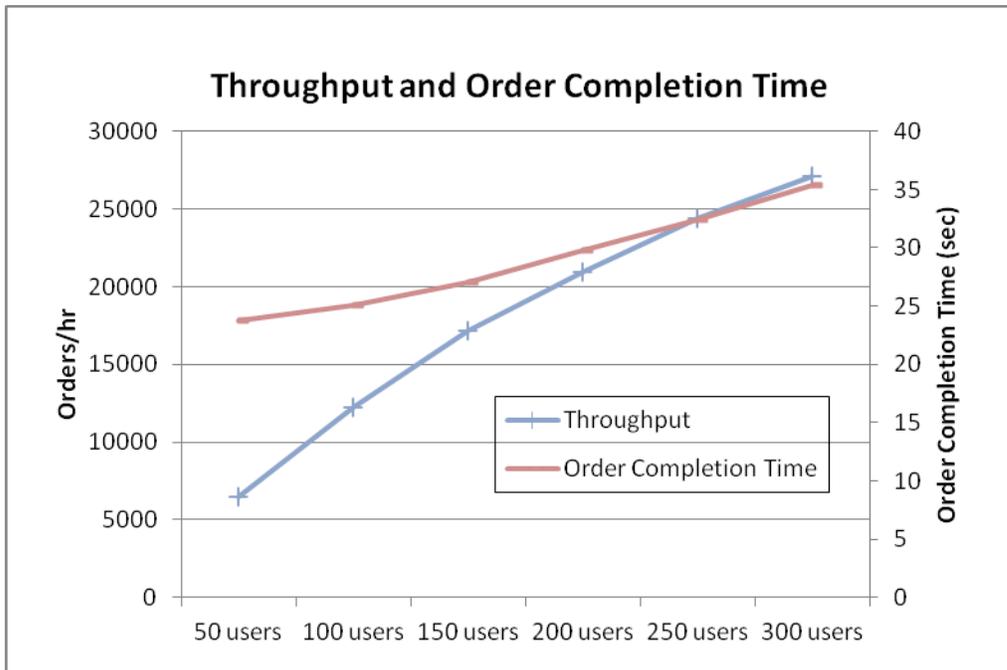
Figure 3. Throughput and Order Completion Time against workload

Here's a table of response time statistics for some key component workflows (in seconds):

COMPONENT	AVERAGE	MEDIAN	90TH PERCENTILE
CommunicationsCustomerPartyEBSV2Resequencer	2.75	2.7	4
UpdateSalesOrderOSMCFSCommsJMSConsumer	2.57	2.5	3.9
CommsProcessFulfillmentOrderBillingAccountListEBF	3.65	3.6	5

CommsProcessBillingAccountListEBF	3.39	3.4	4.7
OSM COM_SalesOrderFulfillment	28.78	29	33
OSM SOM_ProvisionOrderFulfillment	8.23	8	9
Siebel Order LifeTime	35.42	35	40

Remarks

It is observed that the order creation workload warrants significant storage I/O at the database. By leveraging the Smart Cache features of Exadata we are able to sustain a DB IOPS rate more than 3 times the stated disk IOPS capacity and achieve the reported high throughput. We also take advantage of the Infiniband backplane to ensure low latency, high volume network communications between Exalogic and Exadata. Other success factors include an efficient partitioning strategy of the AIA tables and indices, right-sizing various thread and connector pools, and following the best-practice guidelines of the respective applications.

Conclusion

We have demonstrated that the RODOD solution can handle almost 3 times the typical end-to-end order delivery volume on modest hardware (Quarter Rack Exalogic and Exadata), and validated the features in Oracle's Engineered Systems to enable RODOD to achieve such high throughput. We believe that with the current generation of Engineered Systems which provide more processing power and higher I/O capacity RODOD on Engineered Systems will deliver the extreme performance and throughput capacity that communication service providers demand for their businesses.

Resources

For more details review the following resources:

- About Oracle Communications Rapid Offer Design and Order Delivery
- About Oracle Exadata Database Machine
- About Oracle Exalogic Elastic Cloud
- Oracle Communications

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