

Oracle Enterprise Manager Cloud Control 12c: Cloud Mgmt Workshop

Student Guide

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Introduction

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Course Objectives

After completing this course, you should be able to:

- Differentiate between different types of cloud computing
- Determine whether cloud computing will benefit an organization
- Describe how end users can request resources in Oracle Enterprise Manager Cloud Control 12c private clouds
- Implement private clouds by using Oracle Enterprise Manager Cloud Control 12c



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This course introduces you to the concepts of cloud computing and the benefits of its implementation within an organization. You will explore how end users can use Oracle Enterprise Manager Cloud Control 12c to request resources in the cloud, and how you as an administrator can build the infrastructure required to support and service those requests.

Lesson Objectives

After completing this lesson, you should be able to:

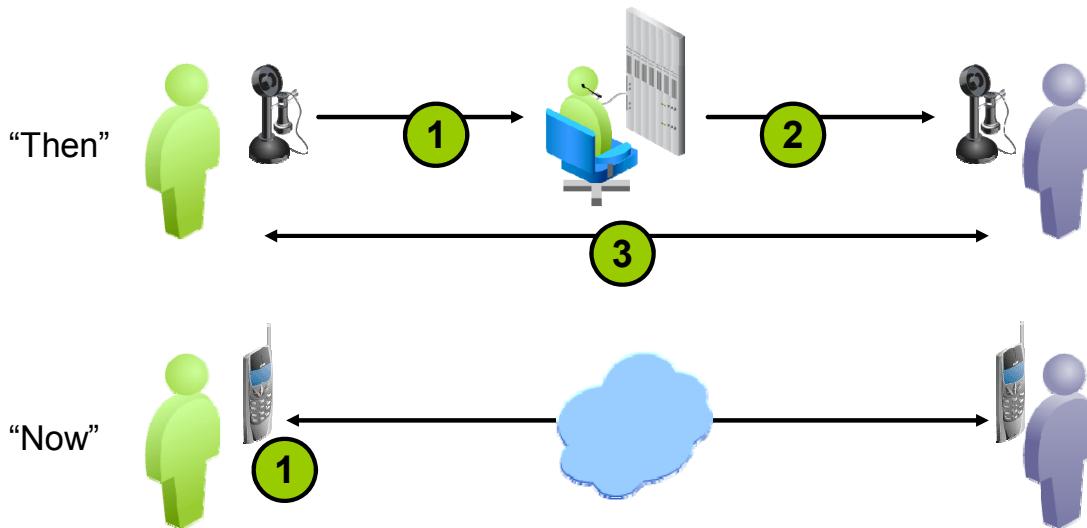
- Define cloud computing
- Describe the benefits of cloud computing to an organization
- Describe Oracle's cloud computing offerings



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We Are Already Consumers of the Cloud

- The cloud is a metaphor for obfuscated service provision.
- The cloud metaphor is neither new nor exclusive to IT.
 - Consider the phone call then and now.



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We Consume Cloud Services Every Day

The cloud metaphor is invoked whenever the details of an implementation or provision of a service are obfuscated from the perspective of the end consumer. There are many examples of cloud-based services in everyday life, such as a phone call between two parties. Before the advent of the automated exchange, making a phone call involved multiple steps of which you were cognizant of:

1. Call the operator and ask for a connection to the other party.
2. Wait for the operator to connect you to the other party.
3. Converse with the other party (with the possibility of the operator sniffing all voice traffic).

Hence, when making a phone call, you were aware of how the call was routed to the other party, and could possibly even trace the phone lines along which the call had been transmitted.

These days, making a phone call only requires access to a phone service and knowledge of the other party's phone number. How your call is actually connected to the other party is obscured within the telecommunications cloud, and in this era of voice-over-IP, mobile communication, and global roaming, the means of communication is further obfuscated.

Other cloud services in your daily life could include:

- Your milk supply. Once, you would have known what dairy produced your milk, but today that information is obscured by large milk producers and their distribution network.
- The electricity supply grid. The power you consume may have been generated in another country.
- Mail delivery network. Whereas once your post could be guaranteed to be collected, sorted, and delivered by a single government agency, now there could be multiple independent contractors between the sender and recipient.

In all of these examples, the service or product you consume has not altered, only the way in which it is provided has changed.

To further illustrate how the cloud is already part of our everyday life, consider one more example:

- Browsing a website. You are typically unaware of the route taken by the HTTP packets between your browser and the site's web servers, or even where the web server is physically located.

Cloud Computing

- From the consumers' perspective:
 - It is an IT capability or service.
 - Its implementation is both unknown and unimportant.
 - It is available anytime, from anywhere.
- From the providers' perspective:
 - It allows them to use computing resources efficiently, wherever, and however possible.
 - It allows for flexibility in resource allocation to meet varying consumer demand.
 - Meeting agreed service levels is more important than anything else.



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The US National Institute of Standards and Technology (NIST) defines cloud computing as “a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

Every Cloud Has a Silver Lining

Cloud computing takes on a different aspect depending upon your perspective. However, all aspects present views of benefits that can be derived from cloud computing.

From the perspective of a consumer of cloud-based resources, the cloud is simply a capability or service that is used without having knowledge of how or where it is implemented. Indeed, knowledge of how the consumable product is provided is obscured by the very nature of it being accessed via “the cloud.” Because implementation details are of no concern to the consumer, their primary interest is availability and usability.

From the perspective of a provider of cloud-based resources, the cloud allows them to service consumer demand by using whatever computing resources are available. This loosens the ties of physical resources to application topologies and gives the provider the flexibility and agility to deploy resources in the most efficient and timely manner possible. Like consumers of cloud-based resources, providers are also primarily interested in the availability and usability as the efficacy of their offering will be determined by the consumers' satisfaction with that offering, typically defined and measured through service-level agreements.

Cloud Computing: Essential Characteristics

- On-demand self service
 - Anytime, no human involvement is required
- Broad network access
 - Anywhere, from any device
- Resource pooling
 - Shared resources to meet many demands
- Rapid elasticity
 - Seamless response to meet changing demands
- Measured service
 - Metering of and reporting on usage



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Five Essential Characteristics of Cloud Computing

The NIST definition of cloud computing includes five essential characteristics:

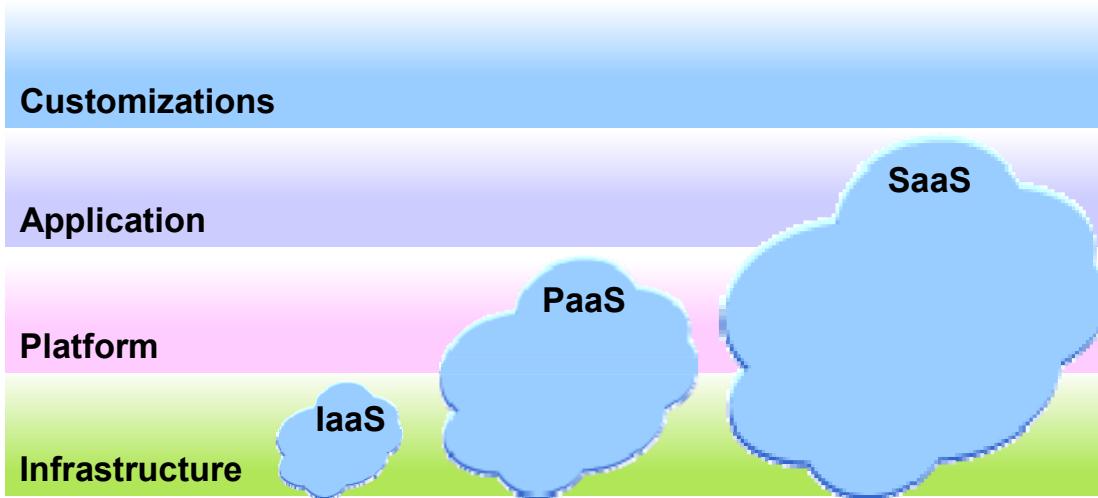
- **On-demand self service**
Consumers can request and receive computing resources as required without human intervention by a provider.
- **Broad network access**
The resources and self service portals provided by the cloud can be accessed through standard network-connected devices (for example, mobile phones, tablets, laptops, and workstations).
- **Resource pooling**
Providers use their computing resources to serve the demands of many customers in a multi-tenancy model. All customers can then benefit from the dynamic allocation of resources from the pool to meet their demands. Examples of resources include storage, processing, memory, and network bandwidth.
- **Rapid elasticity**
Capacity of the cloud can be scaled up or down in response to consumer demand in a manner that appears to the consumer to provide unlimited capabilities.

- **Measured service**

Consumption of cloud resources is measured in a manner appropriate to the service (for example, storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported upon by providers and consumers alike.

Cloud Computing: Service Models

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)



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Three Cloud Computing Service Models

The NIST definition of cloud computing includes three service models.

Infrastructure as a Service (IaaS)

The cloud computing provider makes available resources such as processing, networking, and storage that can be requested by consumers. Typically, the infrastructure that is provisioned in an IaaS cloud is virtualized, although this is not necessarily apparent to the consumer. The consumer is responsible for providing an application platform and applications to deploy upon that platform, and can of course customize those applications as required.

An example of an IaaS cloud request is an Oracle Linux 5 Update 7 x86-64 virtual machine with 16 GB of RAM and 250 GB of storage.

Platform as a Service (PaaS)

The cloud computing provider makes available platforms onto which consumers can deploy their own applications, and then customize those applications as required.

Examples of platforms that might be available in a PaaS cloud are Oracle Database (both single instance and RAC) and Oracle WebLogic Server.

Software as a Service (SaaS)

The cloud computing provider makes available an application that consumers can use and customize.

Examples of the software that might be available in a SaaS cloud are Oracle Fusion Applications and Oracle Social Network.

Cloud Computing: Deployment Models

- Private
 - For exclusive use by a single organization
- Community
 - A common environment for use by a group of related organizations
- Public
 - Separate environments for use by multiple organizations (multi-tenancy)
- Hybrid
 - A combination of private and public clouds for a single organization



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Four Cloud Computing Deployment Models

The NIST definition of cloud computing includes four deployment models:

Private Cloud

The hosting and operation of private clouds may also be outsourced to a third-party service provider, but a private cloud remains for the exclusive use of one organization.

Community Cloud

Examples of communities are all the different branches of the military, all the universities in a given region, or all the suppliers to a large manufacturer.

Public Cloud

All underlying infrastructure is owned and operated by the public cloud provider.

Hybrid Cloud

This may be to implement a “cloud bursting” scenario, where an organization might run the steady-state workload of an application on a private cloud. But when a spike in workload occurs (such as at the end of the financial quarter or during the holiday season), the application can burst out to use computing capacity from a public cloud, and then return those resources to the public pool when they are no longer needed.

Sharing the Benefits of Cloud Computing

- Separation of the provisioning and usage of resources
 - Consumers can focus on their business needs.
 - Providers can focus on the resources to meet those needs.
- Allows maximum flexibility for all parties
 - Consumers use as much or as little of the cloud that they need.
 - Providers only need to meet demand, not exceed it.
- Consumers' capital expenses become operating expenses
 - Hardware purchase and maintenance, machine room cooling and lighting, networking, and so on
- Providers can recoup setup costs from multiple consumers.



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The Cloud Is a Win-Win Scenario for IT Providers and Consumers

The benefits of the cloud are equally distributed between providers and consumers of IT infrastructure and services.

- Resource providers:
 - Can manage the underlying infrastructure in any manner they choose provided they meet their service-level agreements
 - Deploy resources where they are needed, as they are needed
 - Pool resources to provide scalability and multi-tenant capabilities
 - Use IT hardware to ensure optimum return on investment
- Resource consumers:
 - Need only focus on their area of interest and expertise
 - Can leave provisioning and management of underlying infrastructure to the resource providers
 - Consume as much or as little resources as needed, when needed

An inherent benefit to IT service consumers is that the cloud is a consolidation of all the hardware, network, and software infrastructure they would otherwise be required to own to service their requirements. On the other hand, cloud setup necessitates that IT service providers acquire an amount of adequately sized hardware resources, network components, and base software. However, the silver lining is that the provider can monitor resource usage and charge the consumer accordingly.

Cloud computing allows IT service providers to offer capabilities that may be far beyond each consumer's current reach by consolidating and sharing infrastructure across the needs and requirements of many consumers. Conversely, by servicing a wider group of consumers, the cloud service provider can offer a greater range and depth of resources by recouping the requisite IT infrastructure costs through metering and chargeback.

Why Implement a Cloud?

- Standardization
- Consolidation
- Centralization
- Optimization
- Abstraction
- Flexibility
- Self service



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A Cloud Over Your Head Is Not Always Bad

The move to a computing cloud can be compelling for an organization on many fronts:

- Standardization
 - The cloud model naturally lends itself to the adoption of standards including hardware, application platforms, and integration technologies.
- Consolidation
 - Combining physical infrastructure and IT budgets across multiple departments
 - More efficient purchasing, installation, maintenance, and operation processes
 - Reduced operational overhead with fewer physical pieces of infrastructure to manage
 - Potential gains per application deployment in terms of available compute resources
- Centralization
 - Consolidation may result in co-location of previously distributed infrastructure
 - Simplification of operations through the reduction of infrastructure

- Optimization
 - Taking advantage of all available computing resources on any given server
 - Potential for reduced workload on operations or systems staff with fewer resources to manage
- Abstraction
 - The host and application platforms in a cloud deployment become an abstraction of physical servers with installed software, breaking ties to specific physical resources.
- Flexibility
 - As long as any service-level agreements that are in place are not breached, IT resources can be deployed and used in whatever configuration and manner is desired.
 - Applications can be deployed on any environments that meet their current resource needs.
- Self service
 - Where suitable, allow end users (for example, developers) to request resources and have the cloud management system provide those resources, thereby freeing system administrators and operations teams from servicing such requests.
 - End users need only be concerned with any quotas and other restrictions imposed upon them, not where they might be able to find the resources they need as these will be provided by the private cloud.

Oracle's Cloud Offerings

- Public cloud solutions
 - Oracle Cloud
 - Oracle on third party public clouds
 - Powering third party public clouds
- Private cloud solutions
 - IaaS
 - PaaS
 - Private Database Cloud
- Private cloud systems
 - Enterprise Manager Cloud Control 12c
 - Ops Center 12c
 - Exalogic Elastic Cloud



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Oracle Clouds

Oracle offers a number of cloud solutions by using combinations of different technologies. This course will focus on building and managing IaaS and PaaS private clouds by using Enterprise Manager Cloud Control 12c.

You can learn more by visiting the following sites:

- <http://cloud.oracle.com>
- <http://www.oracle.com/goto/cloud>
- <http://www.oracle.com/technetwork/topics/cloud/index.html>

Enterprise Manager Cloud Control 12c Clouds

- IaaS
 - Built on Oracle VM for x86 virtualization platform
 - User requests create virtual machines
- PaaS
 - Database as a Service using Oracle Single Instance, RAC, and RAC 1-Node
 - Middleware as a Service using WebLogic Server
- Metering and chargeback
- Self service portal
- Use Cloud Control's standard security model to enforce multi-tenancy boundaries



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Enterprise Manager Cloud Control 12c: Private Clouds

Enterprise Manager Cloud Control 12c is shipped with all the management, provisioning, metering, and self service tools needed to provide the five essential characteristics of cloud computing:

- **On-demand self service**

The self service portal of the Enterprise Manager Cloud Control 12c allows self service users to review and perform maintenance tasks on IaaS and PaaS requests that have already been provisioned, schedule new requests, and report on usage and any associated charges.

- **Broad network access**

Self service users only need access to the Enterprise Manager Cloud Control 12c self service portal. By leveraging Cloud Control's proven topology of a centralized Oracle Management Service and distributed managed hosts, self service users can effectively use any cloud resources to which they have been granted access.

- **Resource pooling**

Enterprise Manager Cloud Control 12c can manage many IaaS and PaaS infrastructures, and apply a unified security model across all clouds. Thus ensuring that the boundaries of a multi-tenancy model are honored while distributing available resources according to demands.

- **Rapid elasticity**

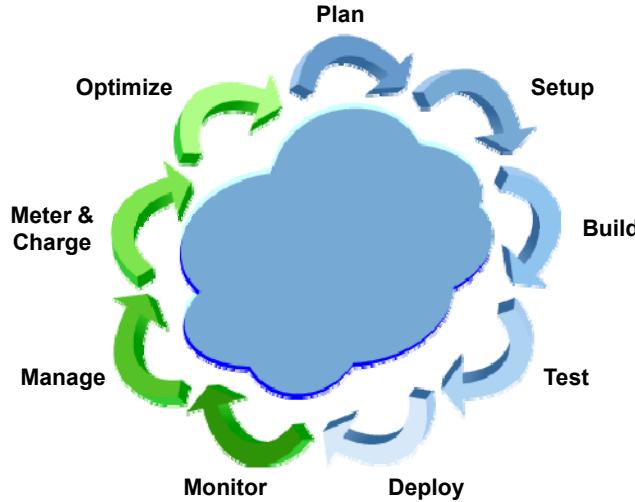
Self service users can define rules to automatically scale their services based upon various metrics. Enterprise Manager Cloud Control 12c will respond to changes in demand and implement those rules as required.

- **Metering**

The Chargeback capability of Enterprise Manager Cloud Control 12c allows cloud administrators to define general and fine-grained rules for calculating charges. Those charges are then allocated to a cost center hierarchy, and usage and cost reports are made available to both self service users and administrators.

Cloud Management Lifecycle

- Enterprise Manager Cloud Control 12c supports the entire cloud management lifecycle.



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Managing the Cloud from Start to Finish and Back Again

Oracle Enterprise Manager Cloud Control 12c assists with the administration and management of all phases of your clouds' lifecycle.

Plan

Consolidation Planner helps you to examine the “what-if” scenarios involved in the early stages of considering infrastructure consolidation or acquisition. By using metric data gathered from your currently managed hosts, you can explore system load and assess if there is merit in giving further consideration to consolidating applications onto existing or new hardware, physical, or virtualized platforms.

Setup

Cloud Control 12c provides tools for setting up the foundations of IaaS, DBaaS, and PaaS clouds. By using Cloud Control 12c, you can define the hardware and software resources that will be available in your cloud, as well as establish the security and resource quota models to be applied to your cloud.

Build

Deployable artifacts such as database provisioning profiles or assemblies can be prepared and published in Cloud Control 12c.

Test

The self service portal allows your artifact developers to test their deployable components easily, in a controlled manner, before exposing them to self service users.

Deploy

As well as being able to request as many deployments as possible within any resource quotas that may apply, your cloud end users can also nominate the amount of computing resources such as CPU and memory that should be assigned to those deployments, thereby scaling predefined templates to suit their needs.

Monitor and Manage

As well as being able to monitor the performance of the underlying cloud infrastructure, artifacts that are created by end-user requests become managed targets in Enterprise Manager Cloud Control 12c. This allows administrators to monitor and manage the performance of the cloud as a single entity by using the standard tools and Incident Management framework.

Meter & Charge

Charge plans can be assigned to cloud resources and deployments, allowing usage to be tracked and reported on a per-user basis. Cloud resources and users can also be assigned to a reporting hierarchy to allow charges to be determined at departmental, regional, or other levels.

Optimize

Resources can be allocated to or reallocated between clouds in response to performance monitoring and demand.

Quiz

What are five essential characteristics of cloud computing?

- a. Rapid elasticity
- b. Power conditioning
- c. On-demand self service
- d. Resource pooling
- e. Hot swappable storage devices
- f. Measured service
- g. Reliability
- h. Broad network access



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Answer: a, c, d, f, h

Although power conditioning, hot swappable storage devices, and reliability are desirable characteristics of any data center, according to the National Institute of Standards and Technology, five essential characteristics of cloud computing are focused on services rather than physical devices.

Quiz

What clouds can you create with Enterprise Manager Cloud Control 12c? (Select all that apply.)

- a. Platform as a Service (PaaS)
- b. Cirrus
- c. Stratus
- d. Software as a Service (SaaS)
- e. Cumulonimbus
- f. Infrastructure as a Service (IaaS)

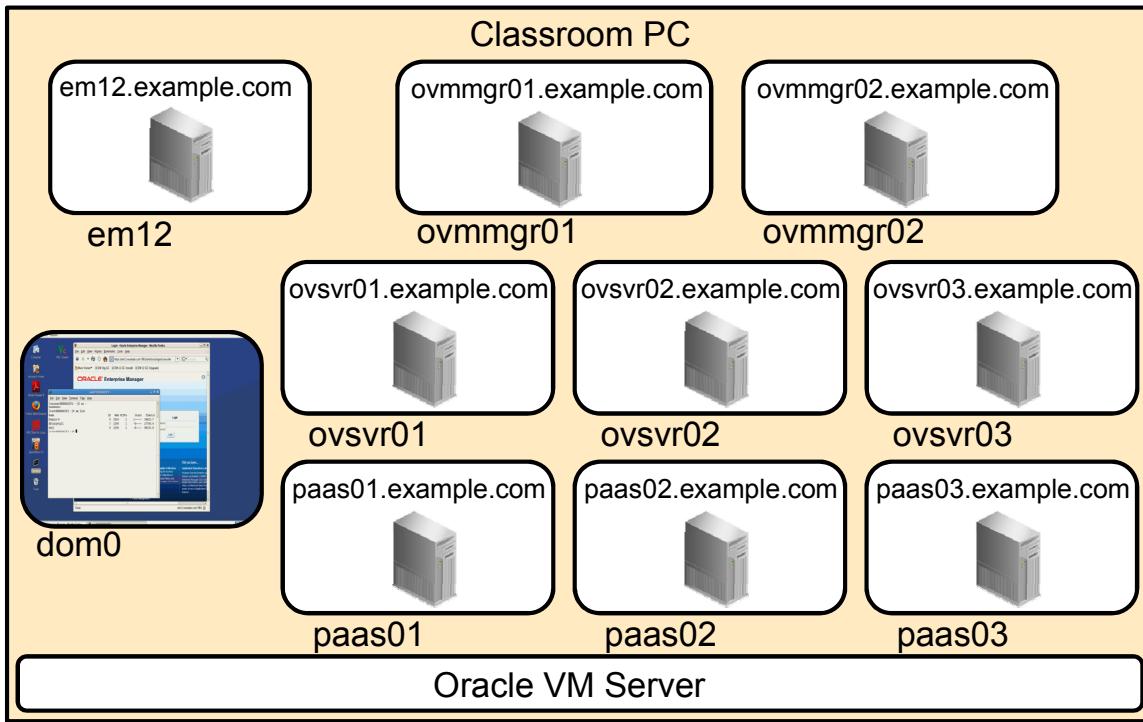


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Answer: a, f

Enterprise Manager Cloud Control 12c does not provide the tools required to implement SaaS, where the infrastructure, platform, and application are made available to self service users. One could argue that IaaS could be used to allow end users to request a complete stack of infrastructure, platform, and application. However, strictly speaking, SaaS is an application service rather than the ability to request provisioning of an application service.

Your Classroom Cloud Environment



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Self Contained Multihost Environment

Your student PC is running Oracle VM Server and has the capacity to run up to five guest virtual machines at the same time, as well as a guest called `dom0` that is always running and provides you with an interface to Oracle VM Server. As illustrated, seven guest virtual machines have been prepared for you and these will be used as required to work through the practice sessions:

- Guest `em12` running host `em12.example.com`
- Guest `ovmmgr01` running host `ovmmgr01.example.com`
- Guest `ovmmgr02` running host `ovmmgr02.example.com`
- Guest `ovsvr01` running host `ovsvr01.example.com`
- Guest `ovsvr02` running host `ovsvr02.example.com`
- Guest `ovsvr03` running host `ovsvr03.example.com`
- Guest `paas01` running host `paas01.example.com`
- Guest `paas02` running host `paas02.example.com`
- Guest `paas03` running host `paas03.example.com`

Guests running on your machine can communicate with each other, but only `dom0` can access the network outside the classroom PC.

Out-of-the-box Oracle VM Server does not offer a GUI front end. However, your `dom0` guest has been modified to include the Gnome interface so that when you log in to the machine, you are presented with a familiar GUI that can also act as an X-server for your guests.

Logging In to Your Machine

Log in to your classroom PC as `vncuser` user. This will log you in to `dom0` and the Gnome GUI. Once you are logged in, the simplest way to control and interact with your guest virtual machines (VMs) is with terminal sessions initiated from the Gnome desktop.

Starting Your Guests

Your practice guides will inform you which VMs are required to be running for each exercise and scripts are provided to start the VMs required for each practice.

Starting, Stopping, and Listing Guests

Once you are logged in to `dom0`, you can switch to root in a terminal session and use the `xm` command-line tool to manually manage guests on the machine by using the commands listed below. Note that you identify guests to the `xm` command by using the guest name rather than the host name of the virtual machine running in that guest.

- `xm list` lists all the currently active guests, including `dom0`.
- `xm create <VM name>` creates a running instance of the specified guest (for example, `xm create ovsvr02`).
- `xm shutdown -w <VM name>` shuts down the specified guest and waits for the action to complete before returning control to you (for example, `xm shutdown -w ovsvr02`).

Your activity guide will detail which guests are required for each practice, and scripts are provided to ensure they are started, so you will not need to create and shut down individual guests.

Connecting to Guests and Running GUI Utilities

Use secure shell (SSH) to create a connection as the `oracle` user from `dom0` to your guests using the host name of the guest VM. Supply the `-X` switch so that any GUI utilities such as the Oracle Installer and Database Configuration Assistant will display in the `dom0` Gnome window. For example:

```
ssh -X oracle@em12.example.com
```

Once logged in, you can test the X-server connection back to `dom0` by running `xclock` in the guest SSH session.

Viewing Web Pages Served by Guests

You can use the browser built into the Gnome interface on `dom0` to view web pages served by your guests, such as the Cloud Control Console by entering a URL that refers to the guest VM host name (`https://em12.example.com:7799/em`).

Summary

In this lesson, you should have learned how to:

- Define cloud computing
- Explain the difference between public and private clouds
- Describe the benefits of cloud computing
- Describe how Cloud Control 12c enables cloud computing



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Practice 1-1 Overview: Getting to Know Your Classroom Environment

This practice covers the following topics:

- Logging in to dom0
- Opening a terminal session
- Exploring the OVM directory structure
- Starting a VM
- Connecting to the VM
- Listing running VMs
- Stopping a running VM



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This practice familiarizes you with the Oracle VM Server environment installed on your classroom PC that you will use for all subsequent practices in this course.

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Cloud for Self Service Users

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Objectives

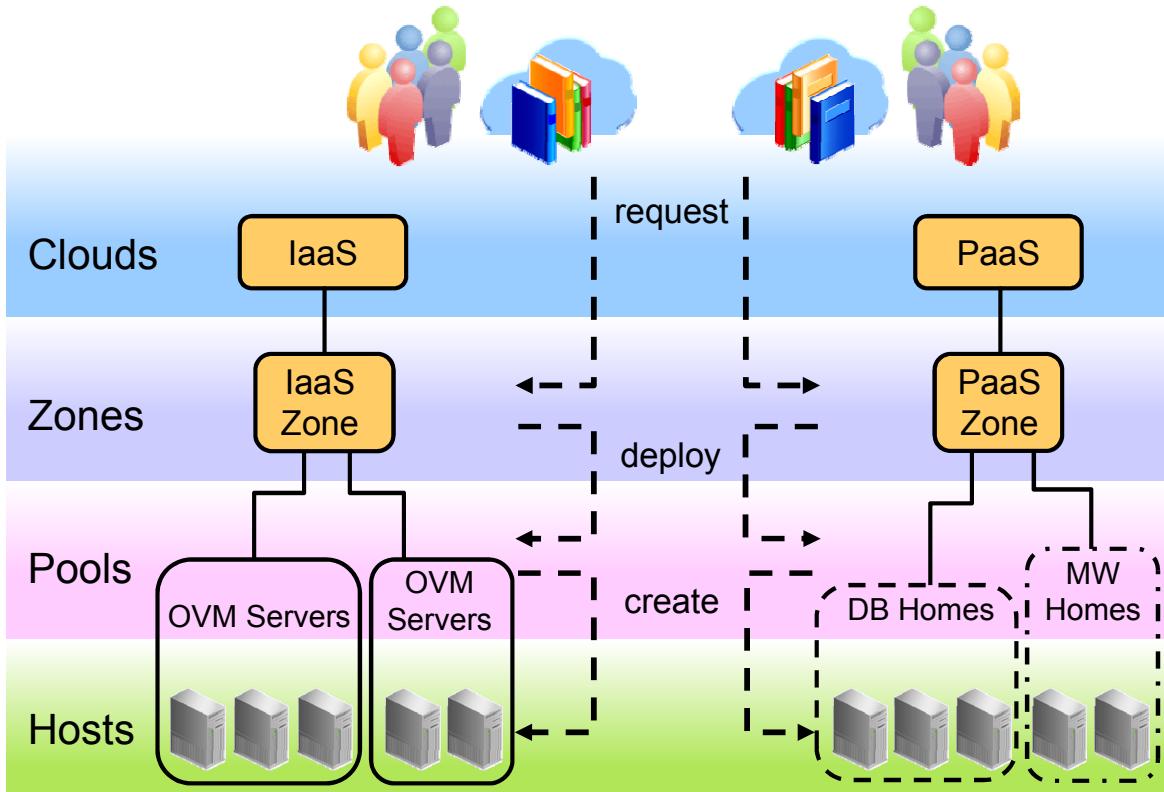
After completing this lesson, you should be able to:

- Describe actions that self service users can take in Cloud Control 12c
- Describe what happens when self service users request resources in Cloud Control 12c



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Cloud Anatomy: Introduction



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Cloud Anatomy and Nomenclature

Any exploration of cloud concepts will inevitably touch on the anatomy and nomenclature of Enterprise Manager Cloud Control 12c clouds, so it is timely to introduce some of those elements for IaaS and PaaS clouds. These and other topics will be explored in more depth in other lessons.

Clouds, zones, pools, and hosts

At an abstracted level, Enterprise Manager Cloud Control 12c clouds are composed of logical zones. Zones are composed of logical pools and pools are composed of hosts. The pools in IaaS zones are collections of one or more Oracle VM (OVM) servers and associated storage resources. The pools in PaaS zones are collections of one or more Oracle Database or Middleware homes of the same platform and version (for example, Oracle Database 11.2.0.2 on Linux x86-64).

Request from the zone, deploy to the pool, create on the hosts

In either cloud type, self service users make a request for resources at the zone level from a catalog of templates. Enterprise Manager Cloud Control 12c will determine which pool in the chosen zone can be used to satisfy the request, and appropriate jobs will be initiated on one or more hosts in that pool to create the entities required to fulfill the request.

DBaaS databases, MWaaS domains, and IaaS servers

In the DBaaS view of the PaaS cloud, self service users request that databases be created, which can be single instance or RAC, depending upon the zones and catalog templates to which they have access. Similarly, in the MWaaS view of the PaaS cloud, self service users request that domains be created. In the IaaS cloud, self service users request that servers be created that are guest virtual machines. A single IaaS request may result in one or more virtual machines being created complete with database(s), middleware software, and deployed applications.

Cloud Control 12c Self Service Users

- They are the Cloud Control 12c users who can request resources from IaaS and PaaS zones.
- Self service users have the following characteristics (directly or indirectly via site-defined roles):
 - The EM_SSA_USER role
 - Resource quotas in IaaS and PaaS zones
 - Privileges on IaaS and PaaS deployment procedures
- Self service users may also be allocated to a cost center for the purposes of chargeback.



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Self Service Cloud Users

Self service users, sometimes referred to as Self Service Application (SSA) Portal users, are distinguished from other Enterprise Manager Cloud Control 12c users by having only the EM_SSA_USER role granted to them and not the EM_USER and PUBLIC roles granted to “regular” Cloud Control 12c administrators. This ensures that self service users are presented with the Cloud home page upon logging in.

Once logged in, self service users will want to request infrastructure and database resources, and to this end they will need to have been granted privileges and quotas on the underlying resource IaaS and DBaaS zones and templates.

IaaS Self Service Users' View of Cloud Control

The screenshot shows the Infrastructure Cloud Self Service Portal. At the top, there's a navigation bar with links like Home, My Requests, My Servers, Storage, Chargeback, Policy Library, and Policies. A yellow callout box labeled "Request new infrastructure" points to a button in the top right of the main content area. Another yellow callout box labeled "Summary of current resource usage" points to a section on the left side of the screen that displays resource utilization for a single server. This section includes four progress bars: Servers (1), CPUs (1), Memory (1 GB), and Local Storage (12.31 GB). The main content area also shows a table titled "10 Last Requested Servers" and another table titled "10 Latest Requests".

Name	Status	Zone	CPU	Memory (MB)	Storage (GB)	Charge	Creation Date	Expiry Date
lab2vm1.example.com	Up	lab2IaaS_Zone	1	1024	12.31		Oct 23, 2012 4:31:43 AM UTC	Oct 25, 2012 3:41:25 AM UTC

Name	Status	Submission Date	Start Date	End Date	Type	Serv	Total CPUs	Total Memory (MB)	Total Storage (GB)
LAB2_USER - Tue Oct 2 Successful	Oct 23, 2012 3:42:22	Oct 23, 2012 3:42:21	Oct 25, 2012 3:41:25		Assembly Deployment	1	1	1024	1.00

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Self Service Infrastructure

All you need know about IaaS as a self service user is that you can log in to Enterprise Manager Cloud Control 12c and navigate to the Infrastructure Cloud Self Service Portal where you will be able to:

- View a summary of your current resource usage against the limits set for you
- Request new infrastructure from the catalog of provisioning procedures that you are privileged to see
- Delete any of your current infrastructure
- View information about any of your current infrastructure
- View information on storage resources associated with your current infrastructure, and request and assign extra storage or release existing storage
- View chargeback data associated with your IaaS usage
- View assemblies (one or more virtual machines including virtual disks, configuration, and interconnectivity), templates (a single virtual machine and its configuration), and deployment plans (saved request settings) that you can use
- Create policies to automatically scale up or down your infrastructure by defining threshold values against metrics with associated actions

IaaS Self Service Users' View of a Server

Stop/start/delete actions for an entire assembly

Stop/start/scale actions for a tier within an assembly

Stop/start/restart/clone/reconfigure or launch VNC console for any server

Name	Type	Operating System	Server Size	CPUs	Memory (MB)	Storage (GB)	Status	Expiry Date
example.com	Server	None	Lab2Machine	1	1024	12.31		Oct 25, 2012 3:41:25 AM UTC

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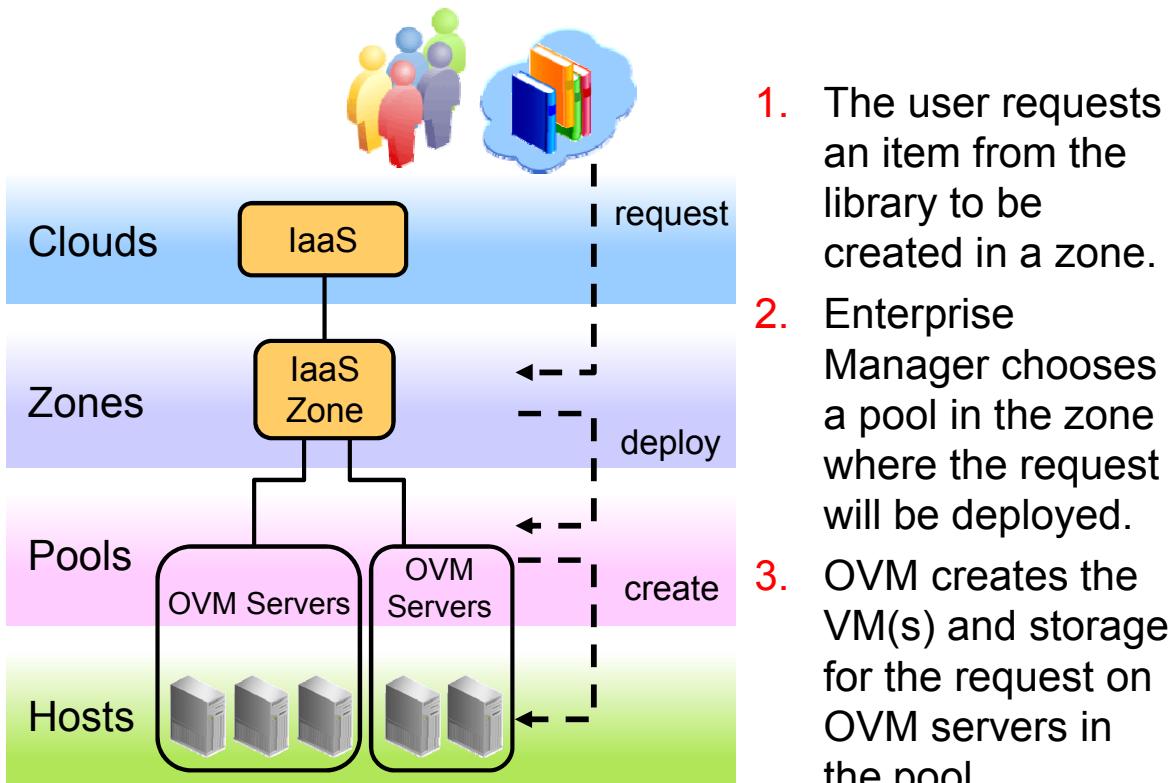
Self Service Infrastructure Monitoring and Control

From the My Servers tab of the Infrastructure Cloud Self Service Portal, self service IaaS users can click the link for any of their current infrastructure to view basic configuration of and status information about the components of that infrastructure. Common and context-sensitive, component-specific actions can be performed based upon what component is highlighted:

- Shutdown and startup operations
- Delete an entire assembly instance—an assembly being one or more virtual machines including virtual disks, configuration, and interconnectivity.
- Scale up and scale down an assembly tier instance—the virtual machines in an assembly can be arranged in tiers such as a middleware or database tier, each tier being a logical collection of virtual machines and possibly other tiers.
- Restart, clone, reconfigure, and launch VNC console for a server.

The infrastructure components will be examined in more detail in the lesson titled “Setting Up the IaaS Self Service Portal.”

Behind the Scenes: IaaS Requests



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Mechanics of Serving an IaaS Request

At a high level, the process that Enterprise Manager Cloud Control 12c employs to satisfy IaaS self service requests includes three steps:

1. The user logs in to the self service portal and requests an item from the library of IaaS artifacts that is visible to the user. The item may be a single server and associated resources, or an assembly consisting of multiple servers with ready-to-use applications. As part of the request, the self service user nominates the IaaS zone where the request should be served.
2. Enterprise Manager examines current resource usage in the pool(s) of the selected IaaS zone and chooses a pool with enough resources upon which to deploy the request. If not already there, Enterprise Manager will push the requested artifact from the software library to the chosen pool's storage repository.
3. OVM creates all required virtual machines and storage on OVM Servers in the chosen pool and then configures them appropriately.

IaaS Self Service Server Request: Initial Steps

The screenshot shows two sequential steps in the 'New Server Request' process:

- Step 1: New Server Request : General** (highlighted with a green circle labeled '1'). This step includes fields for Request Name, Destination (Zone: lab2IaaS_Zone), Source (Source: Lab 2 Oracle Linux), Assembly Instance Name (Name: Lab 2 assembly), Deployment Plan (Optional), and a Name field.
- Step 2: New Server Request : Deployment Configuration** (highlighted with a green circle labeled '2'). This step shows a table for Number of Servers (Default: 1, Minimum: 1, Maximum: 1, Initial: 1) and an Auto Scalable option set to 'Lab2Machine'. It also includes sections for Server Configuration (Deployment Option, Product Configuration, Miscellaneous), General settings (Enable High Availability, Root Password, Confirm Root Password), Network configuration (IP Assignment: eth0: STATIC_FROM_PROFILE, eth1: NONE, eth2: NONE; Network Profile Name: lab2NetworkProfile; Quality Of Service), and Storage configuration.

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Requesting IaaS Self Service Infrastructure: Initial Steps

Clicking Request Servers on the Infrastructure Cloud Self Service Portal initiates the infrastructure request process:

1. General information: Enterprise Manager Cloud Control 12c will automatically generate a request name that you can opt to override with something more meaningful to you. This name will appear in your list of requests on the Infrastructure Cloud Self Service Portal home page. Select an assembly (one or more virtual machines including virtual disks, configuration, and interconnectivity) or template (a single virtual machine and its configuration) from the catalog available to you that defines the infrastructure you want. Then, select a destination zone from all IaaS zones that have been mapped to the assembly or template and against which you have resource quotas. In the Assembly Instance Name, enter a name for the deployed infrastructure—this is the name that you will see in the My Servers tab of the Infrastructure Cloud Self Service Portal.
2. Deployment configuration: On this screen, you can customize the infrastructure to be created, such as specifying the number of servers for each tier. The extent of the customization will depend upon the chosen assembly or template.

IaaS Self Service Server Request: Final Steps

The image contains two screenshots of the Oracle Infrastructure Cloud Self-Service Portal. The top screenshot, labeled '3', shows the 'Schedule' step of a 'New Server Request'. It includes fields for 'Start Date' (set to 'Immediately') and 'End Date' (set to 'Until 10/25/2012 3:41:25 AM'). The bottom screenshot, labeled '4', shows the 'Review' step. It displays the 'General' and 'Deployment Configuration' sections. In the General section, it lists the 'Request Name' as 'LAB2_USER - Tue Oct 23 03:37:05 UTC 2012', 'Zone' as 'lab2IaaS_Zone', 'Source' as 'Lab 2 Oracle Linux 5 Update 7 x86 assembly', and 'Assembly Instance Name' as 'Lab 2 assembly'. In the Deployment Configuration section, it shows a table with one row for 'OVM_OL5U7_x86_PVM:Lab 2 assembly', specifying 'Machine' as 'Lab2Machine'.

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Requesting IaaS Self Service Infrastructure: Final Steps

The final steps in requesting IaaS self service infrastructure are:

3. Schedule: Nominate the provisioning (start) and retirement (end) dates for the infrastructure. Using the schedule, you can both prepare for future work needs and semi-automatically manage your resource usage.
4. Submit the request for deployment.
5. Monitor the request deployment in the My Requests tab on the Infrastructure Cloud Self Service Portal home page.
6. Use the My Servers tab on the Infrastructure Cloud Self Service Portal to view information on the successfully deployed infrastructure.

Practice 2-1 Overview: Using the IaaS Self Service Portal

This practice covers the following topics:

- Logging in as an IaaS self service user
- Creating an IaaS request



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In this practice, you will experience the Enterprise Manager Cloud Control 12c IaaS cloud as a self service user, and create a request to create an environment in an IaaS zone. Because the deployment process can take some time to complete, you will assess the deployment status after completing the lesson.

DBaaS Self Service Users' View of Cloud Control

The screenshot shows the Database Cloud Self Service Portal interface. At the top, there are buttons for 'Request a new database.' and 'Delete a current database.'. Below this is a table for 'Databases' with one entry: 'DBceed89.paas01.example.com'. A red box highlights the 'Usage' section on the left, which displays resource consumption for Memory (0.62 GB) and Storage (1.26 GB). A summary bar chart is also shown. The 'Requests' section at the bottom lists several database requests with their status, request type, submission date, and begin date.

Name	Type	Status	Start	End	Zone
DBceed89.paas01.example.com	Database Instance	Up	Oct 23, 2012 04:07:5	Oct 25, 2012 04:06:4	Lab2 PaaS Zone

Name	Status	Request Type	Submission Date	Begin Date
LAB2_USER DBaaS request_CREATE_6_58	Success	Create Service Inst	Oct 23, 2012 4:06:59	Oct 23, 2012 4:07:59
LAB2_USER DBaaS request_DELETE_6_58	Scheduled	Delete Service Inst	Oct 23, 2012 4:06:59	Oct 25, 2012 4:06:48
LAB2_USER DBaaS request_DELETE_48_53	Scheduled	Delete Service Inst	Oct 23, 2012 3:48:56	Oct 25, 2012 3:46:50
LAB2_USER DBaaS request_CREATE_48_53	Execution Error	Create Service Inst	Oct 23, 2012 3:48:56	Oct 23, 2012 3:49:56

Summary of current resource usage

Request a new database.

Delete a current database.

View current database connection details, status, startup/shutdown/backup.

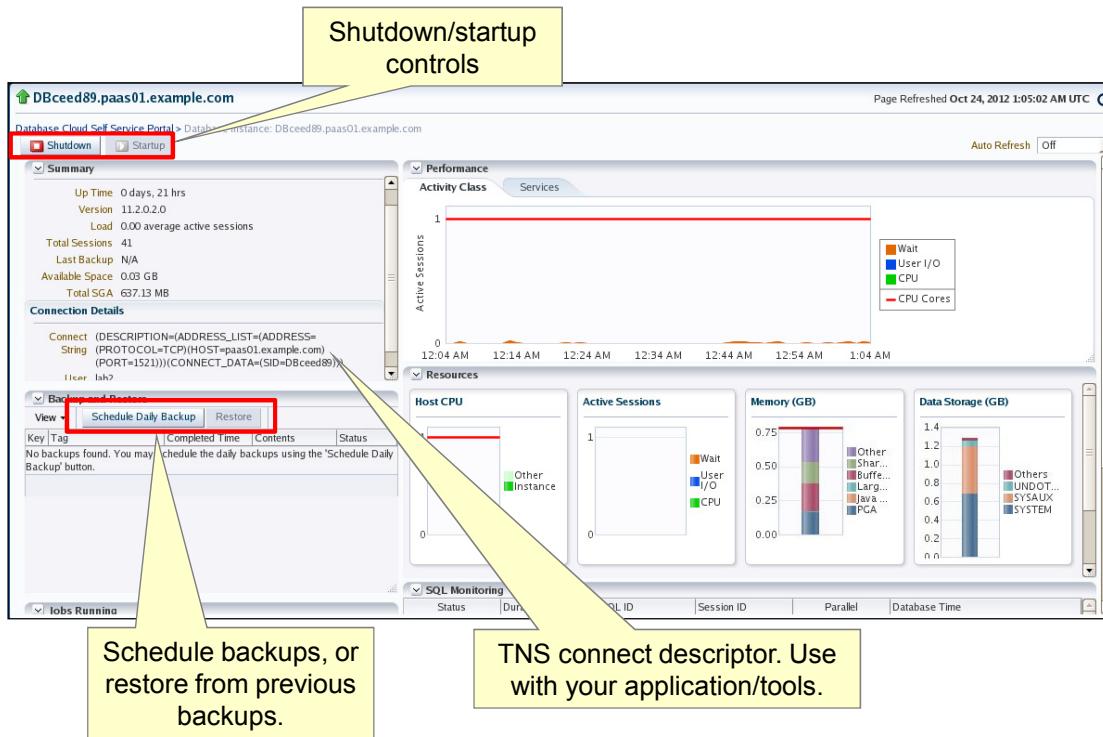
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Self Service Databases

All that you need to know about DBaaS as a self service user is that you can log in to Enterprise Manager Cloud Control 12c and navigate to the Database Cloud Self Service Portal where you will be able to:

- View a summary of your current resource usage against the limits that have been set for you
- Request a new database from the catalog of database provisioning procedures that you are privileged to see
- Delete any of your current databases
- View information about any of your current databases
- View chargeback data associated with your DBaaS usage

DBaaS Self Service Users' View of a DB



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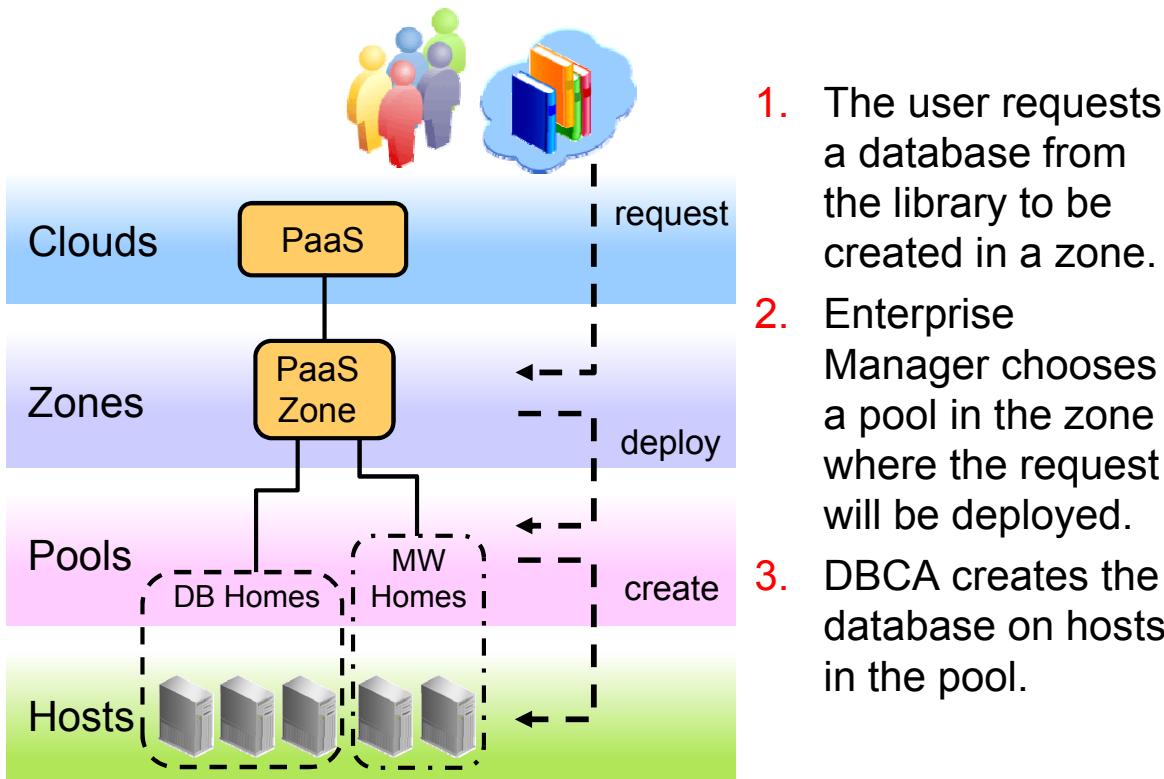
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Self Service Database: Monitoring and Control

From the Database Cloud Self Service Portal, self service DBaaS users can click the link for any of their current databases to view information about and exercise basic control over the database. This includes:

- Shutdown and startup operations
- TNS connect descriptor that the self service user can cut and paste into their application or development environment
- Backup and restore controls if the database was created with the appropriate prerequisites (Flashback Recovery Area and archive log mode)
- Performance graph of the database (and individual RAC instances if appropriate)
- Resource usage illustrations of the database (and individual RAC instances if appropriate)

Behind the Scenes: DBaaS Requests



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Mechanics of Serving a DBaaS Request

At a high level, the process that Enterprise Manager Cloud Control 12c employs to satisfy DBaaS self service requests includes three steps:

1. The user logs in to the self service portal and requests a database from the library of DBaaS templates that is visible to the user. The database may be a single instance or a RAC cluster. As part of the request, the self service user nominates the PaaS zone where the request should be served.
2. Enterprise Manager examines current resource usage in the pool(s) of the selected PaaS zone that match the characteristics of the request (database type, platform, and version) and chooses a pool with enough resources upon which to deploy the request.
3. Enterprise Manager then uses the management agents on hosts within the pool to execute the database creation assistant (DBCA) to create the database.

DBaaS Self Service Database Request: Initial Steps

The screenshot illustrates the four initial steps of requesting a DBaaS database:

- Select Service Template:** Shows a list of service templates, with one highlighted. Step 1 is circled.
- New Database Request : General:** Shows the general information step. Step 2 is circled.
- New Database Request : Deployment Inputs:** Shows the deployment inputs step. Step 3 is circled.
- New Database Request : Schedule:** Shows the schedule step. Step 4 is circled.

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Requesting a DBaaS Self Service Database: Initial Steps

Clicking Request Database on the Database Cloud Self Service Portal initiates the database request process:

- Select a service template:** You will be presented with a list of all the database templates that have been made available to you. Highlighting one of them and clicking Select will take you to the deployment steps.
- General information:** Enterprise Manager Cloud Control 12c will automatically generate a request name that you can opt to override with something more meaningful to you. This name will appear in your list of requests on the Database Cloud Self Service Portal home page. You will also need to select a destination database zone from all database zones that have been mapped to the template and against which you have resource quotas.
- Deployment inputs:** On this screen, you will be asked to fill any “blanks” in the service template, which as a minimum will be a database username and password to be created for you.
- Schedule:** Nominate the provisioning (start) and retirement (end) dates for the database. Using the schedule, you can both prepare for future work needs and semi-automatically manage your resource usage.

DBaaS Self Service Database Request: Final Steps

New Database Request : Review

General **Schedule**

Destination Zone: Lab2 PaaS Zone
Service: Lab2 Tiny 11.2.0.2 Single Instance Linux x86-64 Database
Request Name: LAB2_USER DBaaS request

Start: Immediately End: Oct 25, 2012 3:46:50 AM (UTC-07:00)

Back | Step 4 of 4 | Next | **Submit** | Cancel

Requests

Name	Status	Request Type	Submission Date	Begin Date
LAB2_USER DBaaS request_DELETE_48_53	Scheduled	Delete Service Instar	Oct 23, 2012 3:48:56	Oct 25, 2012 3:46:50
LAB2_USER DBaaS request_CREATE_48_53	In Progress	Create Service Instar	Oct 23, 2012 3:48:56	Oct 23, 2012 3:49:56

Databases

Name	Type	Status	Start	End	Zone
DBceed89.paas01.example.com	Database Instance		Oct 23, 2012 04:07:5	Oct 25, 2012 04:06:4	Lab2 PaaS Zone

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Requesting a DBaaS Self Service Database: Final Steps

The final steps in requesting a DBaaS self service database are:

5. Submit the request for deployment.
6. Monitor the request deployment in the My Requests area on the Database Cloud Self Service Portal home page.
7. Use the link in the My Databases area on the Database Cloud Self Service Portal to view information on the successfully deployed database.

Practice 2-2 Overview: Reviewing the IaaS Self Service Request

This practice covers the following topics:

- Checking the status of an IaaS request
- Viewing the details of a current IaaS request



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In this practice, you will complete the IaaS self service request lifecycle by reviewing the outcome of the request created in Practice 2-1.

Practice 2-3 Overview: Using the DBaaS Self Service Portal

This practice covers the following topics:

- Logging in as a DBaaS self service user
- Creating a DBaaS request
- Checking the status of a DBaaS request
- Viewing the details of a current requested database



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In this practice, you will experience the Enterprise Manager Cloud Control 12c DBaaS cloud as a self service user, and create a request for a database in a PaaS zone. You will monitor the progress of the request, and upon completion review the details of the database that has been created for you.

MWaaS Self Service Users' View of Cloud Control

The screenshot shows the Middleware Cloud Self Service Portal interface. At the top, there are links for Manage (My Servers, My Databases, My Middleware), Home, Chargeback, and My Library. Notifications indicate services due to expire in 7 days and service templates published in the last 7 days. A 'Your Usage' section is highlighted with a red box, showing Java Servers (1) and Memory (GB) (1.5). The 'Middleware Services' section shows a table with one row: Lab2_User_MWaaS_Request, Status: Up, PaaS Infrastructure Zone: Lab2 PaaS Zone, Java Servers: 1, Memory (GB): 1.50, Creation Date: Oct 23, 2012 4:40:09, Expiration Date: Oct 25, 2012 4:20:55, Days until Expiration: 1. The 'My Requests' section lists two entries: Lab2_User_MWaaS_Request_Delete_20121023_042141228 (Status: Scheduled, Request Type: Delete Service Instar, Submission Date: Oct 23, 2012 4:21:42, Begin Date: Oct 25, 2012 4:20:55) and Lab2_User_MWaaS_Request_Create_20121023_042141079 (Status: Success, Request Type: Create Service Instar, Submission Date: Oct 23, 2012 4:21:42, Begin Date: Oct 23, 2012 4:22:42).

Request a new service.

Delete a current service.

Your Usage

Java Servers 1

Memory (GB) 1.5

Summary of current resource usage

View a new service.

Delete a current service.

View current middleware service details, status, scale-up/scale-down.

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Self Service Middleware Services

All that you need to know about MWaaS as a self service user is that you can log in to Enterprise Manager Cloud Control 12c and navigate to the Middleware Cloud Self Service Portal where you will be able to:

- View a summary of your current resource usage against the limits that have been set for you
- Request a new middleware service from the catalog of middleware provisioning procedures that you are privileged to see
- Delete any of your current middleware services
- View information about any of your current middleware services
- View chargeback data associated with your MWaaS usage

MWaaS Self Service Users' View of a Service

The screenshot shows the Middleware Cloud Self Service Portal interface. At the top left, there's a dropdown menu labeled "Middleware Service". A yellow callout box points to this menu with the text "Scale-up/scale-down controls". To the right, another yellow callout box points to a "Deploy" button in a toolbar with the text "Deploy applications.". Below the toolbar, a table titled "Data Sources" lists a single entry: "Name: dbaaS_DBcecd89, JNDI Name: dbaaS_DBcecd89, Database URL: jdbc.oracle.thin:@pac.lab2". A third yellow callout box points to this table with the text "Create datasources.". On the left side of the portal, there are several monitoring dashboards: "Performance Summary" (showing availability over time), "Servlets and JSPs" (showing active sessions, request processing time, and requests per minute), and "Resource Usage" (two line graphs showing CPU and heap usage over time). At the bottom right of the portal, there's a "My Requests" section listing two successful operations: "Create Data Source" and "Deploy Application".

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Self Service Middleware Service Monitoring and Control

From the Middleware Cloud Self Service Portal, self service MWaaS users can click the link for any of their current middleware services to view information about and exercise basic control over the service. This includes:

- Scale-up/scale-down operations
- Deploying applications from their application library
- Creating datasources, perhaps to DBaaS-requested databases
- Performance summary of the service
- Resource usage graphs of the service

MWaas Self Service Users' Application Library

Upload applications.

Delete applications.

Share applications.

Name	Type	Status	Revision	Maturity	Size(KB)	Owner	Created On	Description	Shared
Riddles	Java EE Application	Ready	0.1	Untested	4.98	LAB2_USER	Oct 24, 2012 3:57:27		No

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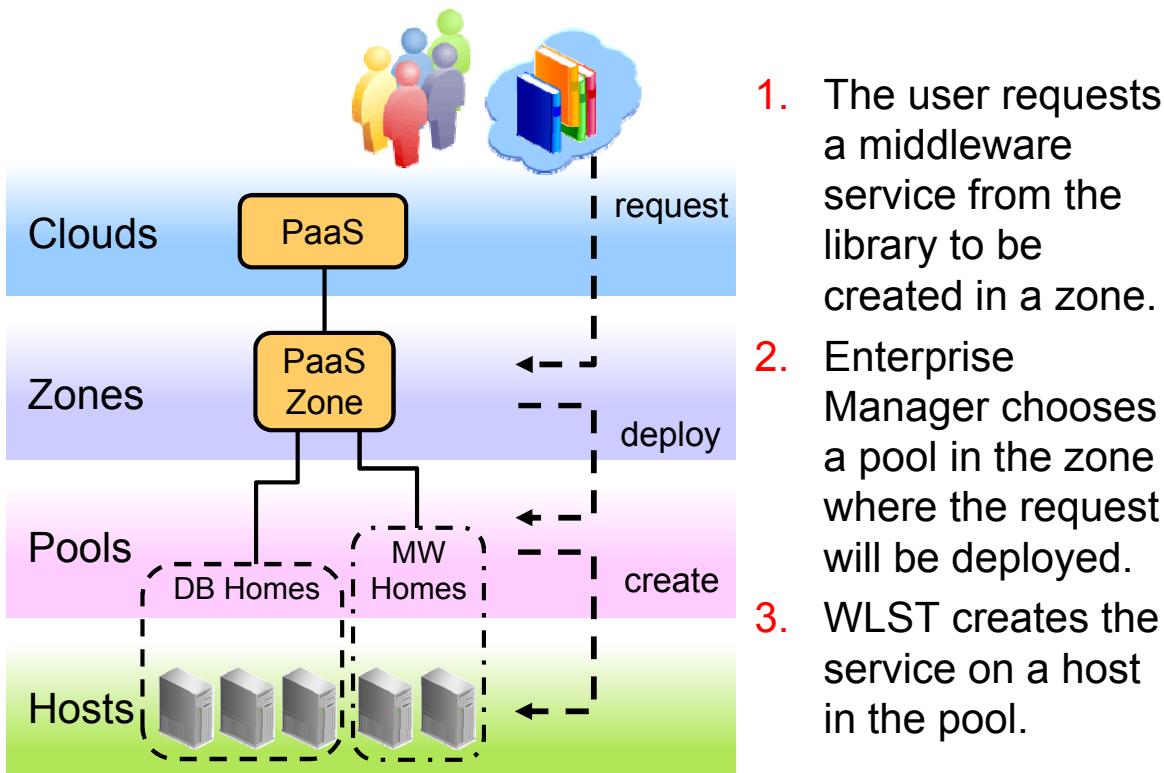
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Self Service Middleware Application Library

MWaas self service users can maintain a personal library of applications that can then be deployed to their middleware services. Accessed via the My Library tab, users can:

- Upload applications from their local file system via the browser
- Delete applications from their library
- Share applications with other self service users and self service–enabled roles

Behind the Scenes: MWaaS Requests



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Mechanics of Serving a MWaaS Request

At a high level, the process that Enterprise Manager Cloud Control 12c employs to satisfy MWaaS self service requests includes three steps:

1. The user logs in to the self service portal and requests a middleware service from the library of MWaaS templates that is visible to the user. As part of the request, the self service user nominates the PaaS zone where the request should be served.
2. Enterprise Manager examines current resource usage in the pool(s) of the selected PaaS zone that match the characteristics of the request (platform and version) and chooses a pool with enough resources upon which to deploy the request.
3. Enterprise Manager then uses the management agents on hosts within the pool to execute the WebLogic Server Transaction (WLST) tool to create the middleware service.

MWaaS Self Service Service Request

Select Service Template

Service Template Name	Description
Lab2 Small WLS 10.3 WLS 10.3.6 Linux x86-64 1.5GB Heap	

New Service Request

Use this page to request a new middleware service. When you click Submit, the request will be submitted as a job, and will be listed in the My Requests table so that you can track the progress.

Service Template: Lab2 Small WLS 10.3.6 Linux x86-64
Description: WLS 10.3.6 Linux x86-64 1.5GB Heap

*** Service Name:** Lab2_User_MWaaS_Request

*** PaaS Infrastructure Zone:** Lab2 PaaS Zone

Schedule

Start Date: Immediately Later [date picker] (GMT+00:00) GMT
End Date: Indefinitely Until 10/25/2012 4:20:55 AM [date picker]

Deploy Application (optional)

You can optionally select an application to be deployed to your service after it is provisioned. Select an application component from the Software Library.

Application Name: [text input]
Application Component: [list box]
Deployment Plan: [button] Browse...

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Requesting a MWaaS Self Service Middleware Service

Clicking the Request Service button on the Middleware Cloud Self Service Portal initiates the middleware service request process:

- Select a service template:** You will be presented with a list of all the middleware service templates that have been made available to you. Highlighting one of them and clicking Select will take you to the deployment steps.
- Request information:** Enterprise Manager Cloud Control 12c will automatically generate a request name that you can opt to override with something more meaningful to you. This name will appear in your list of requests on the Middleware Cloud Self Service Portal home page. You will also need to select a destination PaaS infrastructure zone from all PaaS zones that have been mapped to the template and against which you have resource quotas. Nominate the start and end dates for this service, and optionally an application from your library to be deployed once the service is provisioned.

Practice 2-4 Overview: Reviewing the DBaaS Self Service Request

This practice covers the following topics:

- Checking the status of a DBaaS request
- Viewing the details of a current DBaaS request



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In this practice, you will complete the DBaaS self service request lifecycle by reviewing the outcome of the request created in Practice 2-3.

Practice 2-5 Overview: Using the MWaaS Self Service Portal

This practice covers the following topics:

- Logging in as a MWaaS self service user
- Creating a MWaaS request
- Checking the status of a MWaaS request
- Viewing the details of a current requested database



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In this practice, you will experience the Enterprise Manager Cloud Control 12c MWaaS cloud as a self service user, and create a request for a database in a PaaS zone. You will monitor the progress of the request, and upon completion review the details of the database that has been created for you.

Practice 2-6 Overview: Reviewing the MWaaS Self Service Request

This practice covers the following topics:

- Checking the status of a MWaaS request
- Viewing the details of a current MWaaS request



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In this practice, you will complete the MWaaS self service request lifecycle by reviewing the outcome of the request created in Practice 2-5.

Summary

In this lesson, you should have learned how to:

- Describe Enterprise Manager Cloud Control 12c clouds in abstract terms
- Use the IaaS, DBaaS, and MWaaS Cloud Self Service Portals



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Common Building Blocks

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Objectives

After completing this lesson, you should be able to:

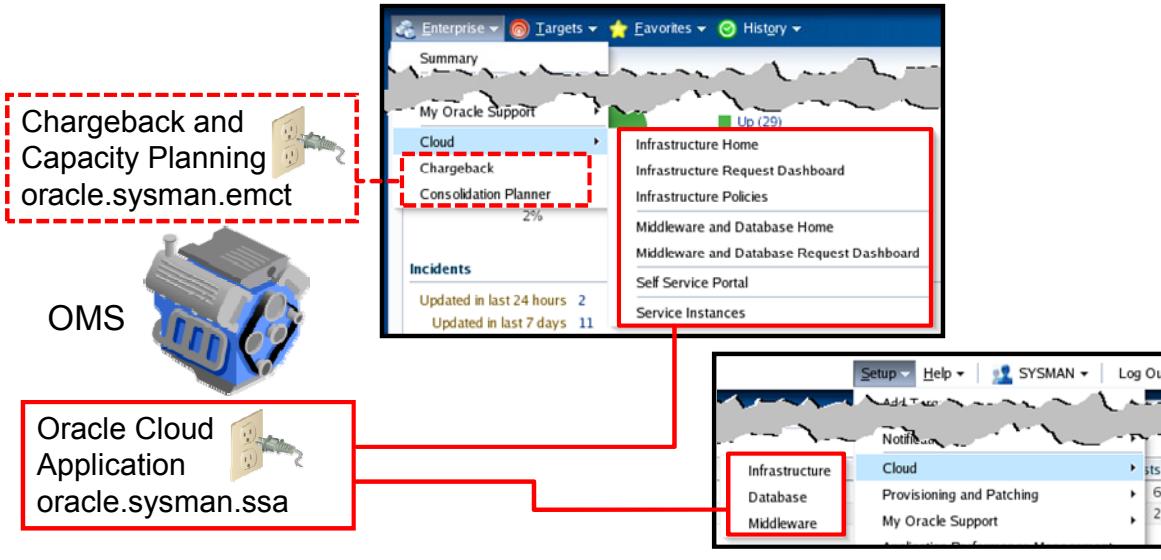
- Describe the common elements required to set up a cloud with Enterprise Manager Cloud Control 12c
- Customize the Enterprise Manager Cloud Control 12c login page for SSA users



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Cloud Plug-ins

- Two plug-ins provide cloud functionality:
 - Oracle Cloud Application
 - Chargeback and Capacity Planning



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The functionality to create and manage Enterprise Manager Cloud Control 12c clouds is provided by the Oracle Cloud Application and the Chargeback and Capacity Planning plug-ins. These can be deployed at the install time or post-installation, and must be deployed to every OMS in your Enterprise Manager Cloud Control 12c topology.

- Oracle Cloud Application: This plug-in has the internal name as `oracle.sysman.ssa` and provides the functionality behind the *Setup > Cloud* and the *Enterprise > Cloud* menu items.
- Chargeback and Capacity Planning: This plug-in has the internal name as `oracle.sysman.emct` and provides the functionality behind the *Enterprise > Chargeback and Capacity Planning* and *Enterprise > Consolidation Planner* menu items.

Enterprise Manager Administrators for Clouds

- Cloud administrator:
 - Has the EM_CLOUD_ADMINISTRATOR role
 - Sets up and manages underlying cloud infrastructure
 - Must have view privileges on all cloud targets
 - Must have operator privileges on cloud zones and pools
 - Uses the *Enterprise > Cloud* menus
- Self Service Application (SSA) administrator
 - Has the EM_SSA_ADMINISTRATOR role
 - Grants access privileges and defines quotas and constraints for self service users
 - Creates provisioning artifacts for deployment on the cloud
 - Uses the *Setup > Cloud* menus



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Setting Up the Clouds

Two principal roles are involved in setting up Enterprise Manager Cloud Control 12c clouds.

Cloud Administrators

Cloud administrators have the built-in EM_CLOUD_ADMINISTRATOR role assigned to them, and are the users who create the IaaS and PaaS cloud infrastructure within Enterprise Manager Cloud Control 12c. There is no distinction, in terms of authorization, between IaaS and PaaS cloud administrators. Hence, any user with the EM_CLOUD_ADMINISTRATOR role can potentially administer both cloud types. Cloud administration pages are accessed from the *Enterprise > Cloud* menus.

Self Service Application (SSA) Administrators

SSA administrators have the built-in EM_SSA_ADMINISTRATOR role assigned to them, and are the users who set up resource quotas and privileges for self service users, as well as defining the objects that can be deployed to the Enterprise Manager Cloud Control 12c clouds. As with the EM_CLOUD_ADMINISTRATOR role, users with the EM_SSA_ADMINISTRATOR role can potentially administer both IaaS and PaaS clouds. SSA administration pages are accessed from the *Setup > Cloud* menus.

The Case for Separating Administrative Duties

On the surface it may appear cumbersome to separate the duties of setting up the underlying cloud infrastructure from the duties of setting up the self service application that will expose the cloud to end users. However, if we consider the case of an IaaS cloud, the self service administrator's tasks are very Enterprise Manager centric, whereas the cloud administrator's tasks are very Oracle VM (OVM) centric, and separating their duties may simply reflect the incumbents' actual roles in the organization. A system administrator familiar with OVM Server will most likely be given the task of installing, configuring, and managing the underlying OVM manager(s), OVM Servers, and associated storage. Complementing the efforts of the OVM system administrator, the IaaS self service application administrator will manage self service roles and users, and associated quotas. They may be a current Enterprise Manager Cloud Control 12c administrator who already interacts with the teams that will ultimately be using the IaaS cloud or will be creating the assemblies and templates that will be published in the IaaS cloud, and as such are ideally suited to administering the self service components.

Self Service Application Roles and Users

- The built-in EM_SSA_USER role alone does not provide granular control.
- Create roles for different groups of SSA users
 - Grant the EM_SSA_USER role.
 - SSA quotas and privileges can be then assigned to these custom SSA roles.
- Revoke PUBLIC and EM_USER roles from SSA users to confine them to the SSA Portal pages.



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Controlling Self Service Application (SSA) User Privileges

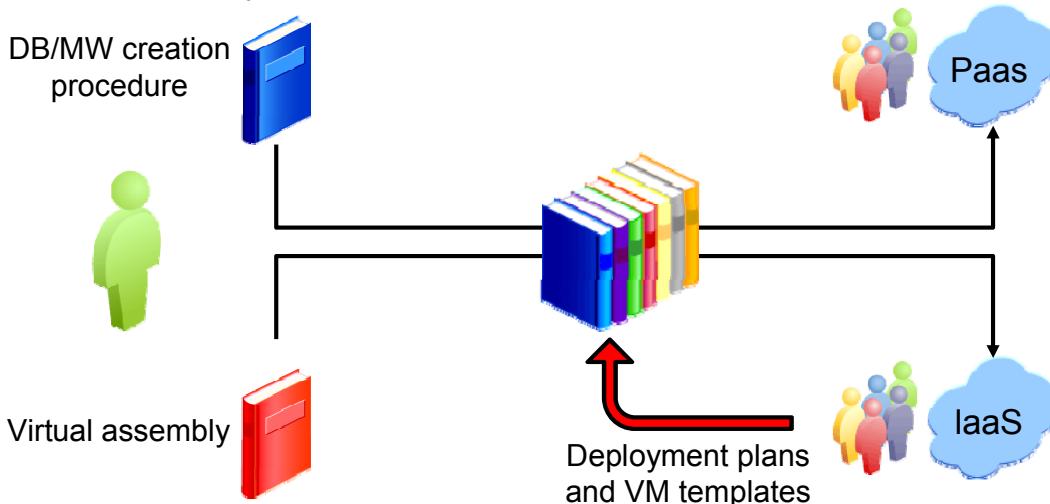
Any user with the EM_SSA_USER role can log in and access the Enterprise Manager Cloud Control 12c SSA Portal pages. However, this does not cater to the needs of SSA administrators who will typically want to grant resource quotas and deployment privileges at a granular level. To achieve greater control over privileges and authorization, it is recommended that you create site-specific roles that are aligned to your cloud users and then assign the EM_SSA_USER role to these roles. The benefit of doing so in the initial setup becomes apparent later as SSA administrators will be able to define quotas and privileges against the group roles.

For example, you may have three distinct groups of users of your IaaS cloud: developers, testers, and support engineers. By creating three corresponding roles, such as SSA_DEVELOPERS, SSA_TESTERS, and SSA_SUPPORT_ENGINEERS, your SSA administrators will be able to assign appropriate quotas and privileges to each role to ensure that only developers have access to and only compete with other developers for development resources and so on.

Regardless of how SSA users are assigned the EM_SSA_USER role, they should have the PUBLIC and EM_USER roles revoked from them in order to confine them to the Self Service Portal pages in Enterprise Manager Cloud Control 12c.

Software Library

- Cloud's local store for:
 - PaaS creation procedures
 - IaaS virtual machine templates and assemblies, and user deployment plans and saved templates



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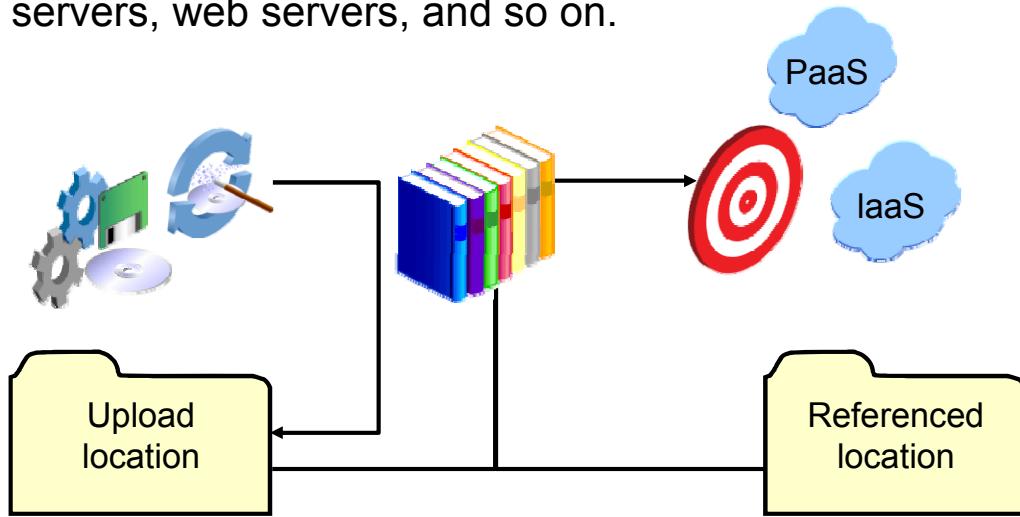
Centralized Shared Software Library

A core feature of Enterprise Manager Cloud Control 12c, the software library is designed as a local store of artifacts such as product distributions and patches, and patching and provisioning scripts and procedures. The software library allows separation of duties in that Enterprise Manager administrators with designer privileges can create deployment and patching procedures, store them in the software library, and then grant access to those items to other Enterprise Manager administrators who can in turn apply them to their environments.

In the context of Enterprise Manager Clouds, the software library is the repository for PaaS database and middleware creation procedures created by PaaS self service administrators, and virtual assemblies and templates created by IaaS administrators. The database and middleware creation procedures are then associated with an appropriate PaaS zone and made available to PaaS self service users. Similarly, the virtual assemblies and templates are imported to an IaaS zone and made available to IaaS self service users. IaaS self service users can also save their deployment inputs in the software library for subsequent use as deployment plans, as well as creating VM templates from their requested servers that will be stored in the software library and made available through their self service library.

Software Library Setup

- Setup > Provisioning and Patching > Software Library
- Create at least one upload location for imported files.
- Optionally, add referenced location(s) to access files in file servers, web servers, and so on.



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The software library may already have been set up independently of the requirements of cloud management in Enterprise Manager Cloud Control 12c; however the steps are identical regardless of the need:

1. Navigate to Setup > Provisioning and Patching > Software Library
2. Add at least one upload location that the owner of the OMS installation can write to. If your environment consists of multiple OMSes, then the upload locations will be shared and must be accessible by all OMS servers. Any patches you download from My Oracle Support through Enterprise Manager Cloud Control 12c, or that you manually upload via Enterprise Manager will be stored in the upload location alongside any software binaries, virtual assemblies and templates, deployment plans, and other software artifacts.
3. If you have directories that already contain software artifacts that you would like to deploy via the software library, you can include them as referenced locations. As with upload locations, referenced locations must be accessible by all OMS servers.

Only items that you make available in the software library can be published for deployment by self service users to your Enterprise Manager clouds.

Self Update

- Automatically or manually download entities from My Oracle Support.
- Entities are stored in the Software Library.
- Updatable entities include:
 - Plug-ins
 - Oracle VM templates and virtual assemblies
 - Provisioning bundles
 - Gold image metadata
- Use Oracle-supplied entities with your clouds as-is or as a basis for customized copies.



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Keeping Your Enterprise Manager Cloud Control 12c Up To Date

Self Update is a core feature of Enterprise Manager Cloud Control 12c and allows you to become aware of and review updates to certain Enterprise Manager entities without having to explicitly search for relevant product updates yourself. By either establishing an online connection between Enterprise Manager Cloud Control 12c and My Oracle Support, or by manually downloading catalogs from My Oracle Support, you can use the Setup > Extensibility > Self Update pages to review and deploy updates to your updatable entities.

Updatable entities that are relevant to Enterprise Manager clouds include:

- Plug-ins: In particular, the virtualization, chargeback, database, and middleware plug-ins
- Oracle VM templates and virtual assemblies (built and supplied by Oracle)
- Provisioning bundles (built and supplied by Oracle)
- Gold image metadata (built and supplied by Oracle)

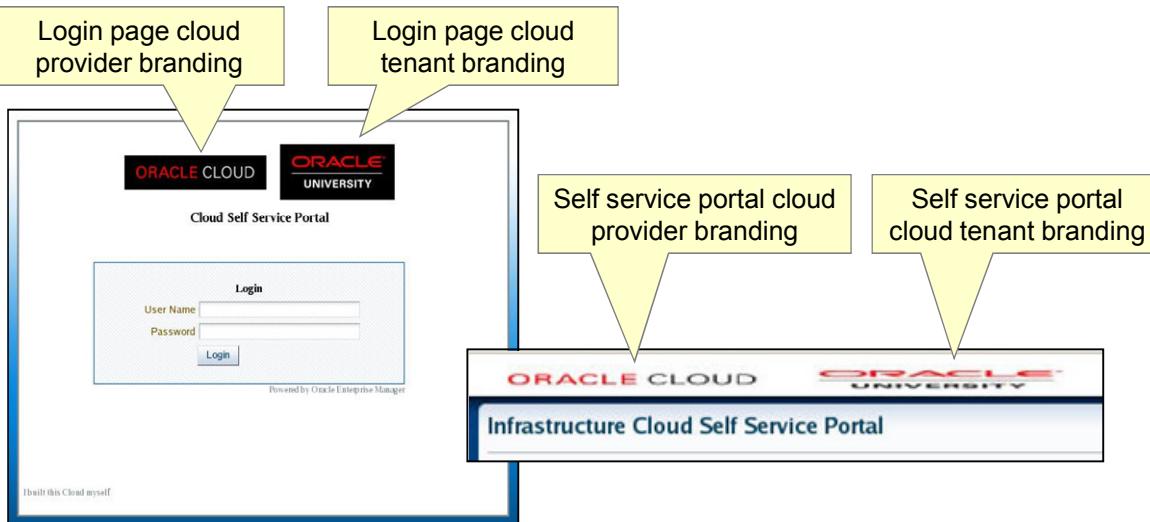
Updates that are downloaded as part of the Self Update feature are stored in the Software Library and can be used when building your IaaS or PaaS clouds.

Rebranding the Self Service Portal

- Set property on OMS.

```
oracle.sysman.ssa.logon.ssa_oms = true
```

- Supply branded cloud provider or tenant logos and text.



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Displaying Your Brand

Instead of presenting the out-of-the-box Oracle-branded Enterprise Manager Cloud Control 12c login page to all Enterprise Manager administrators self service users, you can configure the OMS to present an alternatively branded page. This is done by setting the `oracle.sysman.ssa.logon.ssa_oms` property in the OMS to `true`, setting other properties to indicate which alternative branding logos and text to be used, and then copying the required images to the OMS installation directories.

Set the SSA logon property with the following command:

```
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.ssa_oms -value true
```

Configure which elements should be rebranded with the following commands:

```
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.show_cloud_provider_brand -value true  
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.show_cloud_tenant_brand -value true  
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.cloud_provider_alt_text -value "Cloud  
Provider"
```

```
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.cloud_tenant_alt_text -value "Cloud  
Tenant"  
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.show_disclaimer_text -value true  
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa.logon.disclaimer_text -value "Customer  
Specified Disclaimer Text" $ORACLE_HOME/bin/emctl set property -  
name oracle.sysman.ssa.logon.show_em_branding_text true
```

Finally, copy non-Oracle-branded images that you require to

\$ORACLE_HOME/sysman/config/ by using the following file names:

```
cloud_provider_small_brand.png  
cloud_tenant_small_brand.png  
cloud_provider_large_brand.png  
cloud_tenant_large_brand.png
```

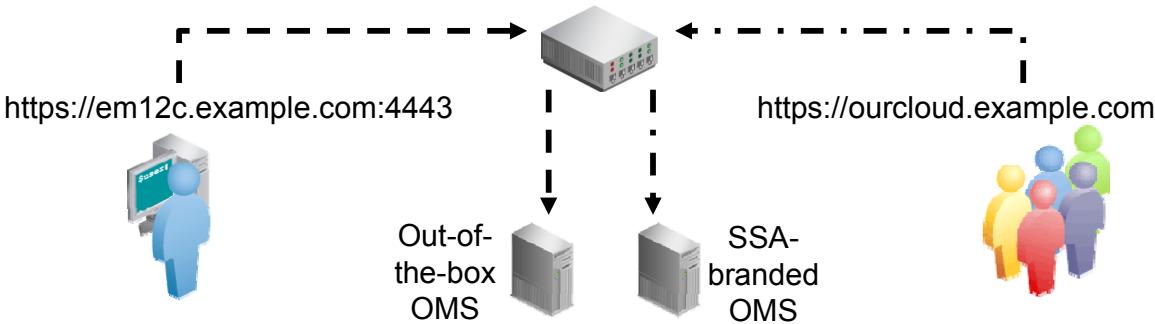
The default Oracle branding will be used for any rebranding properties that are left with the default value, or that are set without a corresponding image file being provided.

To revert to the default Enterprise Manager branding, use the following command:

```
$ORACLE_HOME/bin/emctl set property -name  
oracle.sysman.ssa_oms -value false
```

Customizing Only the Self Service Portal

- SSA branding properties affect all users of an OMS instance.
- Consider multiple OMS instances fronted by a load balancer:
 - Out-of-the box instance for administrators
 - Rebranded instance(s) for different providers and tenants



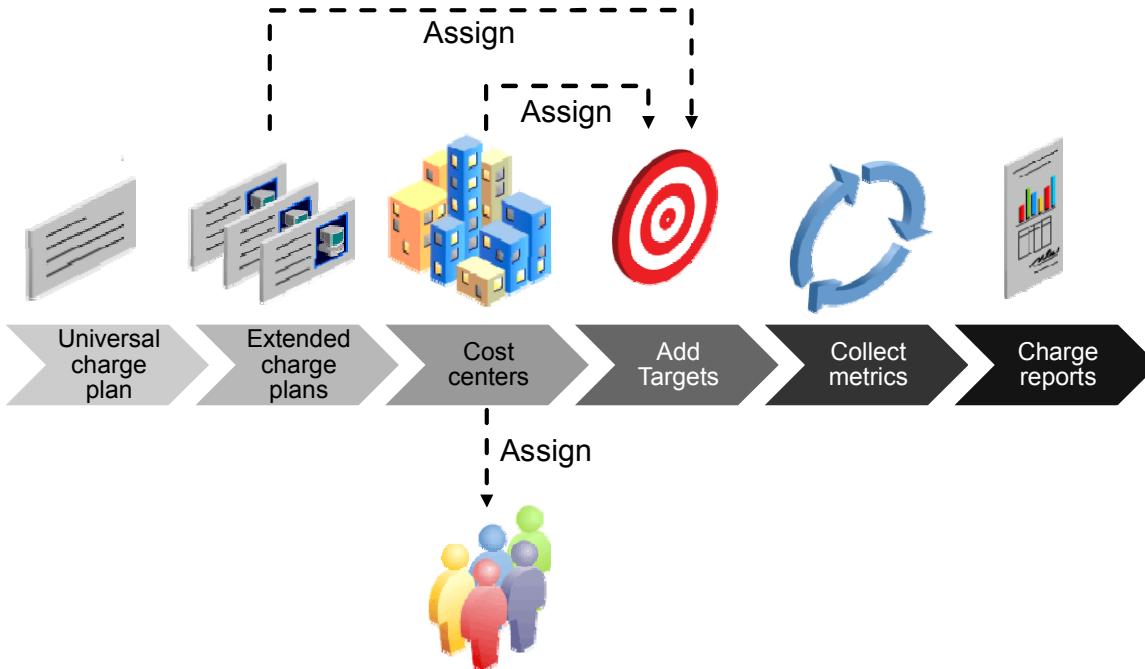
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One Size May Not Fit All

Changing the branding properties for an OMS instance will affect the login for all users logging in to that instance, and the self service portal pages for all self service users. If you want to present different branding for different users, including the default Oracle branding (perhaps for your Enterprise Manager administrators), you will need to set up a multi-OMS environment fronted by a load balancer. Set the SSA branding properties appropriately for each OMS to be rebranded (using the `-oms_name` switch on the `emctl set property` commands) and then direct each group of users to URLs that the load balancer will redirect to the appropriate OMS.

Chargeback



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Recouping Setup and Operating Costs

A key capability that Enterprise Manager Cloud Control 12c delivers is the ability to take the usage and utilization metrics gathered against targets, including those within your clouds, and apply charge rates to produce chargeback reports. By assigning the underlying cloud components and self service users to cost centers, you are able to report on and chargeback for both cloud infrastructure and self service usage. There is also a catch-all default cost center for unassigned targets and users. Self service users can view the charges associated with their cloud resources.

Setting up chargeback involves a mix of mandatory and optional steps that are performed when building your Enterprise Manager Cloud Control 12c clouds that will be explored in more detail in a later chapter:

- **Set rates for the universal charge plan:** The universal charge plan specifies the base metrics and associated rates that will be used for generating chargeback reports.
- **Optional: define extended charge plans:** Extended charge plans are, as the name implies, an extension of the universal charge plan and allow you to specify fees and rates that should be applied to particular targets over and above the universal charges.

- **Optional: define cost centers:** In the absence of a cost center hierarchy, all charges will be reported against the default cost center. Defining a cost center hierarchy not only simplifies separation of charges by department, but also allows you to easily track resource utilization. Add targets to be included in chargeback metering.
- **Collect metrics:** This automatically occurs without any administrator intervention.
- **Generate charge reports:** An Enterprise Manager job generates reports daily, but you can also generate them on-demand.

Summary

In this lesson, you should have learned how to:

- List all and perform some of the setup tasks that are common to all Enterprise Manager Cloud Control 12c clouds
- Create a branded look for self service users



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Practice 3-1 Overview: Setting Up the Common Cloud Elements

This practice covers the following topics:

- Create Cloud Admin user
- Create SSA role
- Create SSA users
- Set up software library
- Customize SSA login page



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In this practice, you will pave the way for subsequent practice sessions by creating Enterprise Manager cloud administration and self service roles and users before configuring the software library and finally customizing the branding for self service users.

Setting Up the IaaS Cloud



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Objectives

After completing this lesson, you should be able to:

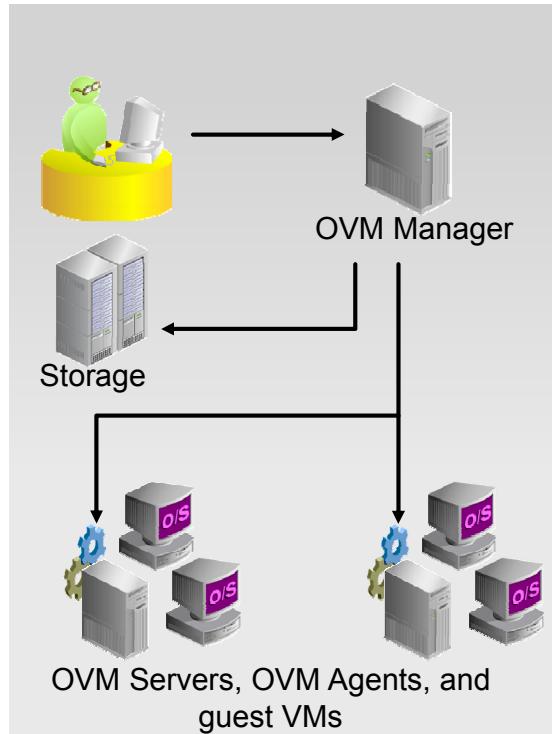
- Describe how Enterprise Manager Cloud Control 12c uses Oracle VM for x86 to implement IaaS
- Configure Enterprise Manager Cloud Control 12c for IaaS
- List the tasks required to set up the IaaS infrastructure



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Oracle VM for x86: Introduction

- Oracle VM Manager:
 - Provides graphical UI
 - Manages Oracle VM Servers, resources, and virtual machines
- Oracle VM Server:
 - Is the virtualization platform that hosts virtual machines
 - Consumes resources managed by Oracle VM Manager
 - Supports clustering for high availability



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Oracle VM Virtualization Platform

Oracle VM is an enterprise-class server virtualization solution, comprising Oracle VM Manager and Oracle VM Server for x86.

Oracle VM Manager

Oracle VM Manager is a management platform with a web user interface. It manages the resources available in the whole Oracle VM environment, including the resources in each of the Oracle VM Servers, the connected networks, and storage. If an action is required on these resources, Oracle VM Manager delegates an Oracle VM Server to carry out the task via the OVM Agent on that server.

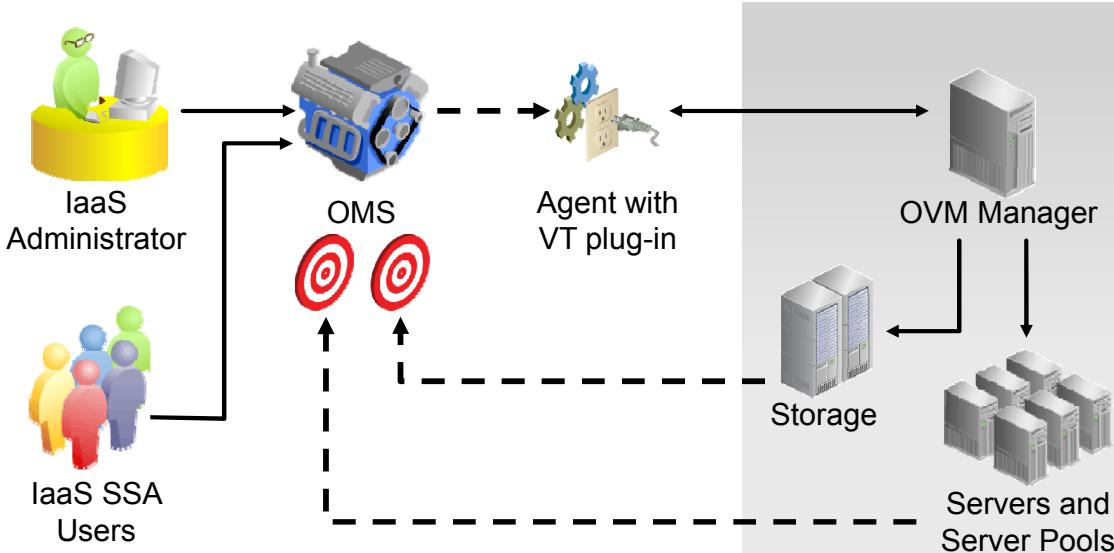
In a pure Oracle VM environment, you use Oracle VM Manager to create guest virtual machines on the Oracle VM Servers.

Oracle VM Server

Each Oracle VM Server is a separate virtualization platform for hosting guest virtual machines. Oracle VM Servers are connected to Oracle VM Manager and other Oracle VM Servers by using one or more network interfaces, potentially each with a dedicated purpose such as management or VM migration.

How IaaS Relates to Oracle VM

- The OMS communicates with Oracle VM Manager by using the virtualization plug-in on an Enterprise Manager agent.



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IaaS Is Tightly Coupled with Oracle VM Manager

Enterprise Manager Cloud Control 12c uses Oracle VM (OVM) to provide the virtualization platform for IaaS. As such, IaaS is tightly coupled with and dependent upon OVM Manager to provide the interface between IaaS administrators and self service users and OVM servers, storage, and other OVM components. The link between Enterprise Manager Cloud Control 12c and OVM Manager is established by the agent-side virtualization (VT) plug-in. Via the VT plug-in, IaaS administrators can create and manage all the OVM elements that can be created and managed directly in OVM Manager. Similarly, IaaS self service application users can request virtual environments from Enterprise Manager Cloud Control 12c in the same way that an OVM administrator would create them directly in OVM Manager.

Servers, server pools, storage, storage devices, and other OVM artifacts that are created in OVM from within Enterprise Manager Cloud Control 12c via the VT plug-in become managed targets in Enterprise Manager. This precludes the need to manage the OVM environment with OVM manager, and in fact it is recommended that only Enterprise Manager Cloud Control 12c be used. This recommendation is made because OVM artifacts can only become known to Enterprise Manager as managed targets if they have been created via the VT plug-in, although there is a synchronization process that can be used should OVM Manager ever be used directly.

Setting Up the IaaS Infrastructure

- Register OVM Manager
- Discover OVM Servers
- Setup Storage
- Configure Networks
- Create Server Pool(s)
- Create Zone(s)

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Paving the Road to Self Service IaaS

The first stop on the road to an Enterprise Manager Cloud Control 12c IaaS cloud is registering an OVM Manager. The next steps are to manage that OVM environment in the same way you would if you were using OVM Manager directly, with the additional IaaS-specific step of creating one or more zones. Enterprise Manager Cloud Control 12c allows you to register multiple OVM Managers and then monitor and manipulate all of them from a single, unified interface. Once an OVM Manager is registered with Enterprise Manager Cloud Control 12c, any resources already under the control of that OVM Manager will be visible in Cloud Control and there is no need to visit the OVM Manager's administration console pages directly again.

You will briefly look at how each of the standard OVM Manager tasks are executed within Enterprise Manager Cloud Control 12c before examining the details of creating IaaS zones.

Registering OVM Manager

- Deploy the virtualization (VT) plug-in to an Enterprise Manager agent.
- Register OVM Manager with Enterprise Manager Cloud Control 12c via the agent with the VT plug-in.
- Perform “standard” OVM management tasks from the OVM Manager home page in Enterprise Manager:
 - Discover OVM Servers.
 - Configure networks and network interfaces.
 - Create storage pools and repositories.
 - Create server pools.
- Enterprise Manager always communicates with OVM Manager via the agent with the VT plug-in.



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Managing OVM Via Enterprise Manager Cloud Control 12c

Managing OVM from within Enterprise Manager Cloud Control 12c is little different to managing OVM directly through OVM Manager. Once the connection between the two is established, the steps that are required to manage OVM from OVM Manager still need to be performed in Enterprise Manager. OVM 3.x administration skills are a prerequisite for creating an IaaS cloud in Enterprise Manager Cloud Control 12c.

Establishing a connection to OVM

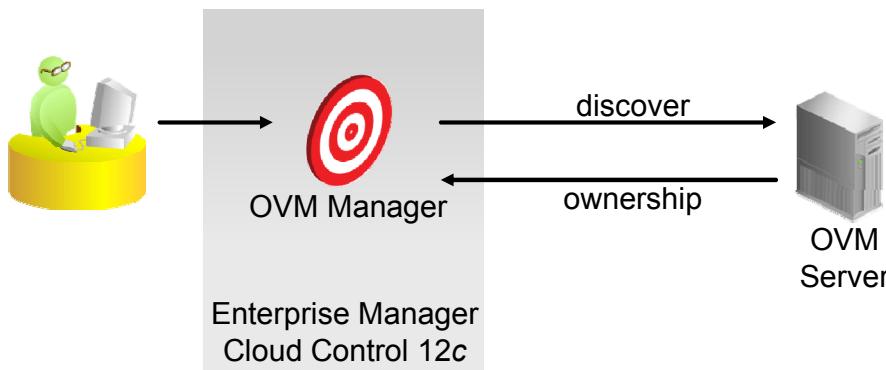
The first step in managing OVM via Enterprise Manager Cloud Control 12c is for a cloud administrator to register the OVM Manager. This is done from the *Enterprise > Cloud > Infrastructure* page. You will be asked to nominate an Enterprise Manager agent to use for the registration—this must be an agent to which the virtualization plug-in has been deployed from the *Setup > Extensibility > Plug-ins* page, and an agent that is expected to always be up and running. It is recommended to use a management agent other than the so-called central agent on the OMS server to insure against starving the OMS itself of resources. Another recommendation is to avoid using a single agent to connect to multiple OVM managers as this too may lead to excessive resource consumption by the agent as it services requests to and from many OVM Managers.

Other fields that need to be provided are:

- **Display name:** This is literally a label that is used for the OVM Manager instance you are registering. You can register multiple OVM Manager instances, so the name should reflect the purpose, version, or location of the instance such as ovm311_test_eastcoast.
- **OVM Manager URL:** For OVM 3.1.1 and above this is the Secure TCP (TCPS) URL, for earlier versions it can be the default TCP URL. You may need to configure your OVM Manager environment to allow TCPS connections—refer to My Oracle Support note *Configure Secure TCP (TCPS) for Oracle VM Manager (Doc ID 1456338.1)* for details. The URL must include the protocol (for example, `tcps://ovmmgr.example.com:54322`).
- **OVM Manager Monitoring Credentials:** A username and password combination that can log in to OVM Manager.
- **OVM Managed Administration Credentials (optional):** An administrative username and password for logging in to OVM Manager to perform administrative tasks. If not specified, the monitoring credentials will be used.
- **OVM Manager Console URL:** The SSL or non-SSL URL for the OVM Manager Console including protocol (for example, `https://ovmmgr.example.com:7002/ovm/console`)

Discovering OVM Servers

- Initiate from the OVM Manager's home page or right-click menu on the Infrastructure Cloud navigation pane.
- Specify fully qualified domain name or IP address of the OVM Server(s) and the OVM agent password.
- After discovery, the OVM Server(s) will be *owned* by the OVM Manager but *unconfigured*.



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Discovering an Oracle VM Server

Because Enterprise Manager Cloud Control 12c is managing the OVM environment indirectly via OVM Managers, discovering an OVM Server places it under the ownership of an OVM Manager and as such it only needs to be accessible by the OVM Manager and not directly accessible by the OMS. Implicit prerequisites to discovery are that OVM Server 3.1.1 has been installed and the OVM agent password is known.

- Initiate the discovery process by selecting the *Discover Virtual Server* menu option from the OVM Manager's right-click menu in the infrastructure cloud target navigation panel or from the *VM Manager* menu on the OVM Manager's home page.
- Enter the fully qualified domain name(s) or IP addresses of the OVM Servers to be discovered on separate lines in the *Virtual Servers* text area.
- Specify the OVM Agent password (the username is assumed to be `oracle` and this field should not be changed). This password will be used for all OVM Servers being discovered, so must be common to all of them.
- Press the *Submit* button to create a job that will execute the discovery process. You will be presented with a dialog confirming the job creation with a *Job Details* button that you can press to monitor the job as it progresses.

Once the discovery job completes, the newly discovered OVM Server(s) will be shown in the target navigation panel on the infrastructure cloud home page as child nodes of the OVM Manager you chose initially.

Setting Up Storage

- Supports local storage on OVM Servers, file servers (NFS), and storage arrays (iSCSI, SAN)
- Needed for various IaaS resources such as:
 - Templates, assemblies, and ISOs
 - Disk space presented to virtual machines as virtual disks or raw physical disks
 - Server pool file systems used for pool cluster data
- Resources are collected together in storage repositories.
- Storage repositories are presented to OVM Servers.



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Storage for Every Need

Storage in the IaaS cloud is required for various IaaS resources, all of which are vital to its good health. These resources include:

- Templates and assemblies that can be used to create virtual machines
- ISO images
- Shared and non-shared virtual disks
- Virtual machine configuration files
- Data files for clustered server pools

Local or remote storage

Storage can be locally attached to your OVM servers or mounted from file servers and storage arrays. The principal drawback to local storage is that it cannot be shared with other OVM servers, hence virtual machines using that local storage resource cannot be highly available as they cannot be migrated to another OVM server. Remote storage, on the other hand, can be shared across multiple OVM servers, making it ideal for migration tasks and other purposes for which file sharing is essential.

Storing resources

The IaaS cloud needs storage for a variety of resources including templates and assemblies for virtual machines that can be deployed in your cloud. Other resources that require storage are ISO files that can be mounted as virtual-DVDs by virtual machines, as well as virtual disks (image files) to be attached to virtual machines. Even virtual machine configuration files are a resource that needs to be stored. Server pool cluster data needs to be stored in an OCFS2 file system that can be shared by all members of the pool.

Repositories of resources

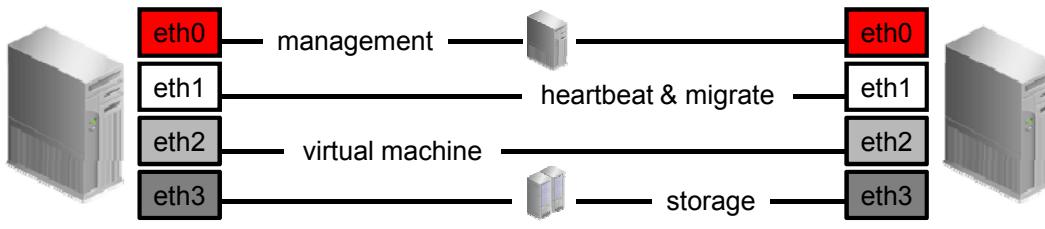
Resources (other than server pool cluster data) are collected together in storage repositories, and these repositories are then presented to OVM servers in a server pool. LUN-based (iSCSI, SAN) repositories use an OCFS2 file system and hence have a dependency upon OCFS2 cluster-aware file management. As such, they can only be presented to a clustered server pool (with its OCFS2 pool file system). OVM manager can use the resources in the storage repository with any of the OVM servers it has been presented to. For example, an assembly in the storage repository can be decompressed and the various files within copied to create configuration and disk files to create a virtual machine based upon that assembly.

Managed from an OVM Manager

Storage and storage repository setup is accessed from an OVM Manager's right-click or home menu. Open the Storage page from Infrastructure Cloud home page by selecting *Manage Storage* from an OVM Manager's right-click menu in the target navigation panel, or by selecting *Administration > Storage* from the *VM Manager* menu on an OVM Manager's home page. Open the Storage Repository page from Infrastructure Cloud home page by selecting *Manage Storage Repository* from an OVM Manager's right-click menu in the target navigation panel, or by selecting *Administration > Storage Repository* from the *VM Manager* menu on an OVM Manager's home page.

Configuring Networks

- Generate virtual NICs to be assigned to virtual machines
- Multiple networks can isolate specific traffic
 - Server management
 - Cluster heartbeat
 - Storage
 - Live migration
 - Virtual machine to virtual machine
- Assign networks to physical ports on OVM servers
- Define network profiles for virtual machine IP addresses



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Networks Can Serve Different Purposes

Network communications within your IaaS cloud are used for five basic functions:

- Server management between an OVM Manager and its OVM Servers
- Sending a cluster heartbeat between members of the same server pool
- Connections between OVM Servers and network-accessed storage
- Migrating virtual machines between servers within a server pool
- Carrying traffic between virtual machines on different or the same OVM servers within a server pool

A single physical network interface card (NIC) on an OVM server can carry all the IaaS cloud traffic. However, you can also take advantage of multiple NICs and network definitions to group or isolate traffic types as well as provide some redundancy through bonded interfaces. In fact, two or more NICs per OVM server are recommended for production environments.

Create networks in three steps

You can create a network in three steps:

- **Name and choose network function(s):** Give the network a name, select which of the five functions it will be provide, and if this will be for interserver or intraserver communications.

- Select network ports for each server to be used and the interface settings (DHCP or static addressing with IP address). If you select two or more ports for any given server, a bond will be created across them. If this will be a VLAN network, select the appropriate VLAN group and segment ID to be used (VLAN groups are created independently).
- Optionally, specify the type of network for quality of service purposes, and the network profile to be used. Network profiles are defined separately and can include a domain name, subnet IP mask, hostname and IP address ranges, gateway IP address(es), and DNS server(s) that will be applied whenever the network you are creating is used with a virtual machine.

Create a pool of virtual NICs

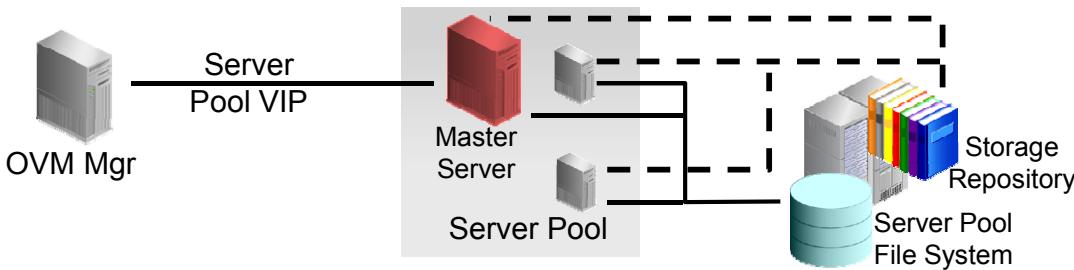
Every virtual machine created in your IaaS cloud will need one or more virtual NICs depending upon its configuration. IaaS assigns the virtual NICs from a pool of MAC addresses that you get it to generate. You can see the assignment of virtual NICs to virtual machines when your self service users start making requests from your IaaS cloud.

Configured from an OVM Manager

Network configuration is accessed from an OVM Manager's right-click or home menu. Open the Network page from Infrastructure Cloud home page by selecting *Manage Network* from an OVM Manager's right-click menu in the target navigation panel, or by selecting *Administration > Network* from the *VM Manager* menu on an OVM Manager's home page.

Creating Server Pools

- An OVM Server can be a member of only one pool.
- A pool and its servers must be owned by the same OVM manager.
- Storage is used for server pool configuration files.
- Virtual IP address is mapped to pool's master server
- It can be clustered for high availability of virtual machines and access to LUN-based storage repositories.
- Virtual machine migration can be secured over SSL.



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IaaS Floats on Server Pools

Server pools are arguably the single most important elements in an Enterprise Manager Cloud Control 12c IaaS cloud, as this is the lowest level that can cater for high availability and resource usage distribution. A server pool is a logical collection of OVM Servers that are all managed by the same OVM Manager. A server can only be a member of one server pool. Each server pool has a virtual IP (VIP) address associated with it that is assigned to the pool's master server, and OVM Manager will use this IP address to communicate with the pool. Should the master server go down, the VIP (and master server role) will be failed over to another server in the pool.

Activate the cluster for virtual machine high availability

When creating a server pool with two or more members, you have the option to activate the server pool cluster. Doing so will cause the creation of a shared server pool OCFS2 file system that can be accessed by all servers in the pool. Because OCFS2 is inherently cluster-aware, the server pool can take advantage of its capabilities to monitor server availability and hence automatically fail over virtual machines to other servers in the pool. If you have selected a NFS file system as the server pool file system, OVM Manager will create a disk image there and format it as OCFS2. Only clustered server pools can access LUN-based storage repositories as these are formatted as OCFS2.

If you choose not to activate the server pool cluster, a server pool file system is not required. After a server failure, you will have to manually migrate virtual machines elsewhere in the pool.

Secure virtual machine migration

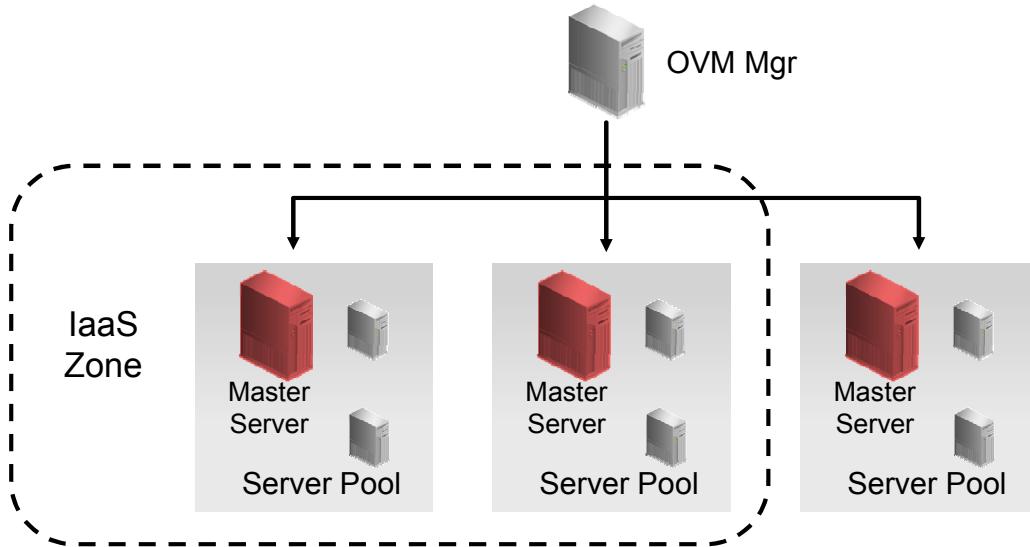
By default, virtual machine migration is performed by using unsecured network connections. Checking the Secure VM Migration option will cause the migration to occur over an SSL connection.

Created from an OVM Manager

The server pool creation process is initiated from an OVM Manager's right-click or home menu, and is a simple one-page operation. Open the Create Virtual Server Pool page from the Infrastructure Cloud home page by selecting *Create Virtual Server Pool* from an OVM Manager's right-click menu in the target navigation panel, or by selecting *Create Virtual Server Pool* from the *VM Manager* menu on an OVM Manager's home page.

Creating IaaS Zones

- Add one or more server pools owned by a single OVM manager
- Can be exposed to self service users



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Getting in the Zone

An IaaS Zone is a collection of one or more server pools owned by a single OVM manager, and is perhaps the simplest element of IaaS to create.

Created from an OVM Manager

The IaaS zone creation process is initiated from an OVM Manager's right-click or home menu, and is a simple one-page operation. Open the Create Zone page from Infrastructure Cloud home page by selecting *Create Zone* from an OVM Manager's right-click menu in the target navigation panel, or by selecting *Create Zone* from the *VM Manager* menu on an OVM Manager's home page, and enter the following information:

- **Name:** Something that will identify this IaaS zone's purpose and capabilities, such as Dev Small Machine Simple Topology Zone.
- **Cloud Self Service Zone:** IaaS zones do not necessarily have to be exposed to self service users. Cloud administrators can still access and use the zones for testing or other purposes. Once this option is checked, self service users will be able to make requests against the zone.
- **Virtual Server Pools:** Select the server pools that you want to be part of this zone. A server pool can only be a member of one zone.

Finishing Touches

- Software library user configuration
 - Set the password for internal CLOUD_SWLIB_USER
 - Used by IaaS deployments to access the software library
- Archiving policy for request information as displayed in the SSA portal
 - Option to automatically archive information for expired requests
 - How long is archived information retained before deletion



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Two Finishing Pieces of the Puzzle

You can configure two options for your IaaS cloud by navigating to *Infrastructure Cloud > Setup* from the Infrastructure Cloud home page.

- **Software library user configuration:** Enterprise Manager Cloud Control 12c creates a user called CLOUD_SWLIB_USER upon deployment of the Oracle Cloud Application plug-in (the plug-in ID is oracle.sysman.ssa). CLOUD_SWLIB_USER is used by IaaS to access components in the software library, and this setup option sets that user's password. The password itself is not exposed anywhere else, but if not set deployment activities will fail.
- **Archiving policy for requests:** These settings determine how long (if at all) information about past requests is retained for display in the Self Service Portal.

Summary

In this lesson, you should have learned how to:

- Undertake the tasks required to implement IaaS
- Establish a connection between Enterprise Manager Cloud Control 12c and OVM Manager
- Discover OVM servers
- Set up storage and storage repositories
- Set up networking
- Create server pools and IaaS zones



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Practice 4-1 Overview: Setting Up the IaaS Cloud

This practice covers the following topics:

- Deploying the VT Plugin to an Enterprise Manager agent
- Discovering an OVM Manager
- Discovering OVM Servers
- Setting up networking
- Setting up storage
- Creating Server Pools
- Creating an IaaS Zone



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In this practice, you will establish a connection between Enterprise Manager Cloud Control 12c and an OVM Manager, and then proceed to discover OVM Servers to be owned by the OVM Manager. Next, you will set up networks for your OVM Servers and create a pool of virtual NICs for use by virtual machines. Your environment includes both a NFS server and iSCSI LUNs that you will add as storage to your OVM Manager before creating a storage repository for IaaS resources. Then, you will create a server pool, before finally creating an IaaS zone.

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Setting Up the IaaS Self Service Portal



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Objectives

After completing this lesson, you should be able to:

- Describe the tasks involved in setting up the IaaS self service portal



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Setting Up the IaaS Self Service Portal

- Define Machine Sizes
- Configure Request Settings
- Assign Quotas to Roles
- Publish Software Components
- Configure Chargeback
- Customize SSA Portal Branding

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Preparing the IaaS Self Service Portal

Having set up your IaaS infrastructure from OVM servers through to IaaS zones, you need to configure your IaaS self service portal before your self service users will be able to log in and issue requests. There are six possible steps in the setup process, but only the first four must be completed in order to open the self service portal to end users. All six steps will be examined in more detail, but are summarized here:

- **Define machine sizes:** Self service users can select a machine size to apply to each request that will determine the CPU, memory, and local storage resources that will be assigned to their virtual machines.
- **Configure request settings:** Among other things, the self service administrator can control if user requests can be made in advance, how long requests can be active, and whether or not an Enterprise Manager agent will be deployed to the request's virtual machines.
- **Assign quotas:** Resource quotas are defined for combinations of roles and zones and specify the maximum resources that can be allocated to that role within that zone at any given time.
- **Publish software components:** Without this step, self service users would actually have nothing to request.

- **Configure chargeback:** Independent of IaaS and not a prerequisite to opening the self service portal, will allow you to track usage and produce chargeback reports.
- **Customize the SSA portal branding:** Apply non-Oracle branding to the login and self service portal pages presented to SSA users (applicable to a multi-OMS environment).

Chargeback and SSA login page customization are tasks that are common to all Enterprise Manager Cloud Control 12c clouds, and are covered in detail in other lessons.

Defining Machine Sizes

- Define virtual CPU, memory, and local storage values.
- Three sizes out-of-the-box: small, medium, and large
- Add your own or customize the OOTB sizes.
- SSA users can select a size when creating requests.

OOTB Size	Virtual CPUs	Memory (MB)	Storage (GB)
Small	2	4096	250
Medium	4	8192	500
Large	8	15360	1000



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Machine Sizes for Simple Server Requests

Machine sizes define resource settings for servers requested by SSA users. SSA users can select a desired machine size at the time of entering a request, thereby allowing them to allocate resources across all their requests within their quota limits. Enterprise Manager Cloud Control 12c comes with three predefined machine sizes that you can modify or extend with your own definitions.

Open the Machine Size Setup page by navigating to Setup > Cloud > Infrastructure, or on the Infrastructure Cloud home page either select Setup from the right-click menu on the Infrastructure Cloud node in the navigation pane or select Setup from the Infrastructure Cloud menu.

Once you are on the Machine Size Setup page, you can select and edit an existing definition, or create a new definition where you can enter values for the following fields:

- **Name:** This is the display name for the machine size that will appear in select lists
- **Description:** Optional description
- **VCPUs:** The number of virtual CPUs to be allocated when using this machine size
- **Memory (MB):** The memory in megabytes to be allocated when using this machine size
- **Local Storage (GB):** The amount of disk space to be allocated as local storage when using this machine size

Configuring Request Settings

- Applied to all self service requests
 - Future reservation restrictions
 - Request duration restrictions
 - Automatic configuration of Enterprise Manager agent on requested virtual machines
 - Software library folder under which SSA user artifacts will be saved



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Settings for All Requests

You can define constraints on the requests of self service users and also define settings that relate to virtual servers and artifacts that result from requests. Navigate to *Setup > Cloud > Infrastructure* to open the *Infrastructure Cloud Self Service Setup* page, and then select *Request Settings* from the left-hand menu. Set values as appropriate to your site, noting that these settings will apply to all zones managed by this Enterprise Manager Cloud Control 12c instance, but also that you can override them by using quotas:

- **Future reservation:** Unrestricted, or set to a number of days, weeks, months, or years. This setting determines how far into the future self service users can make request reservations.
- **Request duration:** Unrestricted, or set to a number of days, weeks, months, or years. This setting determines the maximum length of time a self service user's request can remain active.
- **Configure EM Agent:** Checking this option will cause an Enterprise Manager Cloud Control 12c agent to be deployed to virtual machines that are created as a result of a self service user's request. The particulars of configuring the agents are specified when publishing software components.
- **Software Library top level folder:** Templates and deployment plans created by self service users are saved in the software library under the folder you select here.

Assigning Quotas to Roles

- Limits on the resources that can be consumed at any time
 - Number of servers and virtual CPUs
 - Amount of memory
 - Amount of storage including assembly or template disk images
- Defined against user SSA-enabled role and IaaS zone combinations
- Quotas accumulate for users with multiple SSA-enabled roles
- Enable or disable the archiving of virtual machines to software library
 - “Save as template” functionality in SSA portal
 - Automatic archiving when SSA request expires
- Select a network profile to be used by a role



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Constraining Resource Usage with Quotas

You can constrain how much of your IaaS cloud each self service user is able to consume at any given time by assigning quotas to user roles on resource and IaaS zone combinations. Self service users who are associated with multiple roles will be restricted to the sum total of quotas assigned to those roles.

Navigate to Setup > Cloud > Infrastructure to open the Infrastructure Cloud Self Service Setup page, and then select Roles from the left-hand menu. Click the Assign Quota to Role button to create new quota settings. With the first two fields you select a combination of role and zone(s):

- **Select Role:** Select a self service role to set constraints against.
- **Select Zones:** Select one or more zones to which the constraints will apply.

Next, you can specify maximum resource values to be applied in the selected zone(s) for anyone with the selected role. When multiple zones are selected, the quotas are applied to the zones collectively, rather than to each zone individually:

- **Number of Servers:** Enter the maximum number of servers that may be active at any one time.

- **Number of VCPUs:** Enter the maximum number of virtual CPUs that may be allocated to virtual machines at any one time.
- **Memory (GB):** Enter the maximum amount of memory that may be allocated to virtual machines at any one time.
- **Local Disk (GB):** Enter the maximum amount of storage that may be attached to virtual machines at any one time. Note that this is comprised of the local storage requested as part of a self service request as well as the storage included in the requested assembly or template.

The next option determines whether users with the selected role can back up their servers in the selected zones as saved templates, and if so, whether servers will automatically be archived when they expire:

- Allow Archiving to Software Library – Yes/No
 - Save to Library on Expiry – Yes/No

You can also constrain the network profiles that will be available in the selected zone(s) to users with the selected role:

- **Select Network Profiles:** Virtual machines will be allocated virtual NICs and network settings only from the selected profile(s).

Finally, you have the option of overriding the request settings that have been established for your IaaS cloud:

- **Override Global Request Settings:** Check/uncheck
 - **Future Reservation:** No Restriction/Restriction as a number of days/weeks/months/years
 - **Request Duration:** No Restriction/Restriction as a number of days/weeks/months/years
 - **Configure EM Agent:** Check/uncheck Enable EM Agent Configuration

Publishing Software Components

- Create virtualization components (assemblies and template) in the software library.
- Associate assemblies and templates with SSA-enabled roles.
- Optional:
 - Configure Enterprise Manager agent deployment settings.
 - Import assemblies and templates to zone storage repositories.



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The Final Piece in the Puzzle

The final step in setting up the IaaS self service portal is to make assemblies and templates available for self service users to deploy to your IaaS zones. This is essentially an association of components in the software library with self service roles.

Navigate to Setup > Cloud > Infrastructure to open the Infrastructure Cloud Self Service Setup page, and then select Software Components from the left-hand menu.

- Click Add Components in the Publish Software Components section to open the Publish Assemblies/Templates to Roles dialog.
- Click Add in the Select Software Components section to display a list of available software components. Select the components to publish, and click Select.
- Click Add in the Select Roles section to display a list of self service–enabled roles. Highlight the role(s) that you want to be able to deploy the selected components, and click Select.
- Click Publish to finalize the association of the selected component(s) with the select role(s).

Enterprise Manager agent configuration

After adding the component you can configure how the Enterprise Manager agent will (or will not) be deployed with the component. Doing so will make the guest virtual machine(s) created from the assembly or template into managed targets within Enterprise Manager Cloud Control 12c. Specify a username and password to use for installing the agent on the deployed virtual machine, as well as the platform, port, and installation directories. The agent image for the nominated platform must exist in your software library.

You can also elect to not push the agent with the deployment or, in a multitier or multimachine assembly, you can elect which specific tiers and servers the agent should be deployed to.

Because the settings are per assembly, the agent owner details, platform, port, and installation directory must be valid for every machine you nominate to deploy the agent to.

Import software components into storage repositories

Because you have constrained which zones are available to users via quota definitions, you can also elect to have the components imported into the relevant zone(s) before any user requests a deployment. Doing so will make it quicker to fulfill the request, but if not done now, it will be performed automatically on demand when a self service user's request for the component needs to be fulfilled.

- In the Publish Software Components section, select a role from the Roles select list, causing a list to be displayed of software components published to this role.
- Select a software component and then click Import. You will be presented with a list of server pools and zones that this role has access to (via quotas). Select one or more server pools and zones and click Save to initiate the import of the software component to all appropriate storage repositories.

You can also define rules to regularly import published components to storage repositories.

- In the Import Rules section, click Create to open the Create Import Rules dialog.
- Give the rule a name, select one or more server pools and zones, and enter a schedule for the import job.
- Click Save to set up the schedule.

Summary

In this lesson, you should have learned how to set up the IaaS self service portal.



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Practice 5-1 Overview: Setting Up the IaaS Self Service Portal

This practice covers the following topics:

- Defining machine sizes
- Configuring request settings
- Assigning quotas to roles
- Publishing software components



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This practice will see you establish a working IaaS self service portal.

PaaS Fundamentals



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Objectives

After completing this lesson, you should be able to:

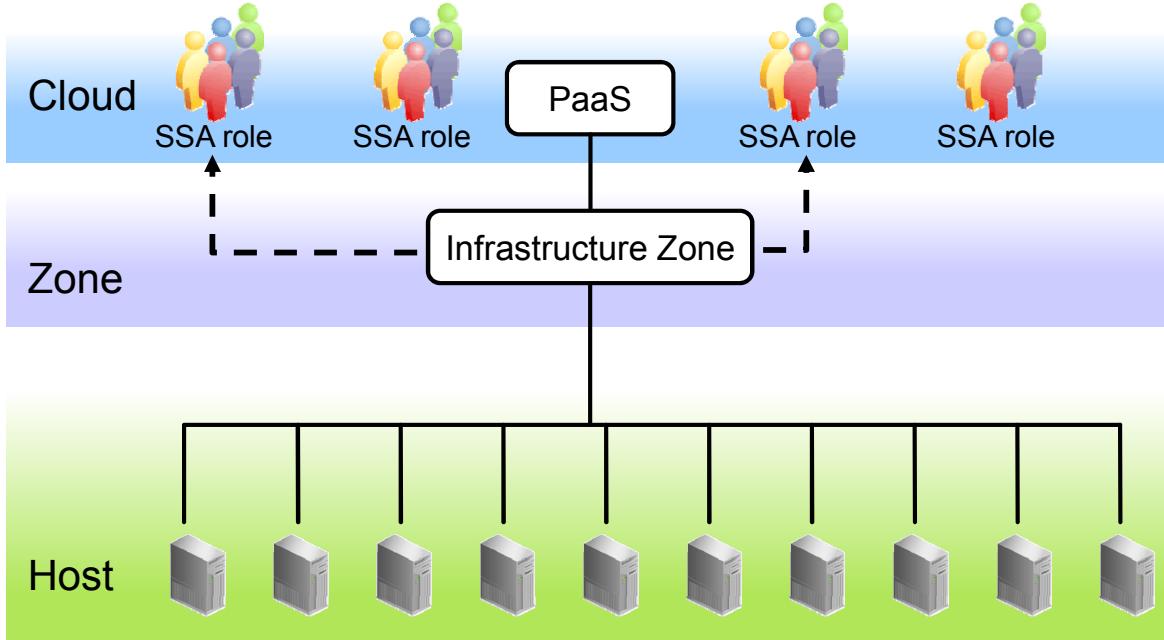
- Describe how PaaS is implemented in Enterprise Manager Cloud Control 12c
- Describe the topology of PaaS Infrastructure Zones
- Describe the relationship between PaaS Pools and Oracle Homes
- Describe the importance of privilege delegation and named credentials to the PaaS cloud



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PaaS Infrastructure Zone

A collection of host targets and SSA roles



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PaaS Zones Are Built from Your Infrastructure

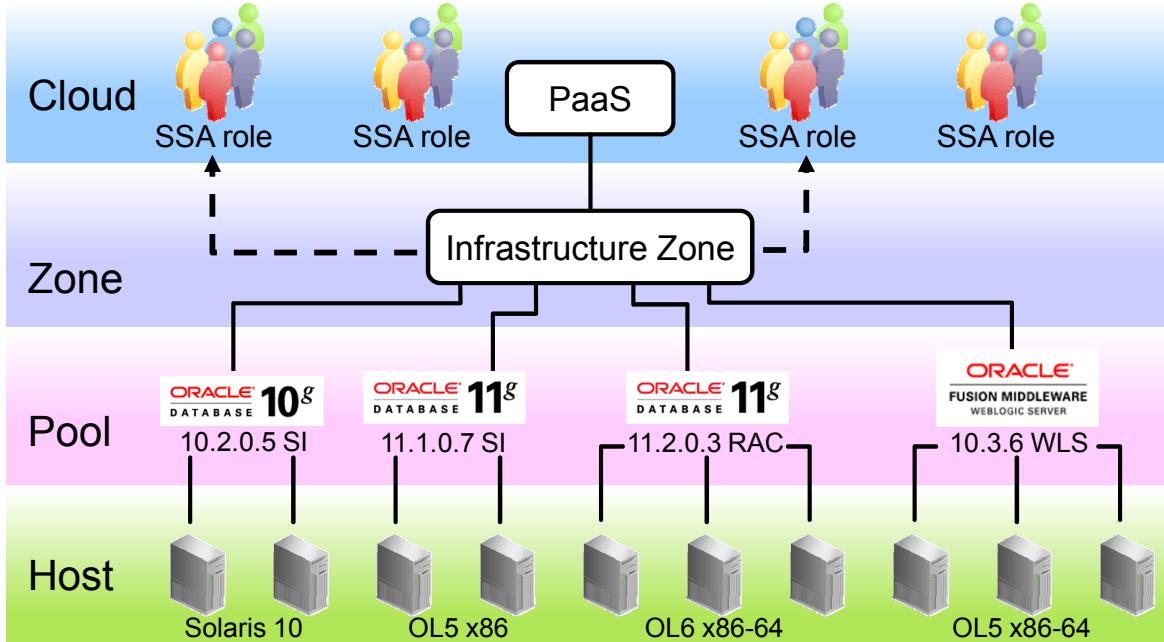
The first step in building a PaaS cloud is to create at least one PaaS Infrastructure Zone, which is done by selecting one or more Enterprise Manager host targets and identifying the SSA-enabled roles that users will need to in order to request resources in this zone.

As a cloud administrator, open the Middleware and Database Cloud home page by navigating to Enterprise > Cloud > Middleware and Database Home. Then, select Create PaaS Infrastructure Zone from the Middleware and Database Cloud menu and complete the three-stage process:

- **General:** Enter a name and optional description for the zone. Placement constraints should be entered as maximum percentage allocations for CPU and memory resources. These constraints will be applied to every host selected to be part of the PaaS infrastructure zone.
- **Targets:** Select host targets to participate in this zone, and select or create host named credentials for the operating system user that will be used to deploy PaaS requests to this zone. The credentials must be valid for all host targets in the zone.
- **Roles:** Select one or more SSA-enabled roles to restrict which users will be able to issue requests against this zone.

PaaS Pool

A collection of database or middleware Oracle Homes



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PaaS Pools of Oracle Homes

The second step in building a PaaS cloud is to create pools of the database and middleware Oracle Homes that exist on hosts within the infrastructure zone.

The mapping of hosts to PaaS pools does not have to be exclusive as shown in the slide—this is simply a convenience for illustrative purposes. The only proviso for a PaaS pool is that it contain Oracle Homes of the same platform, type, and version. For example, Solaris 10 Oracle Database single instance version 10.2.0.5 or Oracle Enterprise Linux 5 x86-64 WebLogic Server version 10.3.6.

Privilege Delegation

- Defines how a user on a host can execute commands as another user with Sudo or PowerBroker
- Allows jobs created by your SSA users to execute creation processes on PaaS servers
- Creates privilege delegation templates and applies them to PaaS servers



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PaaS Needs Privileged Access to Your Servers

PaaS activities on your servers will sometimes need to execute steps as a user other than the owner of the Enterprise Manager agent. To do so, Enterprise Manager Cloud Control 12c needs to know how to execute a command as another user, otherwise known as privilege delegation.

Configuring privilege delegation is a core Enterprise Manager Cloud Control 12c function and must be completed for every server in your PaaS infrastructure zones. Privilege delegation templates make managing the configuration easier by allowing you to define the settings once and apply them to many hosts.

Navigate to Setup > Security > Privilege Delegation to open the Manage Privilege Delegate Settings page. Click the Manage Privilege Delegation Setting Templates link in the Related Links section at the bottom of the page to open the Manage Privilege Delegation Setting Templates page. Create a template with the following steps:

- Select the type of privilege delegation (Sudo or PowerBroker) from the Create select list and then click the Go button.
- Give the template a name that will help you identify it in future (for example PD_LINUX_X86_64_SUDO).

- In the Settings section, enter the command to be used including the full path to the executable along with substitution variables as described on the page. For PowerBroker templates, you can optionally include a password prompt. For example, our Linux x86-64 Sudo command might be /usr/bin/sudo -u %RUNAS% %COMMAND%.
- Click the Save button to return to the Manage Privilege Delegation Setting Templates page.

When using Sudo as the privilege delegation utility, you may need to use the –E switch as part of the command or another technique to preserve the environment of the calling user. See My Oracle Support Note 1378091.1 12c Cloud Control: Provisioning Fails With Can't locate db/dbclone/clone_util.pl in @INC for more details.

Apply templates to managed hosts from the Manage Privilege Delegation Setting Templates page with the following steps:

- Select the desired template and click the Apply button to open the Apply Setting page.
- On the Apply Setting page, click the Add Targets button to open the targets selection dialog. Search for the desired hosts, select the Select check box for up to 16 hosts at a time, and click the Select button to return to the Apply Setting page.
- Click the Apply button to submit jobs that will apply the privilege delegation settings to the selected hosts.

Provisioning Credentials

- Define what operating system user will provision the databases and middleware domains requested by PaaS self service users
- Are associated with PaaS infrastructure zones
- Create global named credentials
- Grant access on them to PaaS self service users



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Named Credentials for Provisioning PaaS Artifacts

One key feature of PaaS is that self service users do not need to know any host operating system credentials to be able to create the databases and middleware domains they request. Enterprise Manager Cloud Control 12c satisfies this need by using the core named credential feature. PaaS administrators create global named credentials for the operating system user(s) that can create databases and middleware domains on the PaaS servers. Global credentials are used instead of target named credentials because they will be applied to all servers within a PaaS infrastructure zone because only one set of named credentials can be associated with each PaaS infrastructure zone.

Create the provisioning credentials by using the standard Setup > Security > Named Credentials page. Click the Create button to open the Create Credential page and then fill in the requisite fields:

- General properties:
 - **Credential name:** Select a name that readily identifies the purpose of the credential (for example, PAAS_NC_GLOBAL).
 - **Credential description (optional)**
 - **Authenticating Target Type:** Select the Host type.

- **Credential type:** Select Host Credentials.
- **Scope:** Global
- **Credential properties:**
 - **Username and Password:** Enter the operating system username and password combination that can be used to create databases and middleware domains on your PaaS servers.
 - **Run Privilege:** Select the privilege delegation method (Sudo or PowerBroker) and enter the privileged user to be used.
- **Access Control:**
 - Press the Add Grant button to display the Search and Select Administrators dialog. Find and select your PaaS self service users and then press Select to return to the Create Credential page. This will grant the selected users the View privilege on the credentials so they can use them.

Use the Test and Save button to nominate a host upon which to test the credentials before saving them.

Summary

In this lesson, you should have learned how to:

- Define a privilege delegation template and apply it to your PaaS infrastructure zone hosts
- Create named credentials to be used for PaaS provisioning
- Create a PaaS infrastructure zone



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Practice 6-1 Overview: Creating a PaaS Infrastructure Zone

This practice covers the following topics:

- Defining a privilege delegation template and applying it to host targets
- Creating named credentials for host targets
- Creating a PaaS infrastructure zone



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In this practice, you will establish a PaaS infrastructure zone with the host credentials and privilege delegation settings that will be used to deploy self service user requests into the zone.

Setting Up the DBaaS Cloud

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Objectives

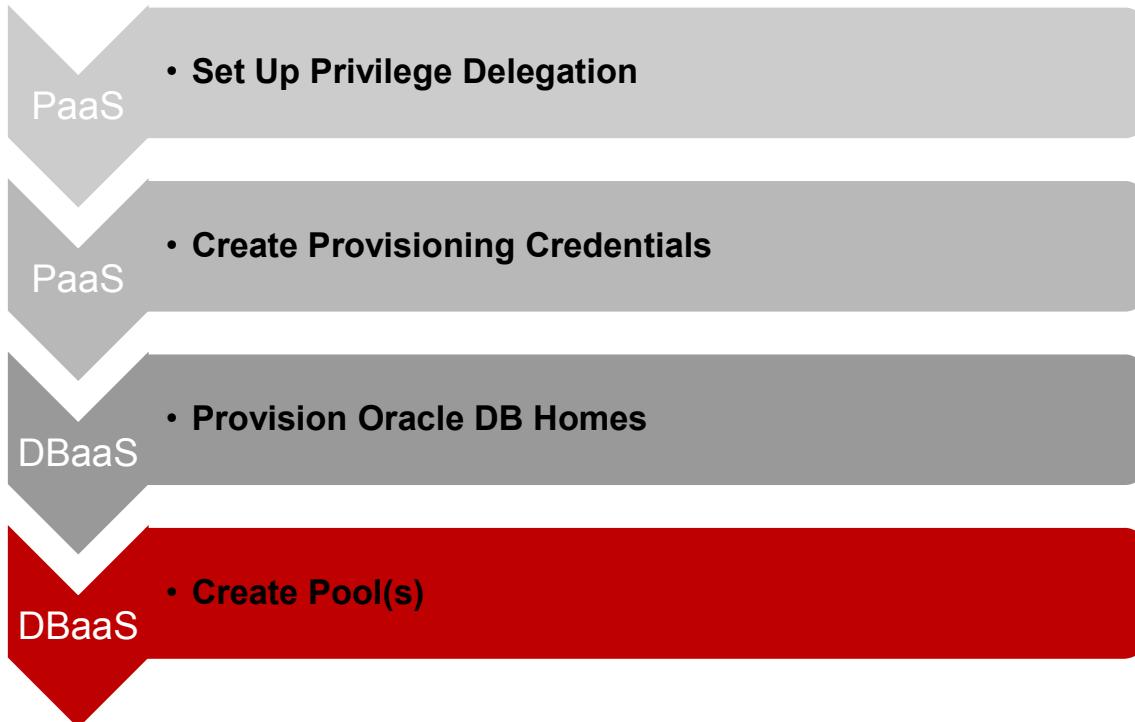
After completing this lesson, you should be able to:

- Describe the tasks required to implement DBaaS
- Describe the relationship between DBaaS and Oracle Database Homes



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Setting Up the DBaaS Infrastructure



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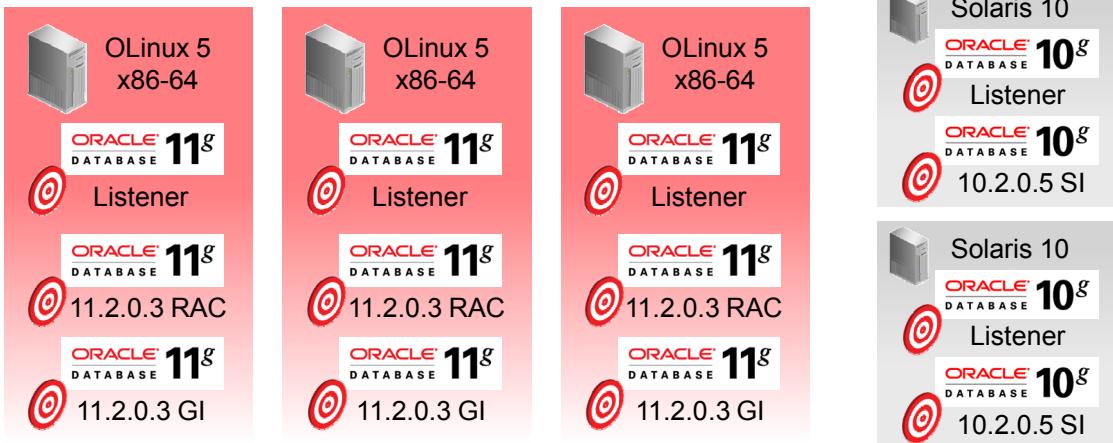
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Paving the Road to Self Service DBaaS

Because DBaaS Pools are collections of Oracle Database Homes, setting up your DBaaS infrastructure is essentially a matter of installing Oracle Database binaries on selected servers and ensuring that Enterprise Manager Cloud Control 12c can manipulate those installations. The first two steps listed of setting up privilege delegation and creating provisioning credentials are generic to the PaaS infrastructure zone and were covered in the lesson titled “PaaS Fundamentals.” Here, you will examine each of the DBaaS-specific steps, but will not delve into the specifics of installing the Oracle Database—it is assumed that your site personnel can provide the Oracle DBA skills required to manage such tasks.

Provisioning Oracle DB Homes

- Install Oracle Grid Infrastructure and Oracle Database binaries and create Oracle Listeners on servers.
- Ensure that all items are Enterprise Manager targets.
- Design Oracle DB Home topology to suit your DBaaS Pools.



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Install Oracle Grid Infrastructure, Database, and Listener

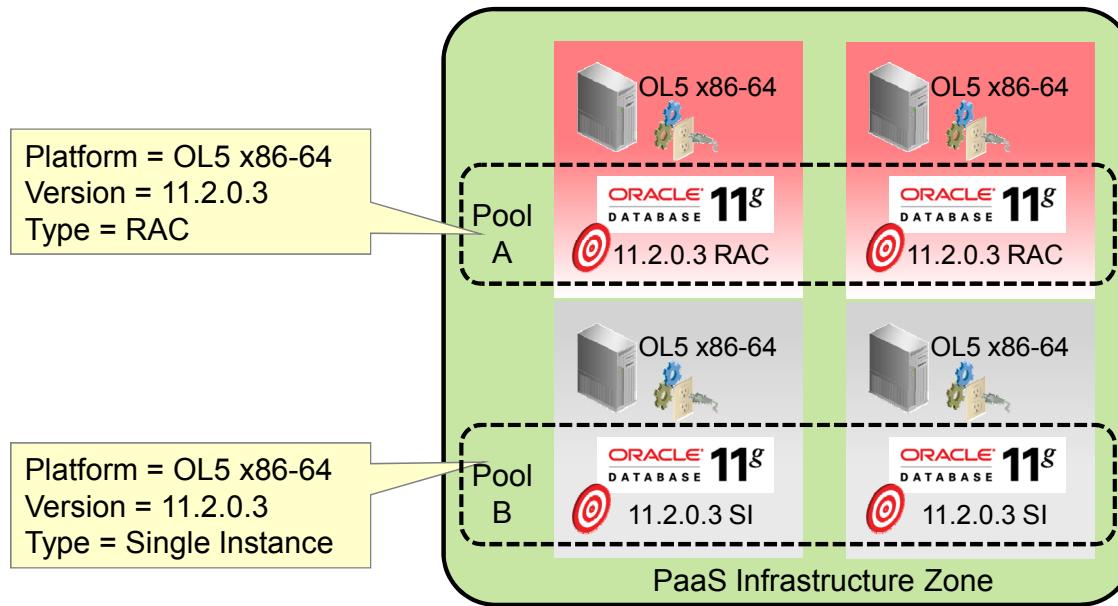
The first step in implementing DBaaS is to install Oracle Grid Infrastructure (for 11g RAC and ASM) and Oracle Database binaries (that is, software only install) and create Oracle Listeners on servers in your PaaS infrastructure zone. You may install the DBaaS infrastructure by using Enterprise Manager Cloud Control 12c provisioning, or by running the Oracle Database installer directly on the servers. All of these Oracle Database artifacts need to be Enterprise Manager targets in order to be included in the DBaaS infrastructure. Hence, manually installed and pre-existing components must be added as non-host targets.

When planning your DBaaS infrastructure topology, you should take into account the following:

- DBaaS considers single instance and RAC binaries to be different for the purposes of grouping them together in DBaaS pools.
- RAC DBaaS pools should be composed of Oracle Database Homes on two or more servers.
- An Oracle Database Home can only belong to one DBaaS pool.

How DBaaS Pools Use Oracle Database Homes

DBaaS Pools agglomerate Oracle Database Homes of homogeneous platform, version, and type combinations



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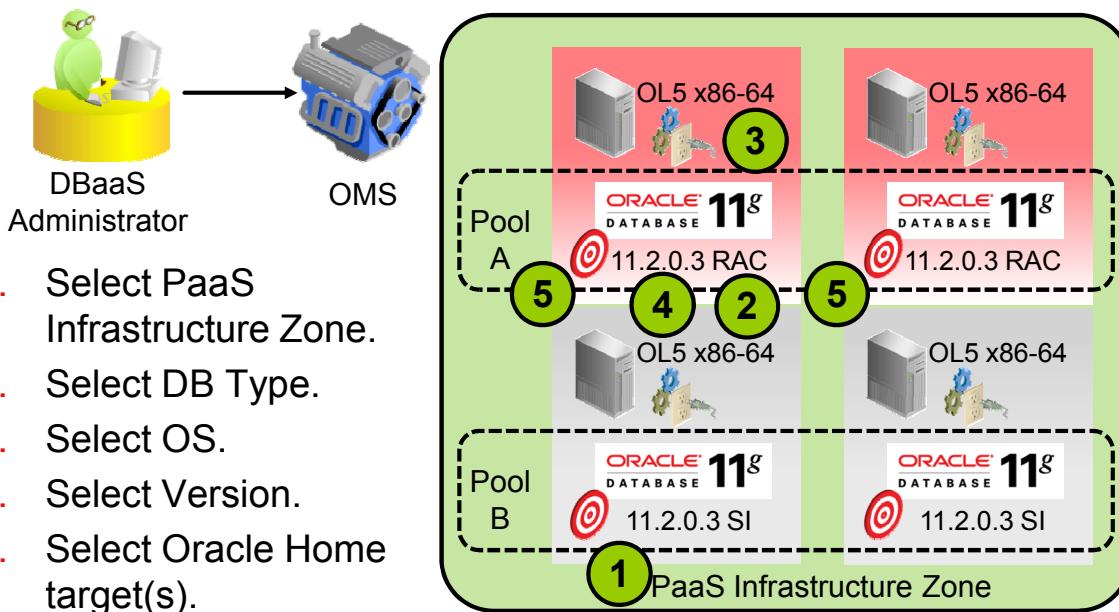
DBaaS Is Tightly Coupled with Oracle Database Homes

Enterprise Manager Cloud Control 12c provides the underlying infrastructure for DBaaS by allowing the DBaaS Administrator to create pools that are collections of Oracle Database Home targets in a PaaS infrastructure zone. Pools are then presented to DBaaS self service application users together with database deployment procedures that they can use to request database instances.

Oracle Database release numbering consists of five fields: <major release>, <maintenance release>, <Fusion Middleware (FMW) release>, <component-specific release>, and <platform-specific release>. Only Oracle Database Homes of the same platform, type, and major.maintenance.FMW.component-specific release combination can be collected together in a DBaaS pool such as Oracle Linux 5 x86-64 11.2.0.3 RAC.

Creating DBaaS Pools

- Select Database Oracle Homes of the same platform, type, and version from a PaaS infrastructure zone.



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DBaaS Pools in Five Easy Steps

DBaaS Cloud administrators create a DBaaS pool by nominating a database type, database version, and operating system combination and then selecting available matching Oracle Database Home targets from the hosts that form a PaaS infrastructure zone. First, open the Database Cloud Self Service Portal Setup page by navigating to Setup > Cloud > Database and then select Database Pools from the left-hand panel. Click Create to open the Create Software Pool: General page where you enter the following information:

- Name and description for the pool
- Maximum number of database instances per host

Click Next to proceed to the Create Software Pool: Targets page where you execute five steps to determine which hosts and Oracle Database Homes will form this pool:

- PaaS Infrastructure Zone Name:** Select the desired PaaS infrastructure zone from the drop-down select list. Note that the select list is not based upon the Oracle Database Home targets in the PaaS infrastructure zone.
- Database Configuration:** Choose Real Application Cluster or Single Instance Database. Note that the select list is generic—it is not based upon the Oracle Database Home targets in the PaaS infrastructure zone.

3. **Platform:** Select the platform for this pool. Again, the select list is generic—it is not based upon the hosts with Oracle Database Home targets in the PaaS infrastructure zone.
4. **Version:** Select the database version for this pool. Once again, the select list is generic—it is not based upon the Oracle Database Home targets in the PaaS infrastructure zone.
5. Click the Add button to select Oracle Database Home targets in the PaaS infrastructure zone that match the database configuration, platform, and version combination that you selected. If no targets are displayed for selection, then there are no targets in the PaaS infrastructure zone that match the database configuration, platform, and version combination that you selected, or they have already been assigned to other database pools in this PaaS infrastructure zone.

When you have selected all the Oracle Database Homes that you want to participate in the pool, click Submit to initiate the job that will create the pool.

Summary

In this lesson, you should have learned how to:

- Prepare the hosts in a PaaS infrastructure zone to participate in a DBaaS pool
- Create a DBaaS pool within a PaaS infrastructure zone



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Practice 7-1 Overview: Setting Up the DBaaS Cloud

This practice covers the following topics:

- Adding Oracle Database Home and Listener non-host targets to Enterprise Manager Cloud Control 12c
- Creating a DBaaS pool



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In this practice you will add Oracle Database Home and Listener non-host targets to Enterprise Manager Cloud Control 12c from the hosts in your PaaS infrastructure zone. Then you will use those Oracle Database Home targets to create a DBaaS pool.

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Setting Up the DBaaS Self Service Portal

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Objectives

After completing this lesson, you should be able to:

- Describe the tasks involved in setting up the DBaaS self service portal



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Setting Up the DBaaS Self Service Portal

- Configure Request Settings
- Assign Quotas to Roles
- Create DB Deployment Procedures
- Publish DB Deployment Procedures
- Configure Chargeback
- Customize SSA Login Page



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Preparing the DBaaS Self Service Portal

Having set up your DBaaS infrastructure from PaaS infrastructure zones through to DBaaS pools, you need to configure your DBaaS self service portal before your self service users will be able to log in and issue requests. There are six possible steps in the setup process, but only the first four must be completed to open the self service portal to end users. All six steps will be examined in more detail, but are summarized here:

- **Configure request settings:** Among other things, the self service administrator can control if user requests can be made in advance, how long requests can be active, and how long archived databases will be retained.
- **Assign quotas:** Define Resource quotas for roles and specify the maximum resources that can be allocated to that role at any one time across all DBaaS pools in your DBaaS cloud.
- **Create and Publish database deployment procedures:** Without these two steps, self service users would actually have nothing to request.
- **Configure chargeback:** Independent of DBaaS and not a prerequisite to opening the self service portal, will allow you to track usage and produce chargeback reports.

- **Customize the SSA login page:** Apply non-Oracle branding to the login page presented to SSA users (applicable to a multi-OMS environment).

Chargeback and SSA login page customization are tasks that are common to all Enterprise Manager Cloud Control 12c clouds, and are covered in detail in other lessons.

Configuring Request Settings

- Apply to all self service requests
 - Future reservation restrictions
 - Request duration restrictions
 - Retention time of archived requests



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Settings for All Requests

You can define constraints on self service users' requests and also define settings relating to virtual servers and artifacts that result from requests. Navigate to Setup > Cloud > Database to open the Database Cloud Self Service Setup page, and then select Request Settings from the left-hand menu. Set values as appropriate to your site, noting that these settings will apply to all DBaaS pools in all PaaS infrastructure zones that are managed by this Enterprise Manager Cloud Control 12c instance, but also that you can override them by using quotas:

- **Future reservation:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines how far into the future the self service users can make request reservations.
- **Request duration:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines the maximum length of time a self service user's request can remain active.
- **Request archive retention:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines how long (if at all) information about past requests is retained for display in the self service portal.

Assigning Quotas to Roles

- Limits on memory, storage, and number of databases
- Defined against SSA-enabled roles
- Applies to all DBaaS pools in all PaaS Infrastructure Zones
- Quotas accumulate for users with multiple SSA-enabled roles



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Constraining Resource Usage with Quotas

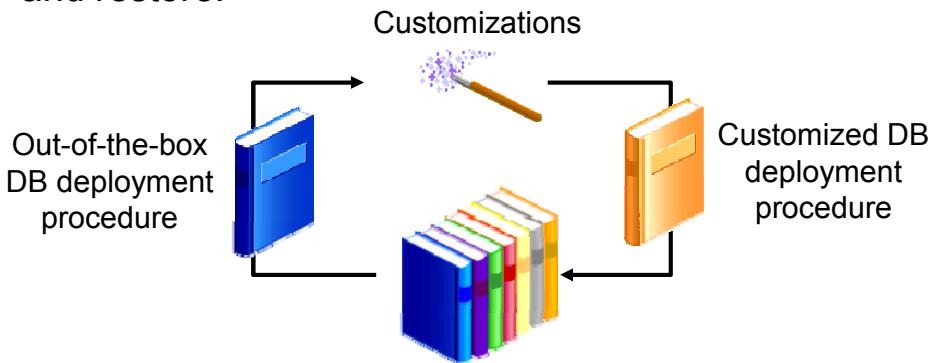
You can constrain how much of your DBaaS cloud each self service user is able to consume at any given time by assigning quotas to user roles. Self service users who are associated with multiple roles will be restricted to the sum total of quotas assigned to those roles.

Navigate to Setup > Cloud > Database to open the Database Cloud Self Service Setup page, and then select Roles from the left-hand menu. Click the Create button to open the Create Quota dialog and create new quota settings:

- **Role Name:** Select a self service role against which to set constraints.
- **Memory (GB):** Enter the maximum amount of memory that may be allocated to requested databases at any one time.
- **Storage (GB):** Enter the maximum amount of storage that may be allocated to requested databases at any one time.
- **Databases:** Enter the maximum number of database requests that may be fulfilled at any one time.

Creating DB Deployment Procedures

- Customize versions of the out-of-the-box procedure
 - Set and lock properties such as version, type, and administrative passwords.
 - Do not lock properties such as host credentials, Oracle Home, and SID that are set at deployment time.
 - Configure fast recovery to enable SSA user-initiated backup and restore.



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Take Advantage of Seeded Deployment Procedures

Enterprise Manager Cloud Control 12c is delivered with a set of database deployment procedures including one to create an Oracle database. By using this as your starting point, launch the procedure against one of the Oracle Database Homes in your environment with the intention of saving it rather than executing it. You can then set values appropriate for your DBaaS cloud, being sure to lock only the input values as specified in the documentation. On the review page, instead of submitting the deployment procedure, save it under a new name that readily identifies the key inputs such as version, type, file system, and sizing.

By manipulating settings such as CPU count, memory sizing, and database options, you can create a catalog of database creation procedures to suit any need. For example:

- Small, single-instance database
- Medium, two-node RAC database
- Medium, four-node RAC database with Advanced Security Option

Publishing DB Deployment Procedures

- Publish as service templates.
- Set defaults for unlocked configuration parameters if desired.
- Select PaaS Infrastructure Zone and DBaaS Pool combinations for potential deployment.
- Select SSA-enabled roles that will be able to use the procedure.



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Use Service Templates to Publish Deployment Procedures

Service templates map database deployment procedures to PaaS infrastructure zones and SSA-enabled roles. You can also set default values for any unlocked configuration parameters in the deployment procedure, as well as optionally locking in those values and hiding the parameter from the request process altogether. This allows you to potentially publish the same deployment procedure to different PaaS infrastructure zones and SSA-enabled roles with differing configurations.

Navigate to Setup > Cloud > Database to open the Database Cloud Self Service Setup page, and then select Service Templates from the left-hand menu. Click the Create button to open the Create Service Template workflow and create a new service template in five steps:

- **General:** Give the service template a name and description, and select the deployment procedure to associate with this template.
- **Configuration:** Set default values for unlocked configuration parameters if desired, with the option to hide the parameters during deployment requests and lock the values.
- **PaaS Infrastructure Zones:** Select the zones and DBaaS pools where this template will be available for deployment.
- **Roles:** Select the SSA-enabled roles that will have access to this template.

Summary

In this lesson, you should have learned how to:

- Configure DBaaS self service portal request settings
- Set quotas for DBaaS self service portal users
- Create and publish DBaaS deployment procedures



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Practice 8-1 Overview: Setting Up the DBaaS Self Service Portal

This practice covers the following topics:

- Configuring DBaaS self service portal request settings
- Setting quotas against DBaaS self service roles
- Creating DBaaS deployment procedures
- Publishing DBaaS deployment procedures



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In this practice you will establish a working DBaaS self service portal.

Setting Up the MWaaS Cloud

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Objectives

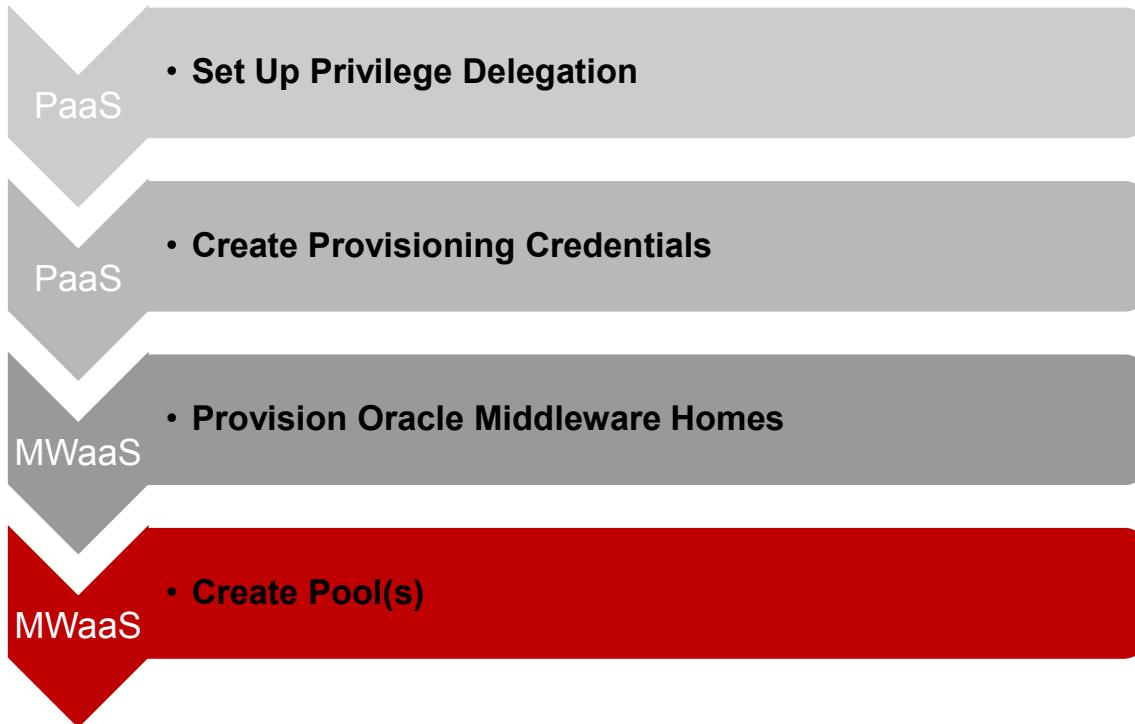
After completing this lesson, you should be able to:

- Describe the tasks required to implement MWaaS
- Describe the relationship between MWaaS and Oracle Middleware Homes



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Setting Up the MWaaS Infrastructure



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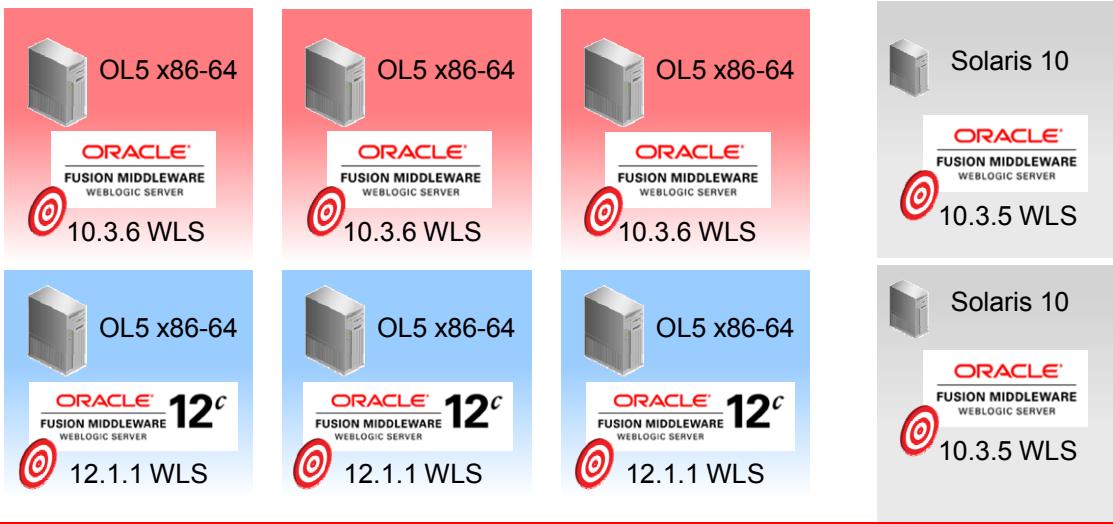
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Paving the Road to Self Service MWaaS

Because MWaaS Pools are collections of Oracle Middleware Homes, setting up your MWaaS infrastructure is essentially a matter of installing Oracle Middleware binaries on selected servers and ensuring that Enterprise Manager Cloud Control 12c can manipulate those installations. The first two steps listed of setting up privilege delegation and creating provisioning credentials are generic to the PaaS infrastructure zone and were covered in the lesson titled “PaaS Fundamentals.” Here, you will examine each of the MWaaS-specific steps, but will not delve into the specifics of installing Oracle Middleware—it is assumed that your site personnel can provide the skills required to manage such tasks.

Provisioning Oracle MW Homes

- Install Oracle Middleware on servers, with no domains.
- Ensure that all items are Enterprise Manager targets.
- Design Oracle MW Home topology to suit your MWaaS Pools.



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Install Oracle Middleware

The first step in implementing MWaaS is to install Oracle Middleware binaries (that is, software only install) on servers in your PaaS infrastructure zone. You may install the MWaaS infrastructure by using the Enterprise Manager Cloud Control 12c provisioning, or by running the Oracle Fusion Middleware installer directly on the servers. All of these Oracle Middleware Homes need to be Enterprise Manager targets in order to be included in the MWaaS infrastructure. Hence, manually installed and pre-existing components must be added as non-host targets.

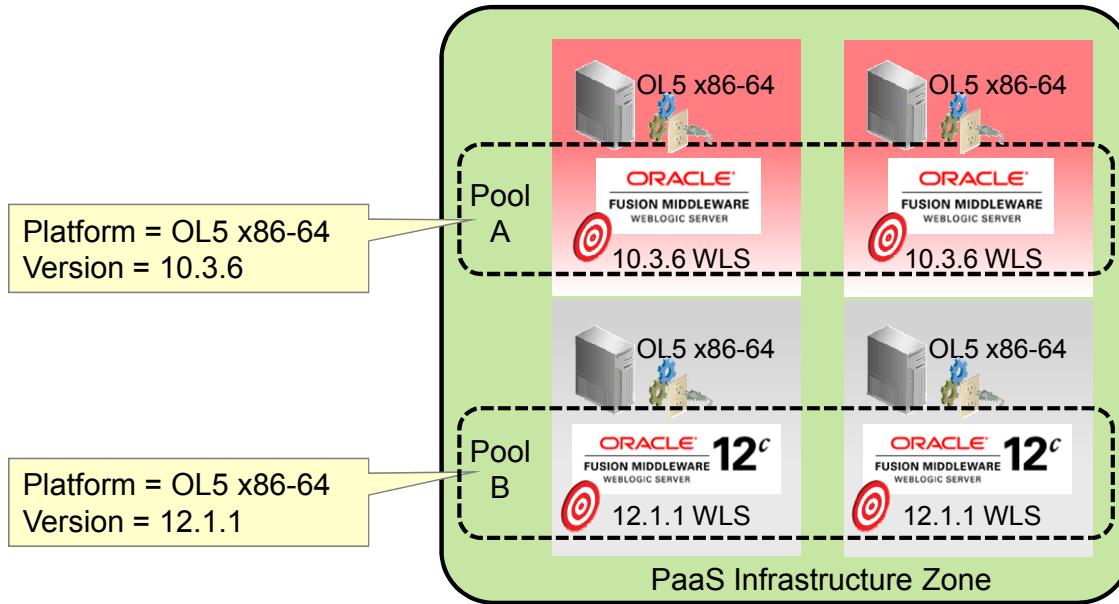
MWaaS relies on the presence of Java Required Files (JRF) in your Middleware homes, located in the `$MW_HOME/oracle_common` directory. This can be added to a WLS-only home by installing Application Developer Runtime into the Middleware home. Alternatively, provision your Middleware home from a product that includes JRF such as SOA suite or WebCenter.

When planning your MWaaS infrastructure topology, you should take into account the following:

- An Oracle Middleware Home can only belong to one MWaaS pool.

How MWaaS Pools Use Oracle Middleware Homes

MWaaS Pools agglomerate Oracle Middleware Homes of homogeneous platform and version combinations



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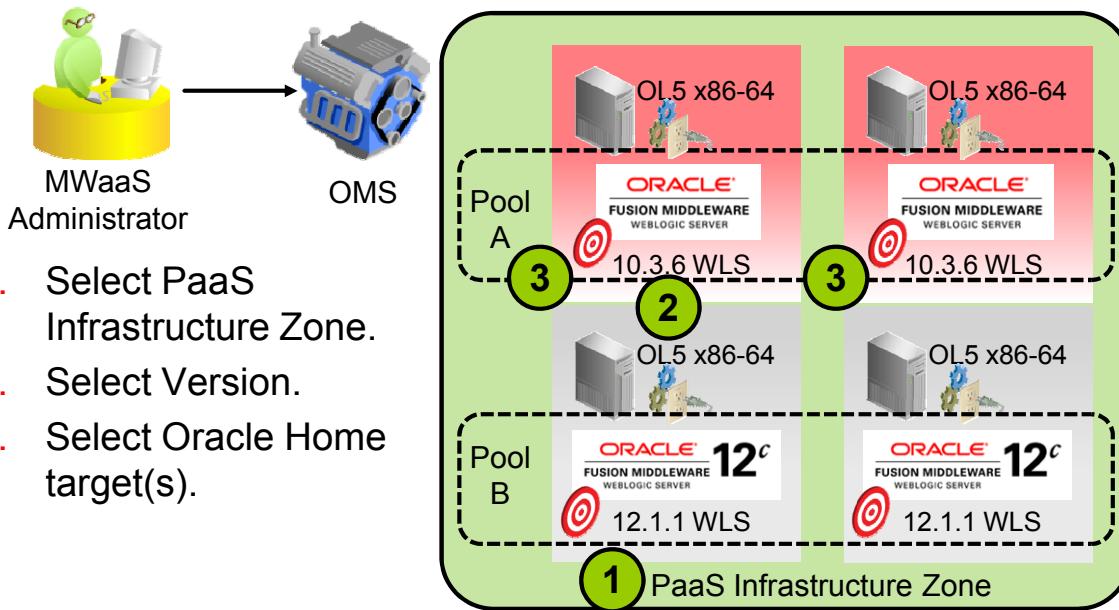
MWaaS Is Tightly Coupled with Oracle Middleware Homes

Enterprise Manager Cloud Control 12c provides the underlying infrastructure for MWaaS by allowing the MWaaS Administrator to create pools that are collections of Oracle Middleware Home targets in a PaaS infrastructure zone. Pools are then presented to MWaaS self service application users together with middleware deployment procedures that they can use to request service instances.

Oracle Fusion Middleware release numbering consists of five fields: <major release>, <maintenance release>, <Fusion Middleware (FMW) release>, <component-specific release>, and <platform-specific release>. Only Oracle Middleware Homes of the same platform and major.maintenance.FMW.component-specific release combination can be collected together in a MWaaS pool such as Oracle Enterprise Linux 5 x86-64 10.3.6.

Creating MWaaS Pools

- Select Middleware Oracle Homes of the same platform and version from a PaaS infrastructure zone.



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MWaaS Pools in Three Easy Steps

MWaaS Cloud administrators create a MWaaS pool by nominating a WebLogic Server version and then selecting available matching Oracle Database Home targets from the hosts that form a PaaS infrastructure zone. First, open the Middleware Cloud Self Service Portal Setup page by navigating to Setup > Cloud > Middleware and then select Middleware Pools from the left-hand panel. Click Create to open the Create Software Pool: General page where you enter the following information:

- Name and description for the pool
- Maximum number of Java servers per host

Click Next to proceed to the Create Software Pool: Targets page where you execute two steps to determine which hosts and Oracle Middleware Homes will form this pool:

- PaaS Infrastructure Zone Name:** Select the desired PaaS infrastructure zone from the drop-down select list. Note that the select list is not based upon the Oracle Middleware Home targets in the PaaS infrastructure zone.
- Version:** Select the WebLogic Server version for this pool. Once again, note that the select list is generic—it is not based upon the Oracle Middleware Home targets in the PaaS infrastructure zone.

3. Click the Add button to select Oracle Middleware Home targets in the PaaS infrastructure zone that match the version that you selected. If no targets are displayed for selection, then there are no targets in the PaaS infrastructure zone that match the version you selected, or they have already been assigned to other middleware pools in this PaaS infrastructure zone. Only select targets of the same platform and architecture, even though the selection dialog will allow you to select any Oracle Middleware Home target of the WebLogic Server version you selected in Step 1.

When you have selected all the Oracle Middleware Homes that you want to participate in the pool, click Submit to initiate the job that will create the pool.

Summary

In this lesson, you should have learned how to:

- Prepare the hosts in a PaaS infrastructure zone to participate in a MWaaS pool
- Create a MWaaS pool within a PaaS infrastructure zone



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Practice 9-1 Overview: Setting Up the MWaaS Cloud

This practice covers the following topics:

- Adding Oracle Middleware Home targets to Enterprise Manager Cloud Control 12c
- Creating a MWaaS pool



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In this practice you will add Oracle Middleware Home non-host targets to Enterprise Manager Cloud Control 12c from the hosts in your PaaS infrastructure zone. Then you will use those Oracle Middleware Home targets to create a MWaaS pool.

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Setting Up the MWaaS Self Service Portal

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Objectives

After completing this lesson, you should be able to:

- Describe the tasks involved in setting up the MWaaS self service portal



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Setting Up the MWaaS Self Service Portal

- Configure Request Settings
- Assign Quotas to Roles
- Create MW Deployment Procedures
- Publish MW Deployment Procedures
- Configure Chargeback
- Customize SSA Login Page

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Preparing the MWaaS Self Service Portal

Having set up your MWaaS infrastructure from PaaS infrastructure zones through to MWaaS pools, you need to configure your MWaaS self service portal before your self service users will be able to log in and issue requests. There are six possible steps in the setup process, but only the first four must be completed to open the self service portal to end users. All six steps will be examined in more detail, but are summarized here:

- **Configure request settings:** Among other things, the self service administrator can control if user requests can be made in advance, how long requests can be active, and how long archived databases will be retained.
- **Assign quotas:** Define resource quotas for roles and specify the maximum resources that can be allocated to that role at any one time across all MWaaS pools in your MWaaS cloud.
- **Create and publish middleware deployment procedures:** Without these two steps, self service users would actually have nothing to request.
- **Configure chargeback:** Independent of MWaaS and not a prerequisite to opening the self service portal, will allow you to track usage and produce chargeback reports.

- **Customize the SSA login page:** Apply non-Oracle branding to the login page presented to SSA users (applicable to a multi-OMS environment).

Chargeback and SSA login page customization are tasks that are common to all Enterprise Manager Cloud Control 12c clouds, and are covered in detail in other lessons.

Configuring Request Settings

- Apply to all self service requests
 - Future reservation restrictions
 - Request duration restrictions
 - Retention time of archived requests



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Settings for All Requests

You can define constraints on self service users' requests and also define settings relating to virtual servers and artifacts that result from requests. Navigate to Setup > Cloud > Middleware to open the Middleware Cloud Self Service Setup page and then select Request Settings from the left-hand menu. Set values as appropriate to your site, noting that these settings will apply to all MWaaS pools in all PaaS infrastructure zones that are managed by this Enterprise Manager Cloud Control 12c instance, but also that you can override them by using quotas:

- **Future reservation:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines how far into the future self service users can make request reservations.
- **Request duration:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines the maximum length of time a self service user's request can remain active.
- **Request archive retention:** Unrestricted, or set to a number of days/weeks/months/years. This setting determines how long (if at all) information about past requests is retained for display in the self service portal.

Assigning Quotas to Roles

- Limits on memory and number of Java servers
- Defined against SSA-enabled roles
- Applies to all MWaaS pools in all PaaS infrastructure zones
- Quotas accumulate for users with multiple SSA-enabled roles



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Constraining Resource Usage with Quotas

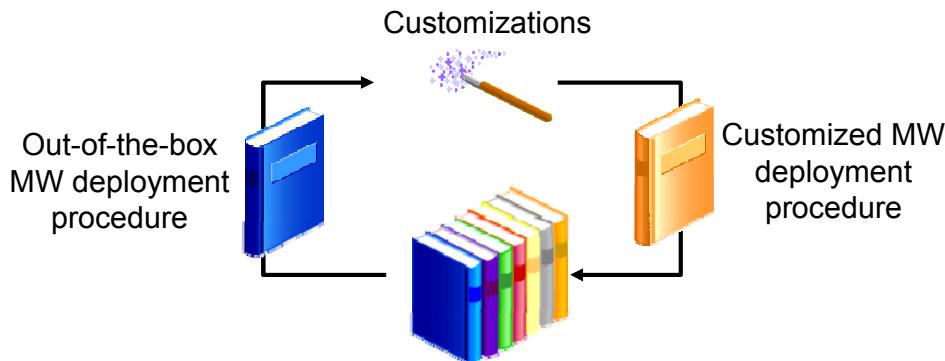
You can constrain how much of your MWaaS cloud each self service user is able to consume at any given time by assigning quotas to user roles. Self service users who are associated with multiple roles will be restricted to the sum total of quotas assigned to those roles.

Navigate to Setup > Cloud > Middleware to open the Middleware Cloud Self Service Setup page and then select Roles from the left-hand menu. Click the Create button to open the Create Quota dialog and create new quota settings:

- **Role Name:** Select a self service role against which to set constraints.
- **Memory (GB):** Enter the maximum amount of memory that may be allocated to requested Java servers at any one time.
- **Number of Java servers:** Enter the maximum number of Java servers that may be requested at any one time.

Creating MW Deployment Procedures

- Import provisioning profiles by using self update.
- Customize versions of the out-of-the-box procedure.
 - Select a provisioning profile to provide sizing configuration.
 - Do not set or lock any properties.



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Take Advantage of Seeded Deployment Procedures

Enterprise Manager Cloud Control 12c is delivered with a set of middleware deployment procedures including one to provision an Oracle Middleware Home. By using this as your starting point, launch the procedure with the intention of saving it rather than executing it. You then select a provisioning profile that will configure the memory settings in the home. There is no need to proceed through any of the other deployment steps as all properties are set at deployment time and defaults can be configured when publishing the procedure. Save the procedure under a new name that readily identifies the key inputs such as version, platform, and sizing.

Publishing MW Deployment Procedures

- Published as service templates
- Set the expected memory consumption to match the profile used to create the procedure
 - Small, 1.5 GB
 - Medium, 3 GB
 - Large, 6 GB
- Set values for other configuration parameters if desired.
- Select PaaS Infrastructure Zones for potential deployment.
- Select SSA-enabled roles that will be able to use the procedure.



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Use Service Templates to Publish Deployment Procedures

Service templates map middleware deployment procedures to PaaS infrastructure zones and SSA-enabled roles. You must set a value for the expected memory consumption as this is used for determining where a service can be placed within a PaaS zone. You can also set values for other configuration parameters in the deployment procedure, bearing in mind that none is presented to the SSA users at deployment time. Any configuration parameters without set values will use out-of-the-box defaults. You can potentially publish the same deployment procedure to different PaaS infrastructure zones and SSA-enabled roles with differing configurations.

Navigate to Setup > Cloud > Middleware to open the Middleware Cloud Self Service Setup page, and then select Service Templates from the left-hand menu. Click the Create button to open the Create Service Template workflow and create a new service template in five steps:

- **General:** Give the service template a name and description, and select the deployment procedure to associate with this template. The WLS version is displayed for each deployment procedure to ensure that you select the desired procedure.

- **Configuration:** Set the Expected Memory Consumption value to suit the profile that was used to create the deployment procedure. Specify default values for other configuration parameters if desired, otherwise the following default values will be applied:
 - WebLogic Username – weblogic
 - WebLogic Password – welcome1
 - Port Range Start – 1024
 - Port Range End – 65000
 - Expected CPU Utilization – 10
- **PaaS Infrastructure Zones:** Select the zones and MWaaS pools where this template will be available for deployment. The WLS version of each pool is displayed so that you can select the one that matches the WLS version of the deployment procedure you chose—a future version of Enterprise Manager Cloud Control 12c will automatically filter the list of pools based upon the version of the selected deployment procedure.
- **Roles:** Select the SSA-enabled roles that will have access to this template.

Summary

In this lesson, you should have learned how to:

- Configure MWaaS self service portal request settings
- Set quotas for MWaaS self service portal users
- Create and publish MWaaS deployment procedures



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Practice 10-1 Overview: Setting Up the MWaaS Self Service Portal

This practice covers the following topics:

- Configuring MWaaS self service portal request settings
- Setting quotas against MWaaS self service roles
- Creating MWaaS deployment procedures
- Publishing MWaaS deployment procedures



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In this practice you will establish a working MWaaS self service portal.

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Chargeback

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Objectives

After completing this lesson, you should be able to:

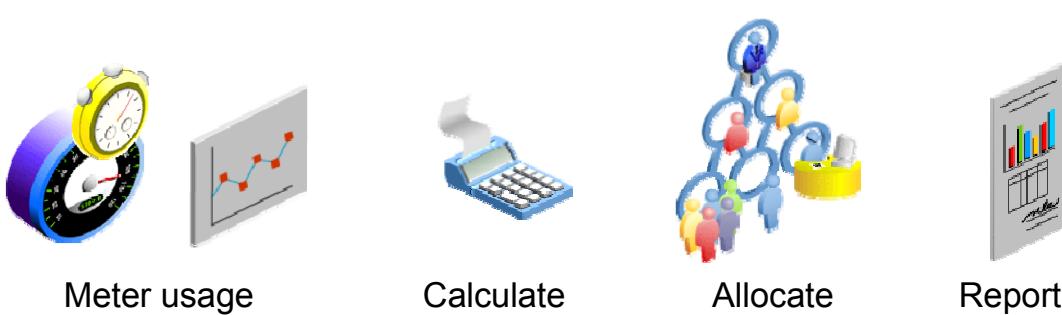
- Describe the implementation of chargeback for Enterprise Manager Cloud Control 12c clouds
- Report on the usage of Enterprise Manager Cloud Control 12c clouds



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Chargeback

- It is the ability to:
 - Meter resource usage
 - Calculate charges based upon usage
 - Allocate charges to cost centers
 - Report on usage and charges



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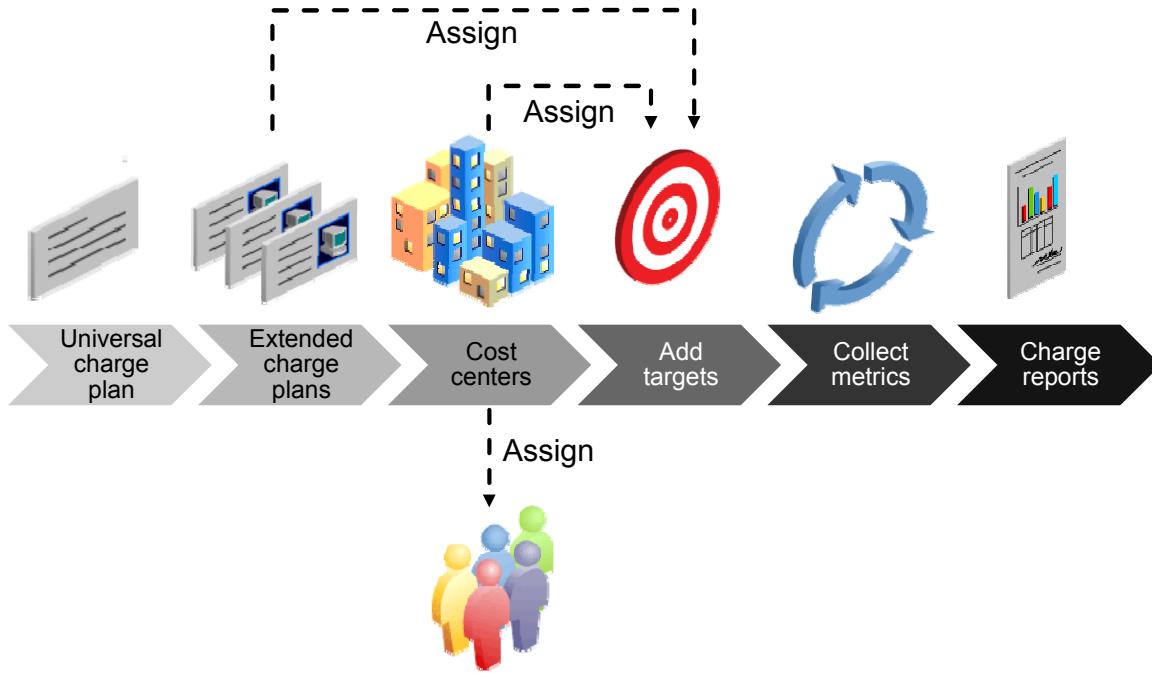
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The Fifth Essential Characteristic

The US National Institute of Standards and Technology defines the fifth of five essential characteristics of cloud computing as the ability to provide a measured service. Enterprise Manager Cloud Control 12c addresses this characteristic through the chargeback capability provided by the Chargeback and Capacity Planner plug-in.

Collecting metrics data is a fundamental element of Enterprise Manager Cloud Control 12c, and chargeback takes advantage of this to measure resource usage. The calculation and allocation of charges is performed by the Chargeback and Capacity Planner plug-in, and reports are made available to self service portal users and chargeback administrators.

Chargeback Workflow



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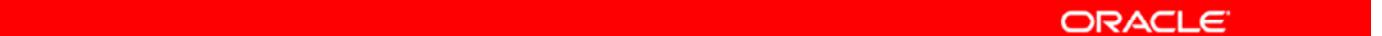
The Big Picture

Setting up chargeback involves a mix of mandatory and optional steps:

- **Set rates for the universal charge plan:** The universal charge plan specifies the base metrics and associated rates that will be used for generating chargeback reports.
- **Optional: define extended charge plans:** Extended charge plans are, as the name implies, an extension of the universal charge plan and allow you to specify fees and rates that should be applied to particular targets over and above the universal charges.
- **Optional: define cost centers:** In the absence of a cost center hierarchy, all charges will be reported against the default cost center. Defining a cost center hierarchy not only simplifies separation of charges by department, but also allows you to easily track resource utilization.
- Add targets to be included in chargeback metering.
- **Collect metrics:** This automatically occurs without any administrator intervention.
- **Generate charge reports:** An Enterprise Manager job generates reports daily, but you can also generate them on-demand.

Universal Charge Plan

- It is applicable to any chargeback target.
- Charge rates for general resource consumption:
 - CPU usage
 - Memory allocation
 - Storage allocation
- Initial rates are set to zero.
- Charged hourly, daily, weekly, quarterly, or yearly
- Changes are effective for the entire current reporting cycle.

 Universal
charge
plan ORACLE

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Defining Universal Charges

The universal charge plan is, as the name implies, applied universally and accounts for CPU, memory, and storage usage of your clouds' underlying infrastructure. You can specify the frequency at which the charges are accrued, and CPU charges can be defined for different architectures such as SPARC or x86-64.

Any changes to the universal charge plan will be effective from the start of the current monthly reporting cycle onwards, but the rates for past cycles cannot be altered.

Extended Charge Plans

- Extend the universal charge plan
 - Target-specific charges for hosts, virtual machines, databases, and WebLogic servers
 - Can adjust universal charge plan rates with multipliers
- Use the provided templates of chargeable entities
- Once assigned to a target, the extended charge plan is applied, instead of the universal charge plan.



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Extending the Universal Charge Plan

Extended charge plans give you the flexibility to supplement the universal charge plan for host, virtual machine, database, and WebLogic server targets and are ideal for applying charges for instances requested from your Enterprise Manager Cloud Control 12c cloud zones by your self service users. For example, you may want to apply a monthly charge for a highly available virtual machine, or a fixed fee for requesting a database that has the partitioning option enabled. Enterprise Manager Cloud Control 12c provides templates that contain typical items you can charge for.

Extended charge plans can also be used to apply a multiplier to some or all of the Universal charge plan rates. A 2.0 multiplier would double a rate, a 0.5 multiplier would halve the rate, and a zero multiplier would prevent the rate from applying to any targets matching this extended charge plan. By default a multiplier of 1 is applied, so as to ensure that both the universal charge plan and the extended charge plan are applied to any targets using the extended charge plan.

Chargeable Entities

- Chargeable entities determine how you define charges.
 - Suppose you want to charge:
 - A flat fee of \$5 per day for every database instance
 - A daily fee of \$4 for any Enterprise Edition database instance
 - 0.01 cents per second that the database is busy
1. Create an extended charge plan for a database instance.
 2. Add an unconditional base charge of \$5.
 3. Add a conditional charge of \$4 for Version = “Enterprise Edition”.
 4. Add a usage charge of \$0.001 per DB Time second.



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Target-Specific Chargeable Entities for Extended Charge Plans

Extended charge plans are defined by using chargeable entities. The following entities are exposed through the provided target templates for use in formulating extended charge plans:

- Host targets
 - Chargeable configuration entities
 - OS
 - CPU Count
 - CPU SPECInt Rate*
 - Disk Space
 - Memory
 - Software Installed
 - Chargeable usage entities
 - CPU Time
 - CPU Utilization (%)
 - CPU Utilization (SPECInt) *
 - Disk Space Utilization (%)

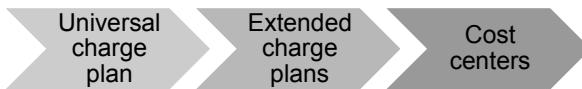
- Disk Usage
- Memory Used
- Memory Utilization (%)
- Network IO
- Virtual machine targets
 - Chargeable configuration entities
 - Allocated Memory
 - Allocated Storage
 - HA
 - IP Address
 - vCPU Count
 - Size
 - Chargeable usage entities
 - CPU Utilization (%)
 - CPU Utilization (SPECInt)*
- Dedicated database targets
 - Chargeable configuration entities
 - Edition
 - Memory Usage
 - Option
 - Storage Usage
 - Version
 - Chargeable usage entities
 - CPU Time
 - CPU Utilization (%)
 - CPU Utilization (SPECInt)*
 - Network IO
- Shared database service targets
 - Chargeable configuration entities
 - Edition
 - Option
 - Chargeable usage entities
 - CPU Time Per Service
 - CPU Utilization Per Service
 - CPU Utilization Per Service (SPECInt)*
 - DB Time Per Service
 - Disk Read (Physical) Operations Per Service
- Dedicated WebLogic Server targets
 - Chargeable configuration entities
 - Nodes of Cluster
 - Version

- Chargeable usage entities
 - CPU Utilization (%)
 - CPU Utilization (SPECInt) *
 - Memory Usage
 - User Requests
 - Active Sessions
 - Request Execution Time
- Shared WebLogic service targets
 - Chargeable usage entities
 - User Requests per Application
 - Active Sessions per Application
 - Request Execution Time per Application

* Metric derived by using SPEC benchmark results and CPU configuration and utilization.

Cost Centers

- Charges are allocated to cost centers.
- Every SSA user is their own cost center.
- Create extra cost centers to reflect the business hierarchy.
- Add SSA users to your cost center hierarchy.
- VMs, databases, and WLS instances requested in the self service portal inherit the requester's cost center.
- A default cost center captures charges for users not in the cost center hierarchy.



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Use Cost Centers to Allocate Charges

Charges calculated by the universal and extended charge plans are allocated to cost centers. Every self service user is effectively their own cost center, hence charges associated with their self service portal activity are allocated to them.

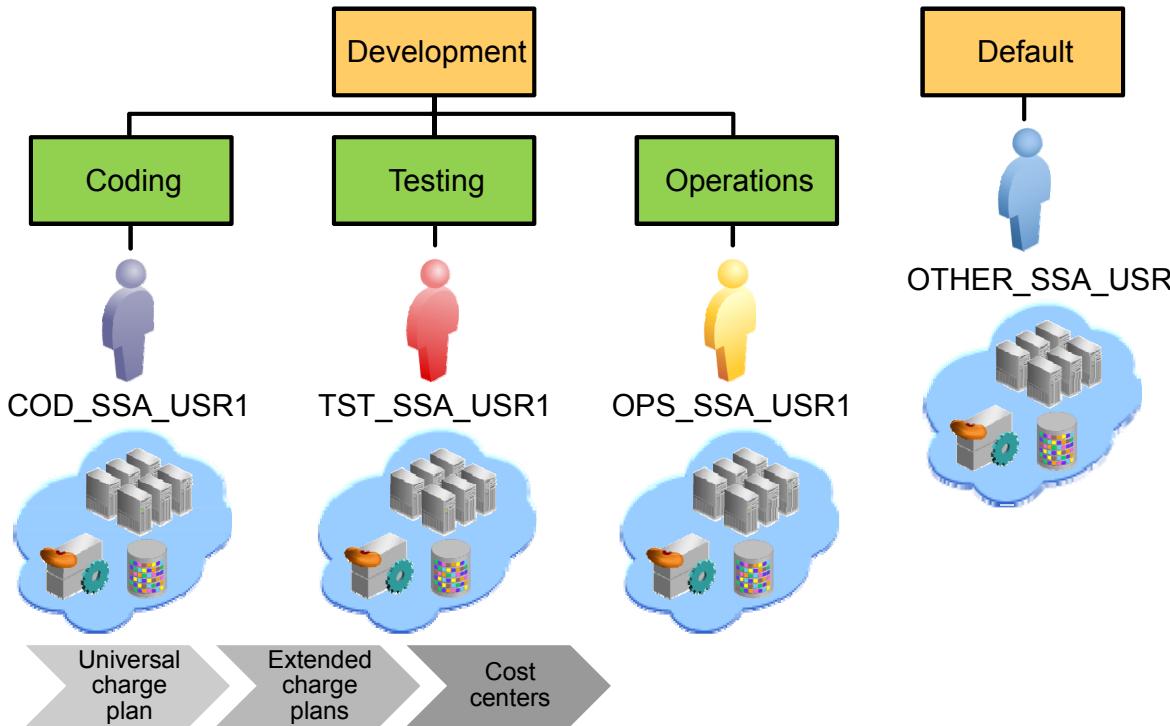
To take advantage of chargeback's ability to help track and recoup operating costs, you should build your own cost center hierarchy that reflects the hierarchy of your organization. Self service users can be then included in your hierarchy, after which charges for any servers or services they request will roll up to ascendant cost centers. IaaS and PaaS zones can also be included if they are for the exclusive use of a single cost center.

The cost center hierarchy can be built within Enterprise Manager Cloud Control 12c or imported from an LDAP server, allowing you to synchronize with your corporate hierarchy.

Charges for any self service users not included in your cost center hierarchy roll up to the default cost center.

Be mindful that chargeback will not know about your SSA users until they have requested resources from IaaS and PaaS zones, and those zones must in turn be known to chargeback. This effectively means that you may have to revisit the cost center SSA user assignments as SSA users become known to chargeback.

Cost Center Hierarchy: Example



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Using SSA User Cost Centers to Allocate Charges in Your Clouds

In this sample cost center hierarchy, you can find a Development cost center with three child cost centers equating to three development teams—Coding, Testing, and Operations. The corporate IT Services group operates Enterprise Manager Cloud Control 12c clouds and has created self service–enabled users for the Development group. Four users are considered—a member of the coding team (COD_SSA_USR1), a member of the testing team (TST_SSA_USR1), a member of the operations team (OPS_SSA_USR1), and an account (OTHER_SSA_USR) used by IT Services for testing the rollout of new self service templates. Every virtual machine, database instance, or WebLogic Server instance requested by each user will be assigned to them as individual cost centers, and the charges as calculated by charge plans will be allocated to them. To track their charges at the team level, each user in the cost center hierarchy is included as a child of their respective team’s node in the cost center hierarchy—COD_SSA_USR1 as a child of Coding, TST_SSA_USR1 as a child of Testing, and OPS_SSA_USR1 as a child of Operations. Because the OTHER_SSA_USR user does not belong to the Development group, it is left unallocated and made to appear under the default cost center. Charges accrued by the cloud resources requested by each user will now roll up to their team’s cost center, and ultimately to the Development group’s cost center, allowing for reporting at each level in the hierarchy.

Adding Targets

- Add your SSA zones as chargeback targets.
 - Assign the universal or an extended charge plan to each zone.
 - Do not assign cost centers to them.
- Requested VMs, database instances, and WLS instances will have the zone's charge plans applied to them.
- Charges will be allocated to the SSA requester's cost center.



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Add Your Cloud Zones to Chargeback

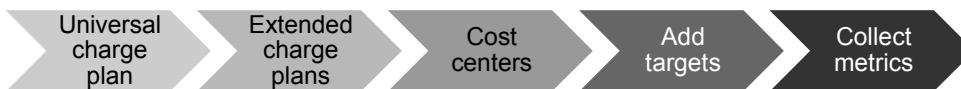
When using chargeback to calculate and allocate charges for usage of your Enterprise Manager Cloud Control 12c clouds, add the self service application IaaS Zones and PaaS Infrastructure Zones as targets to the chargeback application rather than the underlying servers. This is because self service users request resources at the zone level. Assign either the universal or an extended charge plan to the zones, but do not assign a cost center unless the zones are exclusively used by one cost center. The virtual machines, database instances, and WebLogic Server instances requested by your SSA users will be allocated to their cost center and that is the position in your cost center hierarchy where the charges for their usage should ideally be accrued.

Chargeback in a Non-cloud Scenario

Should you wish to use chargeback in a non-cloud scenario, you do not have the advantage of SSA-requested resources inheriting the cost center of the requester, and you must assign cost centers to your targets. This implies that hosts, groups, systems, databases, virtual machines, and so on must be allocated to the cost centers that have agreed to bear the cost of running them.

Chargeback ETL Process

- Monthly reporting cycle
- Daily collection cycle
 - Extracts configuration and monitoring data from Enterprise Manager repository
 - Performs transformations and aggregations
 - Loads data into chargeback schema
 - Calculates charges for cost centers by using charge plans
- Changes to charge plans, and cost center and charge plan assignments are backdated to the start of the current reporting cycle



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Extract Transform and Load Every Day

The chargeback extract, transform, and load (ETL) job is executed every 24 hours, has Job Type of *Chargeback Data Loader*, a Target Type of *Targetless*, and Job Name *CBADATACOLLECTOR*.

Enterprise Manager Cloud Control 12c super administrators (such as SYSMAN) can force chargeback ETL to occur on demand from the Actions menu of the Chargeback Targets tab.

Alternatively, a PL/SQL block of code can be executed by the SYSMAN user in the Oracle Management Repository:

```
BEGIN  
  emct_cba_loader.submit_cba_etl_job('test');  
END;
```

Full details are in My Oracle Support Note 1377185.1 *How to manually run the chargeback ETL job*.

Chargeback Reporting

- Administrators via the chargeback pages
- SSA users via the chargeback tab in the SSA portal
- Business users via BI Publisher reports
- External billing systems via data extracted with the Enterprise Manager Command Line Interface

```
emcli get_metering_data
  [-start_date=<start_date_in_mmddyyyy>]
  [-end_date=<end_date_in_mmddyyyy>]
  [-charge]
  [-cost_center=<cost_center_name>]
  [-target_type=<target_type>
  [-target_name=<target_name>]
```



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Reports for Cloud Administrators, Self Service Users, and Billing Systems

Cloud administrators

Cloud administrators can view chargeback reports from the chargeback homepage by navigating to Enterprise > Chargeback and selecting the Reports tab. Reports can be a summary or trending (showing a time scale) and can be filtered by date range, cost center, target type or target, and metric (charge, CPU Usage, Disk Usage, Memory Usage, Uptime).

Self Service Application (SSA) users

SSA users can view chargeback reports on the Chargeback tab present on each of the Infrastructure, Database, and Middleware self service portals. SSA users can view charge trend and summary information relevant to requests they have issued through the self service application.

Business users

The business users who are paying the charges accrued by their departments can be granted access to BI Publisher reports.

External billing systems

Using the Enterprise Manager command-line interface (emcli) `get_metering_data` command, administrators can extract metering data from the chargeback schema that can then be imported into external billing systems. The following parameters can be used:

- **start_date and end_date:** If either or neither is specified, data for the latest reporting cycle is printed.
- **charge:** Print charge data. If not specified, usage data is printed.
- **cost_center:** Internal name of the cost center to report upon. If not specified, the cost center of the user logged in to emcli is used.
- **target_type:** Optionally, restrict the output to a particular target type. Allowable values are `oracle_database`, `oracle_vm_guest`, `host`, and `weblogic_j2eeserver`. If specified, the `target_name` parameter must also be specified.
- **target_name:** If restricting output to a particular target type, optionally restrict output to an individual target.

Summary

In this lesson, you should have learned how to:

- Define universal and extended charge plans
- Create a cost center hierarchy
- Add targets to chargeback
- View chargeback reports



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Practice 11-1 Overview: Setting Up Chargeback

This practice covers the following topics:

- Configuring the universal charge plan
- Defining extended charge plans
- Creating a cost center hierarchy
- Adding targets to chargeback
- Assigning charge plans and cost centers to users and targets
- Forcing chargeback data to be collected
- Viewing chargeback reports



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In this practice, you will set up chargeback for the targets you have created and view chargeback information for them.

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Consolidation Planner

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Objectives

After completing this lesson, you should be able to:

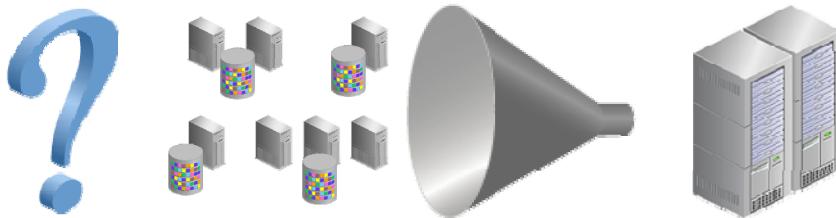
- Describe how Consolidation Planner fits in to the IT infrastructure lifecycle
- Describe how Consolidation Planner can assist in assessing IT infrastructure usage and needs
- Describe how to use Consolidation Planner



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Doing More with Less

- Perennial questions that plague IT operations:
 - How to best use existing servers?
 - How to best meet future demand?
 - What hardware to invest in for the future?
 - How to fit everything into the existing data center?
- Consolidation Planner can help by:
 - Leveraging historical host metric data
 - Evaluating a variety of “What if … ?” scenarios
 - Allowing you to get a feel for the right direction



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How Much Hardware Is Enough?

Demand for computing power within an enterprise always increases, be it from an increasing user base, new applications and systems to be implemented, existing hardware reaching its end of life, or a myriad of other reasons. Answering the question of how much computing power is required starts with examining past demand, and Enterprise Manager Cloud Control 12c is ideally positioned to assist in that investigation, thanks to its repository of host metrics data.

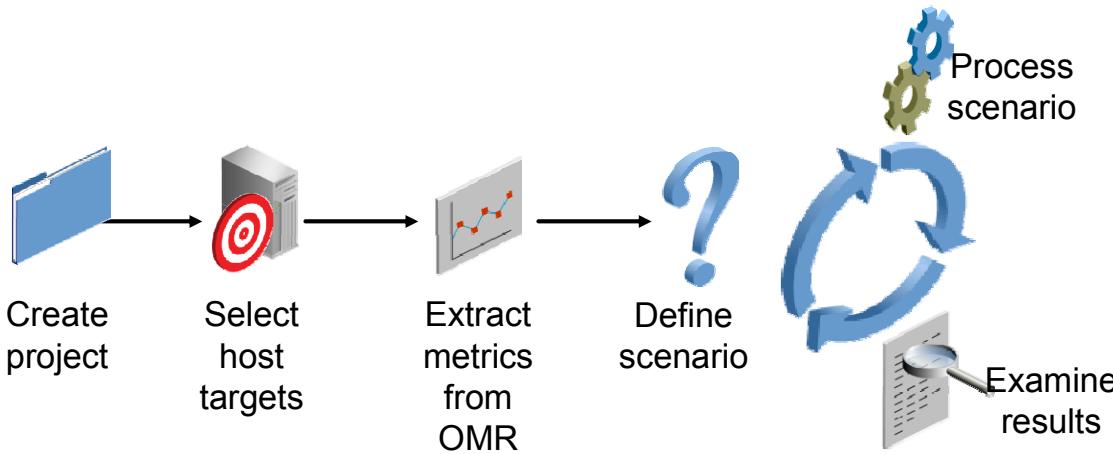
What If ... ?

Consolidation Planner uses historical host metrics data to help you explore “What If … ?” scenarios such as:

- What if I migrate the workload from one existing machine to another?
- What if I replaced a number of database servers with one Exadata Database Machine?
- What if I replaced a number of Linux x86 servers with a single Sun Solaris server?
- What if I replaced a number of physical servers with virtual machines?

It should be noted that Consolidation Planner does *not* generate recommendations upon which you can order and commission new hardware resources. It is a tool that can be used to great effect at the start of a consolidation project.

Consolidation Planner Workflow



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One Project, Many Scenarios

Working with Consolidation Planner is a simple process of establishing a project against which you then run an unlimited number of consolidation scenarios.

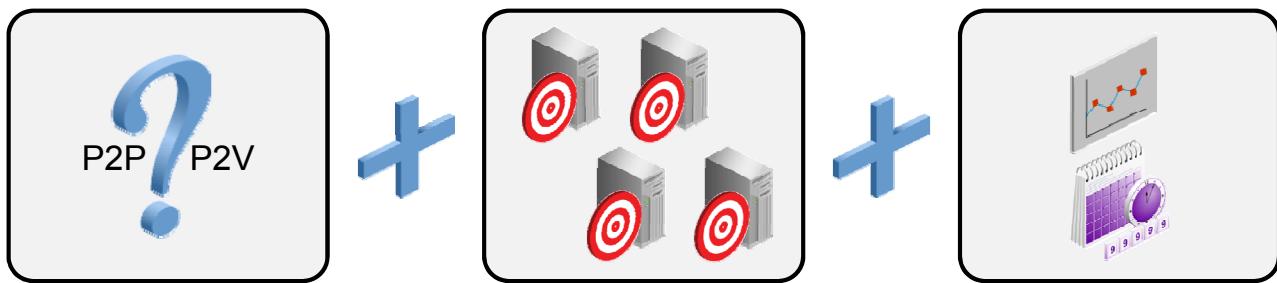
Consolidation Planner allows you to define two different types of projects:

- **Physical to physical (P2P):** All the scenarios in a P2P project will be based upon consolidating existing physical servers onto other physical servers.
- **Physical to virtual (P2V):** All the scenarios in a P2V project will be based upon consolidating existing physical servers onto guests running on Oracle VM Servers.

As well as deciding the type of consolidation scenarios to be considered, you select the host targets to be included in the project and the amount of metric data to be extracted from the OMR. When Consolidation Planner has harvested the metrics data from the OMR, you can define a scenario to investigate how much of the workload on your selected host targets might fit on existing or new hosts. Each scenario is defined independently and you have the choice of using preconfigured or custom scenarios. After processing the scenario, the Consolidation Planner presents you an indication of how well the existing workload could be deployed on the destination servers. You may repeat the scenario definition-processing-examination cycle as many times as you want for any given Consolidation Planner project.

Creating a Consolidation Planner Project

- Choose the type of consolidation to investigate:
 - Physical to physical (P2P)
 - Physical to virtual (P2V)
- Select host targets to consider as sources.
- Specify the number of days of metrics data to be used.
- (Optional) Select host targets to consider as destinations.
- (Optional) Select preconfigured scenarios.



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Each Consolidation Planner project can only be used for one type of consolidation scenario—physical to physical (P2P) or physical to virtual (P2V).

Source and destination host targets

You must select at least one source host target to be considered for consolidation, and optionally other host targets to be used as destination servers for your consolidation scenarios. For a P2V consolidation project, the destination servers must be the existing Oracle VM Servers. However, for P2P, the destination servers can be the existing servers, “phantom” servers that are not yet purchased, or Oracle Exadata Database Machines. If you do not select existing host targets, you can define “phantom” servers when creating scenarios.

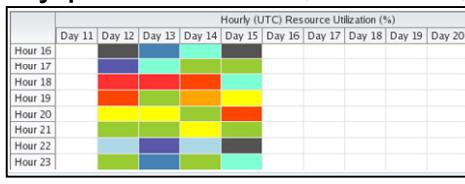
Metrics data window

By default, Consolidation Planner collects at least 21 days and at most 90 days of metrics data available to process consolidation scenarios, and will start harvesting this data when you create the project or at a later date nominated by you. You can modify the window of data that will be used, and also elect to maintain a rolling window of data by purging the oldest data while harvesting the new data. Setting the minimum number of days to zero allows you to immediately work with existing metrics data rather than waiting for the minimum number of days to elapse before a scenario can be evaluated.

Viewing Project Metrics Data

- CPU, memory, disk storage, disk I/O, and network utilization for the source servers
- Table of average resource utilization over the data window
 - One row per source server
 - Utilization % values shown for each resource
- Workload heat maps of hourly resource utilization
 - Displayed for a selected server, resource, and month
 - Color-coded table of utilization % for each hour of each day
 - Quickly identify periods of low, medium, and peak demand

CPU (SPECint®_rate_bar)	CPU Vendor	CPU Name	CPU MHz	CPU Cores	CPU Utilization (%)	Memory (GB)	Memory Utilization (%)	Disk Storage (GB)	Disk Storage Utilization (%)	Disk I/O (Request/second)	Disk I/O Request Utilization (%)	Network I/O (MB/second)	Network I/O Utilization (%)
35.9 (Estimated)	GenuineIntel	Intel(R) Xeon(R) CPU X5670 @ 2.92GHz	2.926	2	7.3	7.81	83.4	119.14	63.2	334356.00 (Estimated)	31.7	125.00 (Estimated)	0.2



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Visualizing Past Resource Demand

After the metrics data has been harvested for your Consolidation Planner project, you can view the information that will be used as a basis for your consolidation scenarios. Resource utilization data is presented to you in a table of average values calculated over the entire data window and as workload heat maps showing hourly averages for each day in the data window.

Average resource utilization

The table of average resource utilization displays a row for each source server with the columns listed below. Utilization percentages are shown as a numeric value superimposed upon a bar proportional to the value that is color coded to assist in rapid identification of under-utilized and over-utilized servers.

- **CPU:** SPECint rating, vendor, name, MHz, number of cores, and average utilization %
- **Memory:** Total amount (GB) and average utilization %
- **Disk:** Total storage (GB), average utilization %, I/O capability (request/second), and average I/O request utilization %
- **Network:** I/O capability (MB/second) and average I/O utilization %
- **Operating system:** Name and base version

Workload Heat Maps

The workload for individual servers for a given resource over any month in the project data window can also be viewed as color-coded heat maps. The workload heat map is presented as a table of average hourly resource utilization data for each day in the month, where the cells in the table are colored so you can easily identify periods of low, medium, and peak demand for that particular resource and server. Workload heat maps are a valuable tool in their own right for investigating resource usage, and may allow you to immediately identify opportunities for better or reserve resource allocation.

Consolidation Scenarios

- Preconfigured
 - Conservative, medium, or aggressive aggregation
 - Requirements based on CPU, memory, and disk storage
 - No source-to-destination mapping compatibility constraints
 - Destinations can be existing (P2P or P2V) or phantom servers (P2P only)
- Custom
 - Conservative, medium, or aggressive aggregation
 - Choose resources, days of week, and date range for estimating requirements
 - Choose consolidation compatibility constraints
 - Destinations can be existing (P2P or P2V) or phantom servers (P2P only)



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Preconfigured or Custom Scenarios

Consolidation Planner allows you to choose from three preconfigured consolidation scenarios or you can define your own custom scenarios. Regardless of the choice you make, all scenarios have the same characteristics.

Resource utilization aggregation

Consolidation Planner aggregates each source server's resource usage into individual 24-hour patterns for each scenario to estimate resource demand, and offers three approaches:

- **Conservative:** Aims to ensure that the peak source workloads can run concurrently on the destination(s) by sampling the maximum values for each hour, resulting in artificially higher apparent demand and a lower source to destination consolidation ratio.
- **Aggressive:** Aims to ensure that the average source workloads can run concurrently on the destination(s) by sampling the average hourly values, resulting in a flatter apparent demand and hence a higher source to destination consolidation ratio.
- **Medium:** Aims to ensure that the 80th percentile source workloads can run concurrently on the destination(s) by sampling the 80th percentile value for each hour, resulting in a mildly elevated apparent demand and a source to destination consolidation ratio somewhere between conservative and aggressive.

Resources included in estimations

Consolidation Planner can use a number of different resources when estimating requirements from the source servers. When using a preconfigured scenario, the resource selection is predetermined. When using a custom scenario, you can select which resources should be used.

- **CPU – SPECint rating:** Used by preconfigured scenarios
- **Memory – Total amount (GB):** Used by preconfigured scenarios
- **Disk – Total storage (GB):** Used by preconfigured scenarios
- Disk – I/O capability (request/second)
- Network – I/O capability (MB/second)

When defining a custom scenario, you can also restrict the data that will be included in estimating source server demand to weekdays or weekends only, as well as specifying a date range rather than using all available data. This allows you to investigate a scenario targeted at particular days or periods such as month end processing or a period when your existing servers experienced unusual demand that may have been highlighted by the workload heat maps.

Consolidation compatibility constraints

Preconfigured scenarios do not apply any source-to-destination mapping constraints when consolidating the workloads from your source servers. Using a custom scenario gives you the opportunity to specify compatibility and mutual exclusivity constraints that must be observed.

- **Compatible servers:** You can configure two criteria for determining which source servers can be consolidated to the same destination server:
 - Server property: Any or all of lifecycle status, department, location
 - Server configuration: Any or all of network domain, system vendor, system configuration, CPU vendor, CPU name, and operating system
- **Mutually exclusive servers:** You are given two criteria that can be used to prevent source servers from being consolidated to the same destination server:
 - Nodes of a RAC Database
 - Nodes of an Oracle Cluster

Destination servers

Both preconfigured and custom scenarios allow you to nominate existing servers or phantom servers as consolidation destinations. When defining phantom servers, you enter a SPECint rating or choose from a reference list of SPECint ratings, and an amount of memory in megabytes. The SPECint ratings are taken from the Standard Performance Evaluation Corporation CPU2006 integer throughput results and more information is available at www.spec.org.

When using existing servers as your destinations, custom scenarios give you more control than preconfigured scenarios by allowing you to select between consolidating to the fewest destination servers or balancing the source workload equally across all the destination servers. You can explicitly map source servers to destination servers, or allow Consolidation Planner to perform auto-mapping.

Custom scenarios also allow you to restrict the estimated workload on each destination server by specifying a maximum CPU and memory percentage utilization.

Viewing Consolidation Scenario Results

- Tabbed results or publishable report
- Reports can be shared by using BI Publisher
- Ratio – Showing source server to destination allocation
- Mapping – Showing source server to destination mapping with resource utilization of sources and estimated utilization of destination(s)
- Confidence – Percentage of source server data points that meet the destination server resource limits
- Violations – Source servers that did not meet scenario constraints
- Exclusions – Source servers that auto-mapping could not consolidate to a destination server



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Analyzing Consolidation Scenario Results

The results of consolidation scenarios can be viewed directly on the Consolidation Planner home page in the Summary section or on a separate report page. Both alternatives render the same information, although some renderings are only available in one format:

- **Ratio:** Showing destination servers and which source servers were consolidated onto them (displayed on tabbed results only).
- **Mapping:** The mapping of source servers to destination servers with aggregated resource utilization percentages for source servers and estimated resource utilization for destination servers.
- **Confidence:** It is calculated as the number of evaluated data points that do not exceed destination server resource limits divided by the total number of evaluated data points. Each data point is the aggregation of hourly data for all source servers. Confidence is displayed as a percentage on tabbed results and as a fraction on the report. The tabbed results also enumerate the total number of data points evaluated, the number of data points meeting requirements, and the number of data points exceeding requirements. In addition to this, the tabbed results display an estimated heat map of resource utilization for the destination servers.

- **Violations:** Source servers that violate any consolidation compatibility constraints. For example, if Lifecycle Status is specified as a compatibility constraint, and manual mappings have been specified, a Production source server and a Development source server mapped to the same destination would violate the constraint (displayed on tabbed results only).
- **Exclusions:** Source servers that could not be consolidated to any destination server when auto-mapping was used (displayed on tabbed results only).

Summary

In this lesson, you should have learned how to:

- Create a Consolidation Planner project
- Create a consolidation scenario
- View scenario results



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Practice 12-1 Overview: Using Consolidation Planner

This practice covers the following topics:

- Creating a Consolidation Planner project
- Viewing Consolidation Planner project data
- Creating a Consolidation Planner scenario
- Viewing Consolidation Planner scenario results



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In this practice, you will create a Consolidation Planner project, view the data that is collected for the source servers, create a consolidation scenario, and view scenario results.

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Cloud Deployment Models

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Objectives

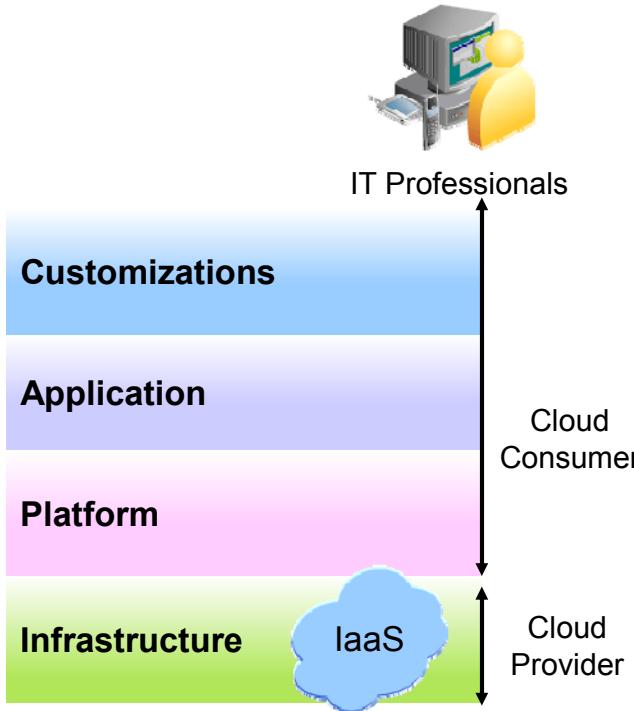
After completing this lesson, you should be able to:

- Describe various cloud deployment models
- Describe use cases for each cloud deployment model



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Cloud Service Models: IaaS



- Provider offers compute and storage resources, and O/S
- Consumer provides everything else
- Use cases:
 - Relocating existing workloads
 - Building highly customized platforms and applications

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IaaS Cloud Service Model

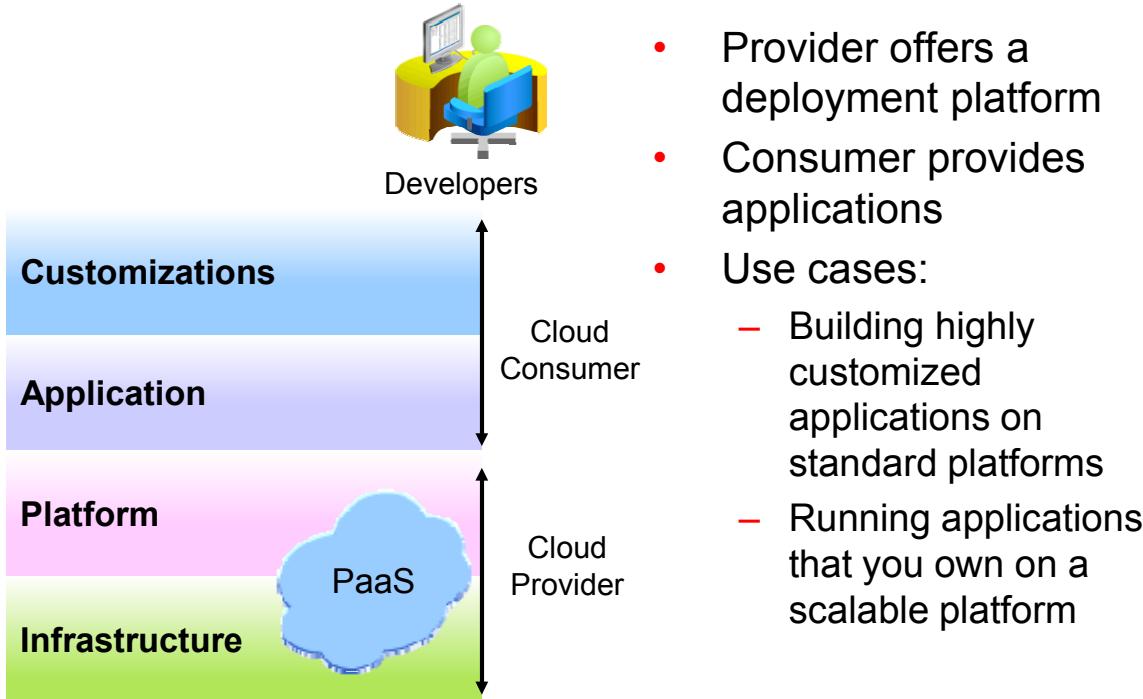
The three cloud service models defined by NIST (IaaS, PaaS, SaaS) are suited to different types of users due to the level of control each model allows for the cloud provider and the cloud consumer.

As a cloud consumer, you are attracted to the IaaS provider's cloud because you do not want to own and manage your own hardware but you do want to control everything from the operating system upwards. In the IaaS service model, cloud consumers use self service to request compute, memory, and storage resources together with a base operating system and then install application servers, databases, and other platforms followed by the applications they want along with the customizations they need.

An IaaS cloud may be suitable in a number of circumstances, such as:

- You want to divest yourself of the cost of purchasing and maintaining your own infrastructure
- Your existing infrastructure is unable to meet current or projected demands, and the IaaS cloud allows you to use as much computing power as you require
- Your internal infrastructure requirements can be best met by consolidating your existing IT hardware into a private IaaS cloud

Cloud Service Models: PaaS



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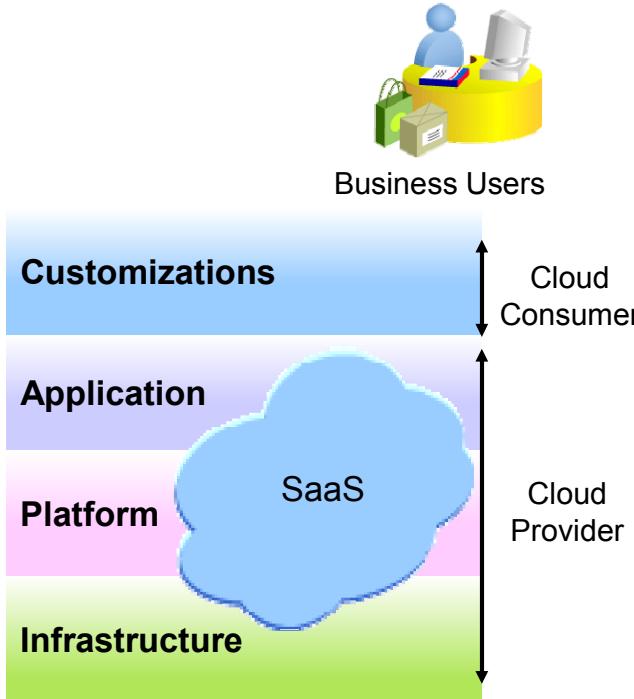
PaaS Cloud Service Model

As a cloud consumer, you are attracted to the PaaS provider's cloud because you want somewhere that you can deploy applications and start using them. You may be an application developer or a licensed application owner. In the PaaS service model, cloud consumers use self service to request a deployment platform such as an application server or database, and they then install their applications on that platform and customize them to suit their needs.

A PaaS cloud may be suitable in a number of circumstances, such as:

- Your organization has the skills to build an application, but you do not want to invest in the underlying platform and computing resources, and you want the flexibility to scale your platform up or down as required.
- You own licenses for an application but do not want to invest and maintain the underlying platform and computing resources yourself.
- You are an IT development shop specializing in J2EE and database applications, and a private PaaS cloud will allow you to consolidate existing resources and service the needs of all your development projects.

Cloud Service Models: SaaS



- Provider offers access to a running application
- Consumer can customize as required
- Use cases:
 - Implementing business processes without any IT acquisition
 - Building complex business flows with publicly available services

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SaaS Cloud Service Model

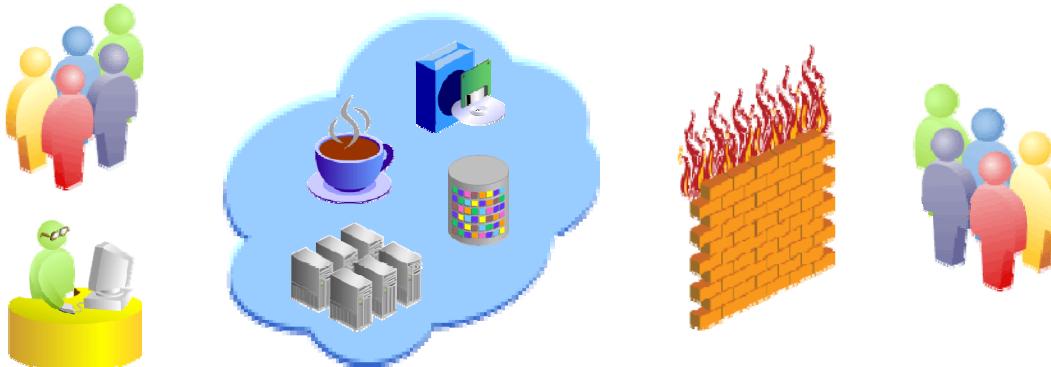
As a cloud consumer, you are attracted to the SaaS provider's cloud because you just want to use an application without owning the hardware or platform that it runs on, nor do you want to own software licenses. In the SaaS service model, cloud consumers use self service to request access to an application such as Oracle Fusion Purchasing or Oracle Social Network that they can then customize to suit their needs.

A SaaS cloud may be suitable in a number of circumstances, such as:

- Your organization needs to implement a business process but cannot justify the cost of investing in and maintaining a technology stack and application licenses.
- Your organization uses the services of a number of SaaS providers and wants to link them together.
- Different departments within your organization generate unsynchronized fluctuating demand and a private SaaS cloud will allow you to consolidate and scale up or down across globally distributed data centers.

Deployment Models: Private Cloud

- Used exclusively by one consumer
- Can be hosted and managed internally or externally
- Savings depend upon the ability to exploit pooled resources, elasticity, and self service automation
- Simple model for an initial transition to cloud



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Private Cloud for Complete Peace of Mind

The private cloud deployment model dictates that the entire cloud is solely used by one cloud consumer, and this exclusivity can be traced to the underlying hardware being used to provide the cloud resources. A private cloud may be owned and operated by an organization from its own or a leased data center, or it may be owned, operated, and managed by a third party in an exclusive arrangement.

A primary advantage of an internal private cloud is the ability for the cloud consumer to control every aspect of the implementation, thereby ensuring compliance to security, naming, and other standards that may be key requirements of the consuming organization.

Deployment Models: Community Cloud

- Used by consumers with common requirements, owners, or regulators
- Can be hosted and managed internally or externally
- For example: Interrelated government organizations or a business conglomerate



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Community Cloud for Shared Compliance

The community cloud deployment model is appropriate for multiple organizations with common security, privacy, and compliance considerations. Often these shared facets arise due to a common owner and a common regulator. A community cloud may be owned and operated by the community from its own or a leased data center, or it may be owned, operated, and managed by a third party.

Community clouds afford each member of the community the benefit of being able to share the costs of investing in and operating technologies and controls that may be required by rules and regulations.

Deployment Models: Public Cloud

- Available to the general public
- Hosted and managed by a cloud provider
- Transfer of costs may motivate the move to the cloud
- Typically a pay-per-use or subscription basis



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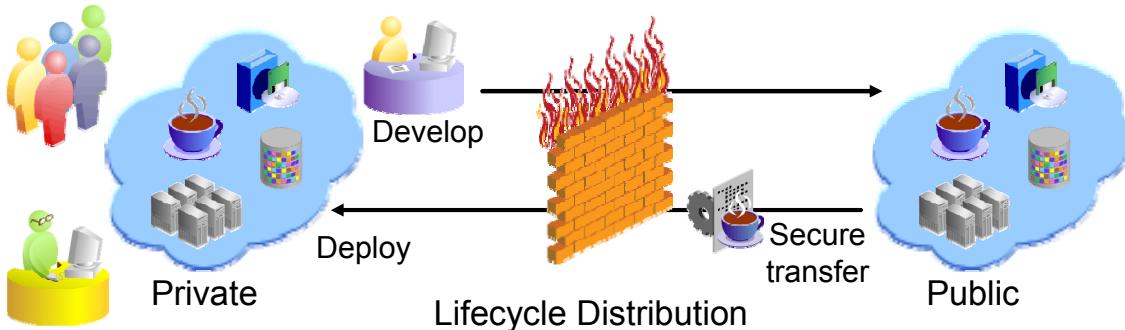
Public Cloud for General Access

The public cloud deployment model is appropriate for organizations or individuals wishing to avail themselves of computing or software resources without the associated costs and requirements of ownership and maintenance. A public cloud is owned by an organization selling cloud services. There is no exclusivity in the public cloud model—consumers have no control over whether the cloud resources they are using are shared with any other consumer, or even with which other consumers they are shared.

Public clouds relieve an individual organization of the burden of owning and maintaining computing and software resources, including the infrastructure and services required to operate a data center such as power, cooling, and lighting. Another potential benefit is the ability to operate a business in geographical locations previously untenable due to the cost of expanding the organization's network and general IT infrastructure—in the public cloud model the onus for global accessibility falls on the shoulders of the cloud provider.

Deployment Models: Hybrid Cloud

- A combination of two or more private, community, or public clouds
- Clouds remain distinct.
- Three use-cases:
 - Lifecycle distribution
 - Functional distribution
 - Workload distribution – aka “cloud bursting”



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Hybrid Cloud for Total Flexibility

The hybrid cloud deployment model involves two or more private, community, or public clouds that are separate entities but are bound by common technologies. These common technologies allow applications to scale, migrate, or communicate between the clouds.

Three use-cases for implementing a hybrid cloud deployment model are:

- **Lifecycle distribution:** Your organization may be developing its own application, but does not wish to own and maintain a development environment including source code control system, development platform, and other development resources. An example of the hybrid cloud model would be using resources in a public cloud to develop and test code, which is then deployed to an internal private cloud where your production environment is running.
- **Functional distribution:** Your organization may have a business process such as an insurance claim workflow where some client interaction is unregulated but for regulatory or privacy compliance part of the process needs to be strictly controlled and monitored. The hybrid cloud model allows you to take advantage of the benefits of a public SaaS cloud while ensuring regulatory compliance by protecting sensitive operations and information in your internal private cloud.

- **Workload distribution:** Also known as cloud bursting, workload distribution implies that the applications you are using in a cloud model can be scaled across multiple clouds as required. You may have a business process such as an online store that for most of the year is serviced by an internal private cloud, but for periods of peak demand needs to be supplemented with additional compute resources. By bursting to a public cloud to cater for peak demand you can minimize your organization's investment in infrastructure yet ensure sales are maximized by servicing all customers to your site.

Cloud Type Formula



Service Host	Service Owner	Tenancy Model	Cloud Type
Enterprise	Enterprise	Single tenant	Private
Enterprise	Cloud provider	Single tenant	Managed private
Cloud provider	Cloud provider	Single tenant	Virtual private
Cloud provider	Cloud provider	Multiple tenants	Public
Any	Any	Community	Community
Any	Any	Any	Hybrid

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Calculating the Cloud Type

With four basic cloud types to choose from, deciding which cloud type best meets your organization's needs requires a thorough planning. One suggested approach is to start with a private cloud that will allow you to assess if your organization can realize the benefits of cloud computing. Choosing which cloud is best suited to your needs depends upon three factors:

- **Service host:** Where will your cloud infrastructure be hosted? Internally in your own data center, in a leased data center, or in a cloud provider's data center? Regardless of the cloud service model you use (IaaS, PaaS, SaaS) there is a need for basic computing resources (CPU, memory, and storage) as well as the supporting networking, power, lighting, cooling, and other elements that comprise a modern data center.
- **Service owner:** Regardless of where the cloud infrastructure is hosted, who will own the cloud service you use? Will your organization set up its own cloud service or use that of a cloud provider? The service owner will also bear the costs of all the infrastructure underpinning the cloud as well as performing the role of service operator and ensuring service-level agreements are met (for example).
- **Tenancy model:** Do your organization's regulatory and privacy needs dictate that you are the sole tenant of the cloud, or can you share the cloud with other consumers?

The result of combining a service host, a service owner, and a tenancy model is the type of cloud that will deliver the desired characteristics:

- **Private:** Your organization hosts the cloud infrastructure, owns and manages the cloud, and is the sole consumer of the cloud.
- **Managed private:** Your organization hosts the cloud infrastructure that may actually be rented from a cloud provider. A cloud provider owns and operates the cloud, but you are the sole consumer of the cloud.
- **Virtual private:** A cloud provider externally hosts, owns, and manages the cloud, but for exclusive use by your organization.
- **Public:** A cloud provider hosts, owns, and manages the cloud for multiple cloud consumers.
- **Community:** Regardless of where the cloud service is hosted or who owns it, the community cloud type is defined purely by the fact that a community of organizations is consuming the resources of the cloud.
- **Hybrid:** Being a combination of two or more clouds, the hybrid cloud is not defined by where the cloud is located, who owns and operates it, or who is using it.

From Zero to Cloud

- Adopting a cloud model:
 - Is a business transformation, not just another IT project
 - Affects people and processes as well as technology
 - Must make life easier for administrators and end users
 - Must satisfy security and compliance requirements
 - Must be acceptable to management
- Consider starting with a private cloud before moving to any other cloud type



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Make Haste Not Speed

Adopting a cloud model will have ramifications far beyond the boundaries of your IT enterprise, and a successful transition to cloud depends upon these being established and understood early in the move to the cloud. Although the IT enterprise may be the initial driver of the move to the cloud in any given organization, the ultimate benefactors should be the business system owners and users, and they should be considered at every decision point.

The cloud model introduces new behaviors and processes for your end users to adopt, and these changes should help rather than hinder the core activities of those people. Similarly, your system and software administrators must benefit from the changes introduced by adopting the cloud—introducing an IaaS private cloud where your system administrator now has to maintain the operating systems on hundreds if not thousands of virtual machines would not be seen as beneficial by them.

Regardless of the cloud model you choose to pursue, you cannot ignore or abandon the security and compliance requirements of both your IT enterprise and your business. IT security standards must continue to be observed, as should any compliance standards you have in place for infrastructure and software configuration. Upholding business process security standards and regulatory compliance are also paramount to the success of any transformation to a cloud model.

Finally, your CIO and other upper management must find the cloud model an acceptable means of powering the business as they will most likely be the business sponsor of your cloud transformation project.

Managing Internal Stakeholders

- Enterprise architects
 - Want platform standardization in order to reduce the number of technologies
- Procurement managers
 - Want platform standardization in order to reduce the number of vendors
- Application owners
 - Want self service in order to provision systems faster
- Chief Financial Officer
 - Wants a public cloud in order to move capital expenditure to operating expenditure
- Security and risk managers
 - Want an internal private cloud to preserve data security



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Walking the Tightrope

Once you embark upon a cloud implementation project, you will find that different stakeholders perceive different benefits that can be derived from the ensuing transformation. Managing and meeting the expectations of your stakeholders may be challenging, but the success of a cloud implementation ultimately rests on its acceptance by the business sponsors. Hence, you will need to work toward satisfying each of their needs.

There are quantifiable benefits in standardization, consolidation, and self service automation. Conversely, there are quantifiable costs involved in moving any or all of your existing IT enterprise to a cloud model. You may find that it is a fine line between acceptance and rejection of a cloud model, and ultimately the benefits must outweigh the costs for you to transform your business.

To the Cloud or Not? Scenario 1

- A software development organization offers support from globally distributed centers to customers worldwide
- Support engineers are constantly requesting extra hardware to create test environments
- Customers are increasingly spread over various platforms and versions
- Should the support group move to a cloud? If so, what type and why?



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Ask Yourself ...

Who are my stakeholders?

Who stands to benefit from a cloud?

What cloud service model would be best?

What cloud type would be best?

How could I sell my chosen cloud service model and type to my stakeholders?

To the Cloud or Not? Scenario 2

- A financial services company uses a third party application that is always being customized with new product offerings.
- The cost of development licenses and maintaining the development environments is draining the IT budget.
- They want to move some development offshore but cannot justify the infrastructure expenditure.
- Should the development group move to a cloud? If so, what type and why?



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Ask Yourself ...

Who are my stakeholders?

Who stands to benefit from a cloud?

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What cloud type would be best?

How could I sell my chosen cloud service model and type to my stakeholders?

To the Cloud or Not? Scenario 3

- An online retailer has attracted more and more customers to their site through a number of marketing campaigns.
- Your next campaign will be 24 hours of exclusive deals.
- You are pretty sure that the online store can handle the load, and IT is putting a strain on your profits anyway.
- Should the online store move to a cloud? If so, what type and why?



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Ask Yourself ...

Who are my stakeholders?

Who stands to benefit from a cloud?

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What cloud type would be best?

How could I sell my chosen cloud service model and type to my stakeholders?

Summary

In this lesson, you should have learned how to:

- Describe the various cloud service models and when they are appropriate to use
- Describe the various cloud types and when they are appropriate to use
- Start thinking about transforming your business with a transition to the cloud



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