Implementing Oracle E-Business Suite R12 on the EMC Celerra Unified Storage Platform

Abstract

This white paper provides a description of an implementation architecture for Oracle E-Business Suite R12 on the EMC® Celerra® Unified Storage Platform in order to provide high performance, high scalability, and high availability using Intel/Linux servers.

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Executive summary

In today’s world, where cost reduction and resource optimization are key requirements, it is increasingly important to build solutions based on common and reusable components. From an operational standpoint, the higher the level of automation is, the lower the operational cost of the environment.

Oracle E-Business Suite R12 is the latest version of the Oracle application and as in previous versions, it encompasses various technological components including the Forms Server, Web Server, and others. The correct component distribution and configuration can provide a great architecture flexibility that allows for fast computing capacity growth to meet new business demands without major efforts or costs.

Introduction

This white paper describes a proposed architecture capable of providing a high level of scalability, performance, and availability for the Oracle E-Business Suite R12 environment using an EMC® Celerra® Unified Storage Platform and common servers, extracting maximum return on investment in these resources. The deployment’s architecture and components are discussed first, and later sections on deployment planning and environment management provide further details.

Audience

This white paper is intended for technical managers, system architects, and implementation specialists involved in Oracle E-Business Suite R12 planning and deployments.

Components

**EMC Celerra Unified Storage Platform**

The Celerra family is the most flexible product range when consolidating NAS, SAN, and iSCSI in a single system. It also provides an option to use the Multi-Path File System (MPFS) for applications that need high-performance file sharing.

![Figure 1. EMC Celerra connectivity options](image-url)
There is a wide range of options available for the integrated models, starting with the entry-level NX4 (up to 60 drives) up to the NS-120, NS-480, and NS-960 models (which has up to 960 drives). Environments that already use EMC CLARiiON® or Symmetrix® systems also have the option of the Celerra gateways such as the NS-G8.

Figure 2. EMC Celerra product line scalability

Beyond the integrated platform features such as local and remote replication, high availability, Virtual Provisioning™, and file retention, among others, the Celerra range also accepts various disk types to meet each application’s needs appropriately. Apart from traditional Fibre Channel disks, high density SATA drives can also be used for low-cost storage, as well as Flash drives that provide exceptional performance levels, both of which are highly energy efficient.

**Oracle E-Business Suite R12**

The Oracle E-Business Suite, also known as Oracle EBS, is a suite of business applications developed by Oracle. Along with other product lines acquired and integrated by Oracle such as Oracle Fusion Applications, PeopleSoft Enterprise, Siebel, JD Edwards EnterpriseOne and JD Edwards World, Hyperion Financial Performance Management, and Primavera Enterprise Project Portfolio Management, the suite comprises what is known as Oracle Applications.

Some numbers that show Oracle Applications’ leadership are:

- Over 1,500 public sector organizations run Oracle Applications.
- Twenty of the world's top 20 telecom companies run Oracle Applications.
- Ten of the top 10 academic universities worldwide run Oracle Applications.

Other numbers by industry can be found at [http://www.oracle.com/industries/index.html](http://www.oracle.com/industries/index.html).
The current version of Oracle E-Business Suite, also known as R12, was launched in 2007 and includes the following main product ranges:

- Oracle CRM
- Oracle Financials
- Oracle HRMS
- Oracle Logistics
- Oracle Mobile Supply Chain Applications
- Oracle Order Management
- Oracle Transportation Management
- Oracle Warehouse Management Systems

Each product range is made up of a series of modules, each licensed separately.

**Oracle E-Business Suite R12 architecture**

The Oracle E-Business Suite is a layered application, each layer comprising one or more services. The following is a brief description of each layer.

- Desktop or Client Tier – provides the user interface using a web browser to access the applications
- Application Tier – responsible for managing a variety of components and application services
- Database Tier – supports the Oracle RDBMS and is the main data storage area

Figure 3 is a diagram of the main Oracle E-Business Suite R12 components.

![Diagram of Oracle E-Business Suite R12 components](image)

**Figure 3. Oracle E-Business Suite R12 components**

From a physical standpoint, the various application and database layer components can be installed on a modular basis on different servers and with redundancy for each service.
Deployment planning

The technical team responsible for deploying the E-Business Suite R12 normally has the following technical concerns in mind:

Performance

In order to correctly address this item, initial sizing or capacity planning activities are employed. These activities are used to plan and forecast the required computing capacity needed to support the applications by offering suitable performance and the lowest possible level of business risk. Please note that computing capacity does not only include servers (CPU and memory) but also storage devices (GB and IOPS).

Scalability

Architecture scalability is an important issue because it caters to computing capacity growth demands arising either from increased data volumes, more users, and scaling or capacity planning misjudgments. Software version upgrades may also require additional computing capacity.

Scalability, or increased computing capacity, can occur in two basic ways:

- **Vertically** – by adding or upgrading processors in existing equipments. In this case, the restrictions will be based on the number of free processor slots or the ability to upgrade to faster processors. Processor growth ceilings are normally not very high and when reached, the equipment must be replaced. Although there is equipment that can handle a large number of processors, their cost is not proportional to the number of installed processors, which in many cases does not justify using them.

- **Horizontally** – by adding new servers in a cluster configuration. Not all types of software can be installed in this manner or take advantage of multiple servers.

Combined vertical and horizontal computing capacity growth is also possible in some cases.

Availability

Today, many companies require 24x7 availability and even on the exceptions, unplanned outages during business hours can cause serious and significant business impacts.

The most traditional method of addressing availability is to use servers configured in active-passive type high availability clusters. Normally, two servers are used in this type of configuration, with one responsible for executing a service (primary) and the other on standby (secondary) should the first server fail. If there is a failure on the primary server, the cluster software is able to identify the event and quickly restart the service on the secondary server. One concern from companies deploying this type of configuration refers to the spare computing capacity required on the secondary server. In certain cases, the additional capacity not only generates increased hardware costs but also higher software costs, when licensing is based on the number of processors.
Deploying a flexible architecture

This white paper describes a proposed architecture to deploy Oracle E-Business Suite R12 in order to provide high performance, scalability, and availability.

Apart from the Celerra platform, the following are the main hardware and software components included in the final architecture:

- Intel x86-64bit servers – A very common type of server means that there is a wide variety of supplier options for this alternative.
- Linux x86-64 operating system – Any version certified for Oracle E-Business Suite R12 can be used. When using Oracle Enterprise Linux, support-related issues are much simpler because Oracle provides support for this operating system.

The following is a description of the proposed deployment of each layer.

Database tier

The proposed database layer deployment uses Oracle Real Application Cluster (RAC), a technology released by Oracle in 2001 that is now quite mature in terms of software code and market usage, with a considerable number of DBAs now familiar with the product. With Oracle RAC, deployment scalability can be vertical or horizontal. Normally, horizontal computing capacity growth is more linear than vertical growth. Furthermore, by using various database servers in a cluster, we can separate loads by product family or service (e.g., a dedicated database node for Concurrent Manager processes).

When using Oracle RAC with Oracle E-Business Suite R12, the Real Application Cluster option must also be licensed and a shared storage system employed.

We recommend using only the Oracle RDBMS on the database servers and no other Oracle E-Business R12 component should be installed on this equipment. By using this strategy, we can separate the application and database platforms, allowing for migration of the database to another platform at any time without having to simultaneously migrate the application code. Application platform migration is relatively more complex than a simple database platform migration.

One of the benefits of Oracle RAC is the ability to use more than two nodes, in which case the spare capacity that needs to be planned, in case one node fails, is considerably lower compared with the active-passive two-node cluster. For example, in a four-node Oracle RAC environment, if one node is unavailable, this results in a 25 percent loss in total processing capacity. This lost capacity must be redistributed among the three remaining nodes, which means that each one needs around 8.4 percent additional capacity to support failure of one other node.

The Celerra Unified Storage Platform can provide a shared storage area for Oracle RAC using one of the following connectivity methods:

- Fibre Channel
- iSCSI
- NFS
- MPFS

The best option for the Oracle database depends on a few factors depending on the situation:

- Connectivity costs
- Deployment time and new server provisioning
- Storage area provisioning time
- Required performance
- Additional functions required (e.g., local and remote data replication)
In order to illustrate the operational scenario described here, we will be using Fibre Channel (FC) connectivity as a reference for the database volumes.

Figure 4 is a simplified schematic with the respective redundancies.

**Figure 4. Oracle10g RAC cluster using EMC Celerra 4 Gb/s Fibre Channel connectivity**

All LUNs used for the database must be shared among all of the RAC cluster nodes and correctly sized in order to support the workload. To make volume management easier, we recommend using Oracle Automatic Storage Management (ASM) with ASMlib. We also suggest the following (minimum) ASM disk group configuration:

- Control Files and Redo Log Files
- Datafiles
- Archive Logs

Other disk groups can be created as required in each environment. A suggested strategy for datafile area growth is to create new disk groups instead of expanding existing ones, to avoid rebalancing operations.

**Application tier**

In order to eliminate single failure points and provide load distribution for components in this layer, the choice of deployment normally tends toward using multiple servers.

Although Oracle E-Business Suite R12 includes specific services for load balancing, in order to simplify the environment installation and maintenance processes, we recommend the use of the same code installation on all servers. In this case, load balancing among the various application servers should be done...
by using a network switch with this capability as an access entry point. This network switch should also provide persistent sessions for each user and ideally verify application availability on the various servers.

To ensure identical E-Business Suite installation on all servers, we recommend the use of a shared APPL_TOP (application code installation). In this type of configuration, APPL_TOP is installed once and shared among all of the application servers using a NFS mount point, a feature provided by the Celerra Unified Storage Platform. The advantages of this type of deployment come from the single installation point and from the simplified application code maintenance.

Similar to the database layer, this deployment allows for both horizontal and vertical computing capacity growth. In large deployments with many application servers, load balancing can also be done based on server sub-groups, with each one used for different services (e.g., four nodes for the Web/Forms Servers and two nodes for the Concurrent Processing Server).

The proposed architecture is illustrated in Figure 5.
Environment management

**EMC Replication Manager**

Replication Manager is an EMC tool used to manage data replication on EMC storage systems, including the Celerra Unified Storage Platform. It provides a highly simplified and automated replication process. One of its advantages is the fact that the tool “recognizes” the Oracle database, mapping tablespaces up to the storage volumes. This means that the database replication process can be carried out without having to execute a single database, operating system, or storage platform command. Replication Manager also provides script integration for specific activities, like pre- or post-replication tasks, to complement basic volume replication.

On the architecture described in this paper, Replication Manager can carry out the RAC database replication process to create replicas for backups or non-production environments. The ability to integrate scripts also means that the entire process can include the replication of the NFS mount point content and the execution of Oracle AutoConfig.

**Backup replicas**

One of the most widely used features among EMC clients is local data replication for backup purposes. This technology creates a replica on disk that can be used at any time to restore the production environment in case of data corruption. Disk replicas can also be used as a source for tape backups, eliminating or reducing the impact that this type of backup produces on the production environment.

In the architecture proposed in this paper, database clones or snapshots can be generated and mounted on a backup server and the replica content copied to tape. This process can be fully automated through Replication Manager.

Regarding the NFS mount point (Shared APPL_TOP), a snapshot needs to be generated and can subsequently be copied to tape using NDMP, or by mounting it on a backup server and subsequently copying to tape. These tasks can be integrated into Replication Manager as part of the database backup process.

**Figure 6. Storage-based replication for backup purposes**
Creating non-production environments

Another important consideration in Oracle E-Business R12 deployment is creation and management of the non-production environments, including quality assurance, development, testing, training, and so on. This application is so complex that the cloning process for a single environment may take several hours or days, due to the number of stages involved. One of the longest processes is the database copy that normally is carried out over the network or using a tape backup. Additionally, the risk of process errors and the need to repeat the process increase substantially if any of the stages are executed manually.

Oracle E-Business Suite R12 cloning periods can be cut to minutes using the EMC data replication technology based on storage arrays and the automation provided by Replication Manager. Oracle AutoConfig and customized script execution can also be fully integrated into the cloning process.

Virtualization

Dedicated non-production environment infrastructure is normally underused because of a low number of users. Server virtualization for these environments offers increased optimization and rationalization for existing equipment.

The environment management process described previously using local disk replication automated through Replication Manager can also be implemented in identical fashion in VMware environments.

Conclusion

A highly scalable and available architecture for Oracle E-Business Suite R12 environments can be deployed using the Celerra Unified Storage Platform and common Intel x86 servers with the Linux operating system. Celerra local replication features provide even greater management speed and efficiency with greater operating efficiency and a faster return on investment.
References


Other references:

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- *Sharing The Application Tier File System in Oracle E-Business Suite Release 12* – Oracle Metalink Note 384248.1
- *Cloning Oracle Applications Release 12 with Rapid Clone* – Oracle Metalink Note 406982.1
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- *EMC Solutions for Oracle Database 10g/11g for Midsize Enterprises EMC Celerra Unified Storage Platform Applied Technology Guide*
- *EMC Solutions for Oracle RAC 10g for Linux NFS on EMC Celerra NX4 Solutions Guide*