Overview of Oracle E-Business Suite on AWS

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Notices

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Abstract

Oracle E-Business Suite is a popular suite of integrated business applications for automating enterprise-wide processes like customer relationship management, financial management, and supply chain management. This is the first whitepaper in a series focused on Oracle E-Business Suite on Amazon Web Services (AWS). It provides an architectural overview for running Oracle E-Business Suite 12.2 on AWS.

The whitepaper series is intended for customers and partners who want to learn about the benefits and options for running Oracle E-Business Suite on AWS. Subsequent whitepapers in this series will discuss advanced topics and outline best practices for high availability, security, scalability, performance, migration, disaster recovery, and management of Oracle E-Business Suite systems on AWS.

Introduction

Almost all large enterprises use Enterprise Resource Planning (ERP) systems for managing and optimizing enterprise-wide business processes. Cloud adoption among enterprises is growing rapidly, with many adopting a cloud-first strategy for new projects and migrating their existing systems from on-premises to Amazon Web Services (AWS). ERP systems like Oracle E-Business Suite are mission critical for most enterprises and figure prominently in considerations for planning an enterprise cloud migration.

This whitepaper provides a brief overview of Oracle E-Business Suite and a reference architecture for deploying Oracle E-Business Suite on AWS. We also discuss the benefits of running Oracle E-Business suite on AWS and various use cases.

AWS Overview

AWS provides on-demand computing resources and services in the cloud, with pay-as-you-go pricing. As of this publication, AWS serves over a million active customers in more than 190 countries and is available in 16 Regions worldwide. You can run a server on AWS and log in, configure, secure, and operate it just as you would operate a server in your own data center.

Using AWS resources for your compute needs is like purchasing electricity from a power company instead of running your own generator, and it provides many of the same benefits:

- The capacity you get exactly matches your needs.

- You pay only for what you use.

- Economies of scale result in lower costs.

- The service is provided by a vendor who is experienced in running large-scale compute and network systems.

Amazon Web Services Concepts

This section describes the AWS infrastructure and services that are part of the reference architecture for running Oracle E-Business Suite on AWS.

Regions and Availability Zones

Each Region is a separate geographic area isolated from the other Regions. Regions provide you the ability to place resources, such as Amazon Elastic Compute Cloud (Amazon EC2) instances, and data in multiple locations. Resources aren't replicated across Regions unless you do so specifically.

An AWS account provides multiple Regions so that you can launch your application in locations that meet your requirements. For example, you might want to launch your application in Europe to be closer to your European customers or to meet legal requirements.

Each Region has multiple, isolated locations known as Availability Zones. Each Availability Zone runs on its own physically distinct, independent infrastructure, and is engineered to be highly reliable. Common points of failure, such as generators and cooling equipment, are not shared across Availability Zones. Because Availability Zones are physically separate, even extremely uncommon disasters such as fires, tornados or flooding would only affect a single Availability Zone. Each Availability Zone is isolated, but the Availability Zones in a Region are connected through low-latency links. The following diagram illustrates the relationship between Regions and Availability Zones.
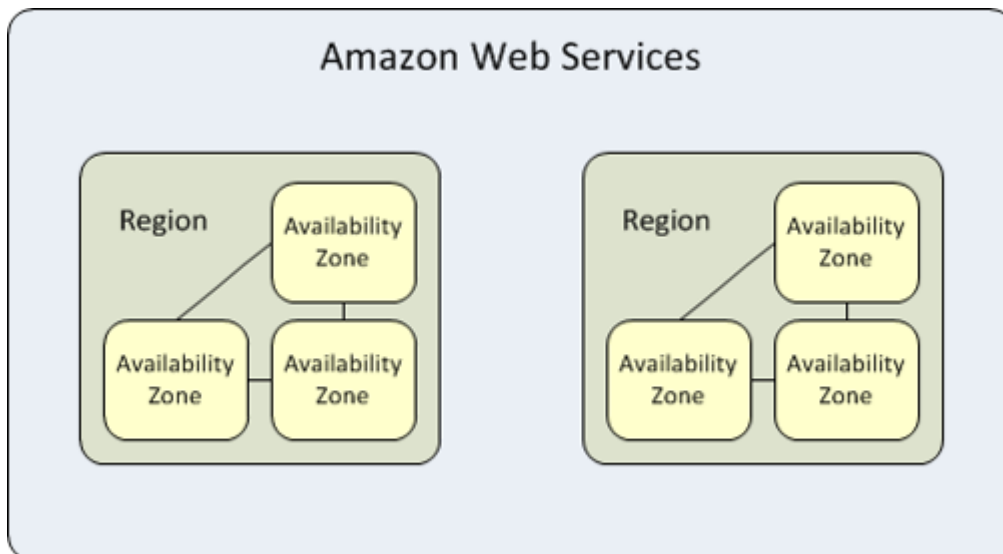
Figure 1: Relationship between AWS Regions and Availability Zones

The following figure shows the Regions and the number of Availability Zones in each Region provided by an AWS account at the time of this publication. For the most current list of Regions and Availability Zones, see https://aws.amazon.com/about-aws/global-infrastructure/.

Note that you can't describe or access additional Regions from the AWS GovCloud (US) Region or China (Beijing) Region.
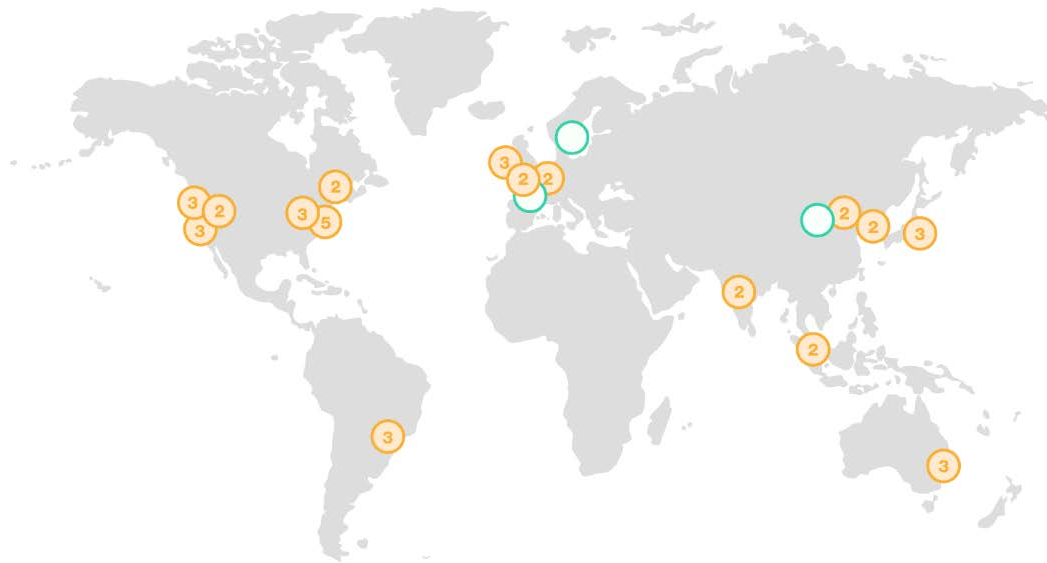
Region & Number of Availability Zones

AWS GovCloud (2)

US West
Oregon (3), Northern California (3)

US East
Northern Virginia (5), Ohio (3)

Canada
Central (2)

South America
São Paulo (3)

Europe
Ireland (3), Frankfurt (2), London (2)

Asia Pacific
Singapore (2), Sydney (3), Tokyo (3), Seoul (2), Mumbai (2)

China
Beijing (2)

New Region (coming soon)

Paris

Ningxia

Stockholm

Figure 2: Map of AWS Regions and Availability Zones

Amazon Elastic Compute Cloud

Amazon Elastic Compute Cloud (Amazon EC2) is a web service that provides resizable compute capacity in the cloud that is billed by the hour. You can run virtual machines (EC2 instances) ranging in size from 1 vCPU and 1 GB memory to 128 vCPU and 2 TB memory. You have a choice of operating systems including Windows Server 2008/2012, Oracle Linux, Red Hat Enterprise Linux, and SUSE Linux.

Elastic Load Balancing

Elastic Load Balancing automatically distributes incoming application traffic across multiple Amazon EC2 instances in the cloud. It enables you to achieve greater levels of fault tolerance in your applications, seamlessly providing the required amount of load balancing capacity needed to distribute application traffic. Elastic Load Balancing can be used for load balancing web server traffic.

Amazon Elastic Block Store

Amazon Elastic Block Store (Amazon EBS) provides persistent block level storage volumes for use with EC2 instances in the AWS Cloud. Each Amazon EBS volume is automatically replicated within its Availability Zone to protect you from component failure, offering high availability and durability. EBS volumes offer the consistent and low-latency performance needed to run your workloads.

Amazon Machine Image

An Amazon Machine Image (AMI) is simply a packaged-up environment that includes all the necessary bits to set up and boot your instance. Your AMIs are your unit of deployment. Amazon EC2 uses Amazon EBS and Amazon S3 to provide reliable, scalable storage of your AMIs so that we can boot them when you ask us to do so.

Amazon Simple Storage Service

Amazon Simple Storage Service (Amazon S3) provides developers and IT teams with secure, durable, highly-scalable object storage. Amazon S3 is easy to use. It provides a simple web services interface you can use to store and retrieve any amount of data from anywhere on the web. With Amazon S3, you pay only for the storage you actually use. There is no minimum fee and no setup cost.

Amazon Route 53

Amazon Route 53 is a highly available and scalable cloud Domain Name System (DNS) web service. It is designed to give developers and businesses an extremely reliable and cost-effective way to route end users to Internet applications by translating names like www.example.com into the numeric IP address.

Amazon Virtual Private Cloud

Amazon Virtual Private Cloud (Amazon VPC) lets you provision a logically isolated section of the AWS Cloud in which you can launch AWS resources in a virtual network that you define. You have complete control over your virtual networking environment, including selection of your own private IP address range, creation of subnets, and configuration of route tables and network gateways. You can leverage multiple layers of security, including security groups and network access control lists, to help control access to EC2 instances in each subnet. Additionally, you can create a Hardware Virtual Private Network (VPN) connection between your corporate data center and your VPC and leverage the AWS Cloud as an extension of your corporate data center.

Amazon Elastic File System

Amazon Elastic File System (Amazon EFS) is a file storage service for EC2 instances. Amazon EFS supports the NFS v4 protocol, so the applications and tools that you use today work seamlessly with Amazon EFS. Multiple EC2 instances can access an Amazon EFS file system at the same time, providing a common data source for workloads and applications running on more than one instance. With Amazon EFS, storage capacity is elastic, growing and shrinking automatically as you add and remove files, so your applications have the storage they need, when they need it.

AWS Security and Compliance

The AWS Cloud security infrastructure has been architected to be one of the most flexible and secure cloud computing environments available today. Security on AWS is very similar to security in your on-premises data center—but without the costs and complexities involved in protecting facilities and hardware. AWS provides a secure global infrastructure, plus a range of features that you can use to help secure your systems and data in the cloud. To learn more about AWS Security, visit the [AWS Security Center](#).[1]

AWS Compliance enables customers to understand the robust controls in place at AWS to maintain security and data protection in the cloud. AWS engages with external certifying bodies and independent auditors to provide customers with extensive information regarding the policies, processes, and controls established and operated by AWS. To learn more about AWS Compliance, visit the [AWS Compliance Center](#).[2]

Oracle E-Business Suite on AWS

In this section we cover the major components of Oracle E-Business Suite and its architecture on AWS. It is important to have a good understanding of Oracle E-Business Suite architecture and its major components to successfully deploy and configure it on AWS.

Oracle E-Business Suite Components

Oracle E-Business Suite has a three-tier architecture consisting of client, application, and database (DB) tiers.
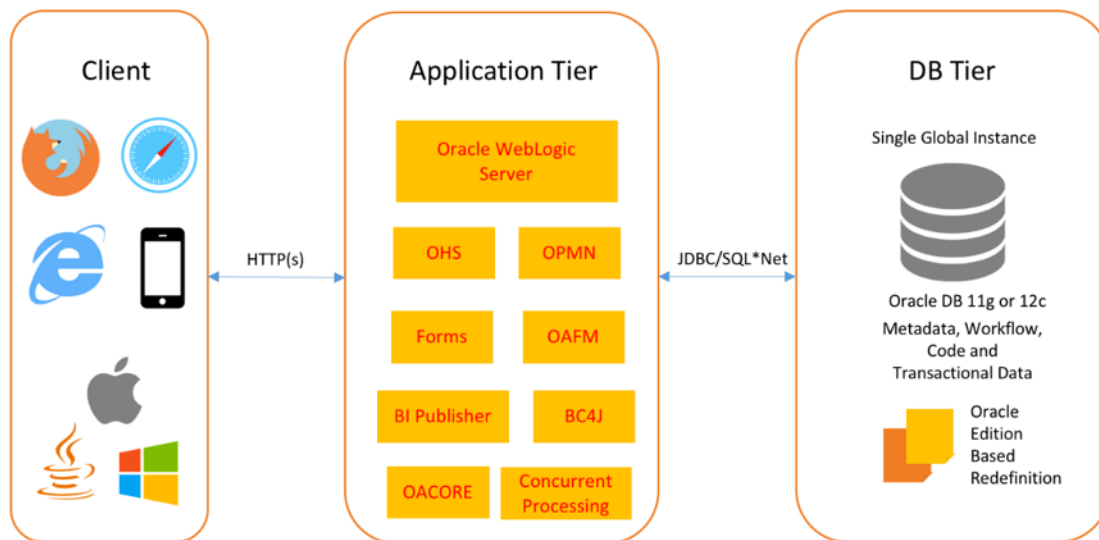

Figure 3: Oracle E-Business Suite three-tier architecture

The client tier contains the client user interface, which is provided through HTML or Java applets in a web browser for forms-based applications.

The application tier consists of Oracle Fusion Middleware (Oracle HTTP Server and Oracle WebLogic Server) and the concurrent processing server. The Fusion Middleware server has HTTP, Java, and Forms services that process the business logic and talk to the database tier. The Oracle HTTP Server (OHS) accepts incoming HTTP requests from clients, and routes the requests to the Oracle Web Logic Server (WLS), which hosts the business logic and other server-side components. The HTTP services, forms services, and concurrent processing server can be installed on multiple application tier nodes and load balanced.

The database tier consists of an Oracle database that stores the data for Oracle E-Business Suite. This tier has the Oracle database executables and the Oracle database files that physically store the tables, indexes, and other database objects in the system.

Please refer to the Oracle E-Business Suite Concepts guide for a deeper dive on the Oracle E-Business Suite architecture components. [3]

Oracle E-Business Suite Architecture on AWS

The following reference diagram illustrates how Oracle E-Business Suite can be deployed on AWS. The application and database tiers are deployed across multiple Availability Zones for high availability.
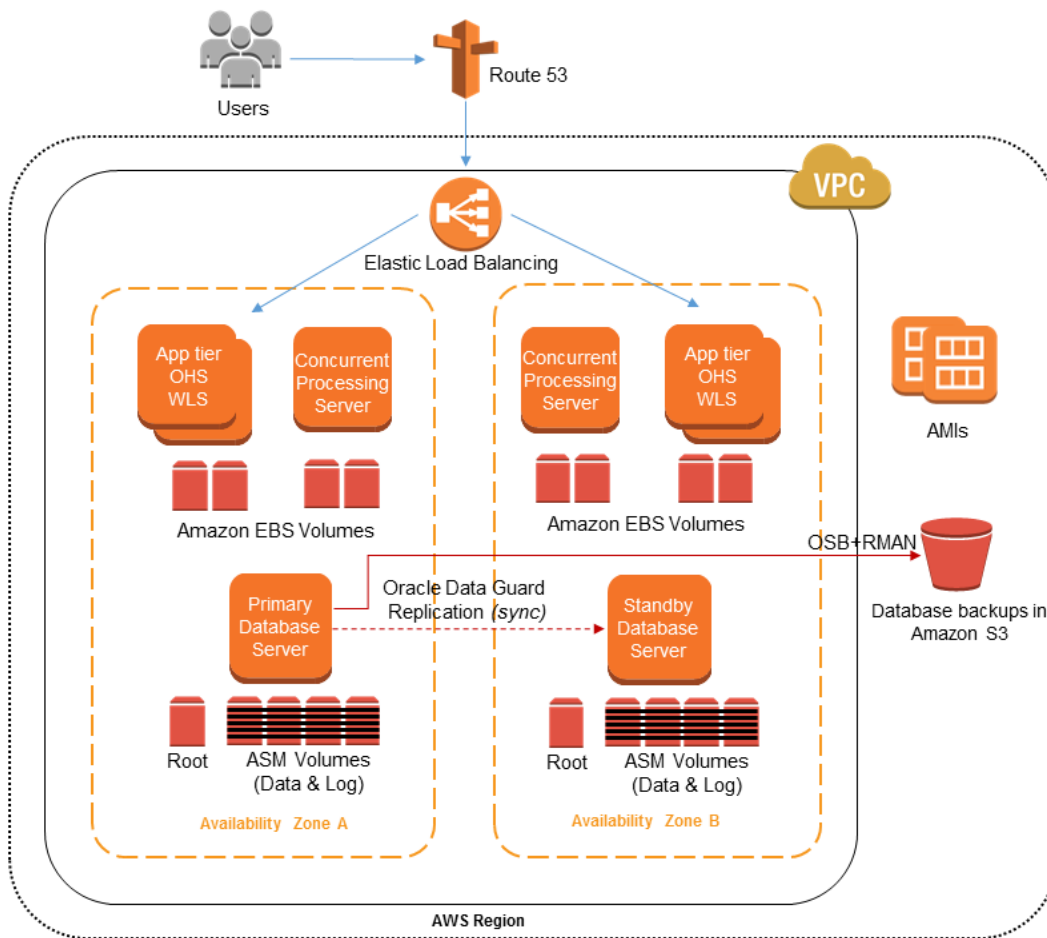

Figure 4: Sample Oracle E-Business Suite deployment on AWS

User requests from the client tier are routed using Amazon Route 53 DNS to the Oracle E-Business Suite application servers deployed on EC2 instances via Elastic Load Balancing. The OHS and the Oracle WLS are deployed on each application tier instance. The OHS will accept the requests from Elastic Load

Balancing and route them to the Oracle WLS. The Oracle WLS will execute the appropriate business logic and communicate with the Oracle database.

The various modules and functions within Oracle E-Business Suite share a common data model. There is only one Oracle database for multiple application tier nodes.

Load Balancing and High Availability

Elastic Load Balancing is used to distribute incoming traffic across multiple application tier instances deployed across multiple Availability Zones. You can add and remove application tier instances from your load balancer as your needs change, without disrupting the overall flow of information. Elastic Load Balancing ensures that only healthy instances receive traffic by detecting unhealthy instances and rerouting traffic across the remaining healthy instances. If an application tier instance fails, Elastic Load Balancing automatically reroutes the traffic to the remaining running application tier instances. In the unlikely event of an Availability Zone failure, user traffic is routed to the remaining application tier instances in the other Availability Zone.

Other third-party load balancers like the F5 BIG-IP are available on AWS Marketplace and can be used as well. Please refer to My Oracle Support document 1375686.1 for more details on using load balancers with Oracle E-Business Suite.[4]

The database tier is deployed on Oracle running on two EC2 instances in different Availability Zones. Oracle Data Guard replication (maximum protection or maximum availability mode) is configured between the primary database in one Availability Zone and a standby database in another Availability Zone. In case of failure of the primary database, the standby database is promoted as the primary and the application tier instances will connect to it.

For more details on deploying Oracle Database on AWS, see the Oracle Database on AWS Quick Start.[5]

Scalability

When using AWS you can scale your application easily due to the elastic nature of the cloud. You can scale up the Oracle E-Business Suite application tier and database tier instances simply by changing the instance type to a larger instance type.

For example, you can start with an r4.large instance with 2 vCPUs and 15 GiB RAM and scale up all the way to an x1.32xlarge instance with 128 vCPUs and 1,952 GiB RAM. After selecting a new instance type, only a restart is required for the changes to take effect. Typically, the resizing operation is completed in a few minutes, the EBS volumes remain attached to the instances, and no data migration is required.

You can scale out the application tier by adding and configuring more application tier instances when required. You can launch a new EC2 instance in a few minutes. However, additional work is required to ensure that the AutoConfig files are correct and the new application tier instance is correctly configured and registered with the database. Although it might be possible to automate the scaling out of the application tier using scripting, this requires an additional technical investment. A simpler alternative might be to use stand by instances as explained in the next section.

Standby Instances

To meet extra capacity requirements, additional application tier instances of Oracle E-Business Suite can be pre-installed and configured on EC2 instances. These standby instances can be shut down until extra capacity is required. Charges are not incurred when EC2 instances are shut down—only EBS storage charges are incurred. At the time of this publication, EBS General Purpose volumes are priced at $0.10 per GB per month in the US East (Ohio) Region. Therefore, for an EC2 instance with 120 GB hard disk drive (HDD) space the storage charge is only $12 per month. These pre-installed standby instances provide you the flexibility to use these instances for meeting additional capacity needs as and when required.

Storage Options and Backup

AWS offers a complete range of cloud storage services to support both application and archival compliance requirements. You can choose from object, file, block, and archival services. The following table lists some of the storage options and how they can be used when deploying Oracle E-Business Suite on AWS.

Storage Type	Storage Characteristics	Oracle E-Business Suite Use Case
Amazon EBS – GP2 volumes	SSD-based block storage with up to 10,000 IOPS per volume	Boot volumes, operating system & software binaries, Oracle database archive logs
Amazon EBS – IO1 volumes	SSD-based block storage with up to 20,000 IOPS per volume. Multiple volumes can be striped together for higher IOPS	Storage for the database tier – ASM disks, Oracle data files, redo logs
Amazon EFS	Highly durable, NFSv4.1 compatible filesystem	PCP out and log files, media staging
Amazon S3	Object store with 99.999999999% durability	Backups, archives, media staging
Amazon Glacier	Extremely low-cost and highly durable storage for long-term backup and archival	Long-term backup and archival
Amazon EC2 Instance Storage	Ephemeral or temporary storage, data persists only for the lifetime of the instance	Swap, temporary files, reports cache, Web Server cache

The application and database servers use EBS volumes for persistent block storage. Amazon EBS has two types of solid-state drive (SSD)-backed volumes: Provisioned IOPS SSD (io1) for latency-sensitive database and application workloads and General Purpose SSD (gp2) that balances price and performance for a wide variety of transactional workloads, including development/test environments and boot volumes.

General purpose SSD volumes provide good balance between price and performance and can be used for boot volumes, the Oracle E-Business Suite application tier file system, and logs. They are designed to offer single-digit millisecond latencies and deliver a consistent baseline performance of 3 IOPS/GB to a maximum of 10,000 IOPS per volume.

Provisioned IOPS volumes are the highest performance EBS storage option and should be used along with Oracle Automatic Storage Management (ASM) for storing the Oracle database data and log files. You can provision up to 20,000 IOPS per io1 volume. These volumes are designed to achieve single-digit millisecond latencies and to deliver the provisioned IOPS 99.9% of the time. You can use Oracle ASM to stripe the data across multiple EBS volumes for higher IOPS and to scale the database storage.

To maximize the performance of EBS volumes, we recommend that you use EBS-optimized EC2 instances.[6]

EC2 instances have temporary SSD-based block storage called instance storage. Instance storage persists only for the lifetime of the instance and should not be used to store valuable, long-term data. Instance storage can be used as swap space and for storing temporary files like the report cache or web server cache. If you are using Oracle Linux as the operating system for the database server, you can use the instance storage for the Oracle database Smart Flash Cache and improve the database performance.

Parallel Concurrent Processing (PCP) allows you to distribute concurrent managers across multiple nodes so that you can use the available capacity and provide failover. You can use a shared file system like Amazon EFS for storing the log and out files while implementing PCP in Oracle E-Business Suite.

Amazon S3 provides low cost, scalable, and highly durable storage and should be leveraged for storing backups. You can use Oracle Recovery Manager (RMAN) to back up your database and then copy the data to Amazon S3.

Alternatively, you can use the Oracle Secure Backup (OSB) Cloud Module to back up your database. The OSB Cloud Module is fully integrated with RMAN features and functionality and the backups are sent directly to Amazon S3 for storage.

Benefits of Oracle E-Business Suite on AWS

In the following sections we discuss some of the key benefits of running Oracle E-Business Suite on AWS.

Agility and Speed

Traditional deployment involves a long procurement process in which each stage is time-intensive and requires large capital outlay and multiple approvals. With AWS, you can provision new infrastructure and Oracle E-Business Suite environments in minutes, compared to waiting weeks or months to procure and deploy traditional infrastructure.

Lower Total Cost of Ownership

In an on-premises environment, you typically pay hardware support costs, virtualization licensing and support, data center costs, etc. You can eliminate or reduce all of these costs by moving to AWS. You benefit from the economies of scale and efficiencies provided by AWS and pay only for the compute, storage, and other resources you use.

Cost Savings for Non-Production Environments

You can shut down your non-production environments when you are not using them and save costs. For example, if you are using a development environment for only 40 hours a week (8 hours a day, 5 days a week), you can shut down the environment when it's not in use. You pay only for 40 hours of Amazon EC2 compute charges instead of 168 hours (24 hours a day, 7 days a week) for an on-premises environment running all the time; this can result in a saving of 75% for EC2 compute charges.

Replace CapEx with OpEx

You can start an Oracle E-Business Suite implementation or project on AWS without any upfront cost or commitment for compute, storage, or network infrastructure.

Unlimited Environments

In an on-premises environment, you usually have a limited set of environments to work with; provisioning additional environments takes a long time or might not be possible at all. You do not face these restrictions when using AWS; you can create virtually any number of new environments in minutes as required.

You can have a different environment for each major project so that each team can work independently with the resources they need without interfering with other teams; the teams can then converge at a common integration environment when they are ready. You can terminate these environments when the project finishes and stop paying for them.

Have Moore's Law Work for You Instead of Against You

In an on-premises environment, you end up owning hardware that is depreciating in value every year. You are locked into the price and capacity of the hardware once it is acquired, plus you have ongoing hardware support costs.

With AWS, you can switch your underlying instances to the faster, more powerful next-generation AWS instance types as they become available.

Right Size Anytime

Often customers over-size environments for initial phases and are then unable to cope with growth in later phases. With AWS, you can scale the usage up or down at any time. You only pay for the computing capacity you use, for the duration you use it. Instance sizes can be changed in minutes through the AWS Management Console or the AWS Application Programming Interface (API) or Command Line Interface (CLI).

Low-Cost Disaster Recovery

You can build extremely low-cost standby disaster recovery environments for your existing deployments and incur costs only for the duration of the outage.

Ability to Test Application Performance

Although performance testing is recommended prior to any major change to an Oracle E-Business Suite environment, most customers only performance test their Oracle E-Business Suite application during the initial launch in the yet-to-be-deployed production hardware. Later releases are usually never performance tested due to the expense and lack of environment required for performance testing. With AWS, you can minimize the risk of discovering performance issues later in production. An AWS Cloud environment can be created easily and quickly just for the duration of the performance test and only used when needed. Again, you are charged only for the hours the environment is used.

No End of Life for Hardware or Platform

All hardware platforms have end-of-life dates, at which point the hardware is no longer supported and you are forced to buy new hardware again. In the AWS Cloud, you can simply upgrade the platform instances to new AWS instance types in a single click at no cost for the upgrade.

Oracle E-Business Suite on AWS Use Cases

Oracle E-Business Suite customers are using AWS for a variety of use cases including the following environments:

- Migration of existing Oracle E-Business Suite production environments

- Implementation of new Oracle E-Business Suite production environments

- Implementing disaster recovery environments

- Running Oracle E-Business Suite development, test, demonstration, proof of concept (POC), and training environments

- Temporary environments for migrations and testing upgrades

- Temporary environments for performance testing

Conclusion

AWS can be an extremely cost-effective, secure, scalable, high-performing, and flexible option for deploying Oracle E-Business Suite. This whitepaper outlines some of the benefits and use cases for deploying Oracle E-Business Suite on AWS. Subsequent whitepapers in this series will cover advanced topics and outline best practices for high availability, security, scalability, performance, migration, disaster recovery, and management of Oracle E-Business Suite systems on AWS.

Contributors

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Notes

[1] https://aws.amazon.com/security/

[2] https://aws.amazon.com/compliance/

[3] https://docs.oracle.com/cd/E51111_01/current/acrobat/122oacg.pdf

[4] https://support.oracle.com/epmos/faces/DocumentDisplay?parent=DOCUMENT&sourceId=1375686.1&id=1375686.1

[5] https://s3.amazonaws.com/quickstart-reference/oracle/database/latest/doc/oracle-database-on-the-aws-cloud.pdf

[6] https://aws.amazon.com/ebs/details/#ebsoptimized