HP Cloud Service Automation

Concepts Guide

Version 3.00

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The Keys to HP CSA

Key Concepts

HP Cloud Service Automation (HP CSA) is a unique platform that orchestrates the deployment of compute and infrastructure resources, and complex multi-tier application architectures. HP CSA integrates and leverages the strengths of a hybrid cloud environment by providing the ability to design and deploy enterprise-ready cloud services, tailored to the business needs of your organization.

HP CSA works through a catalog-based subscription process. Subscribers can request and (in some cases) modify cloud service offerings with pricing and other customer-specific features pre-defined. When the request is approved through a policy-driven process, the cloud service offering is deployed through a structured lifecycle with pre-defined integration mechanisms to invoke external processes.

The Cloud Service Management Console serves to administer system access, manage cloud resources, create service designs, configure service offerings, and manage service catalogs.

Definitions

Hybrid Cloud

A type of cloud-computing that features a flexible, scalable infrastructure that can be deployed either externally or within an enterprise. HP Cloud Service Automation (HP CSA) is optimized for a hybrid cloud environment.

Enterprise-Ready Subscription

A cloud-service delivery model that can be scaled to meet the needs of an enterprise business structure, providing security, multi-tenancy, notification, and approval processes for enterprise customers.

Resource Provider

A management platform that provides either Infrastructure-as-a-Service (IaaS) or Software-as-a-Service (SaaS) to the cloud.

In today's datacenters, the timely delivery of cloud services has become an emerging business model. IT goals are increasingly driven by velocity, efficiency, and reduced time-to-market—meeting the challenge for better and faster service delivery, orchestrated through cloud automation technologies. In the world of cloud-based service delivery, quick response time, plus the ability to be flexible and agile, is the new norm.

Consider the datacenter of five or six years ago. In that slower-paced environment, physical servers were dedicated to one user or business group, with limited sharing across groups or organizations. The setup and management of the infrastructure, as well as the configuration of platforms and applications, was manually driven. Although checklists and time-based job scheduling were in widespread use, server management was, by in large, a time-consuming process. On the other side of the equation, the user experience was often quite personalized and difficult. As part of its mission, IT provided extensive user support to underlie its quality of service, including dedicated system administrators, help-desk teams, and various levels of technical support.

Contrast this with the world of cloud computing where *resources*—whether at the infrastructure, platform, or application level—are virtualized. Plus, the setup, monitoring, and ongoing management of cloud service delivery have been automated. In this new automated delivery model, IT becomes a *service broker*—in other words, the business focus returns to the customer, who selects services and controls service availability based upon business needs. The IT team enables the customer by determining a "just-in-time" delivery model to meet each customer's requirements. And because the whole delivery process is virtualized and automated, IT (as a service broker) can leverage the economies of scale that come from the shared architecture and combined efficiencies of a cloud-automation system. To achieve this, the advantages of a hybrid cloud environment with flexible service delivery models are key innovations.

Service Delivery in the Hybrid Cloud

To understand the hybrid cloud environment, let's begin by looking at two service delivery models in today's cloud computing landscape.

Private Cloud

An environment where cloud applications are deployed entirely on-premise, operating behind an organization's perimeter and deployed upon its proprietary infrastructure.

Public Cloud

An environment where cloud applications are owned by one or more public service providers (such as HP Cloud Services, Amazon, or Google) and accessed on a fee-basis by individuals or organizations.

Between these two opposites a rich opportunity exists for resource optimization and service-delivery integration—what is sometimes referred to as *hybrid cloud computing*. A hybrid cloud takes the best from both worlds. As its name implies, this type of cloud-computing environment features a flexible, scalable infrastructure that can be deployed on either side of the firewall. For instance, you can purchase compute services, such as Amazon EC2, from an external provider. While tapping into the public cloud, you still have the flexibility and safety of launching mission-critical applications, such as payroll or financial applications, from behind your company firewall.

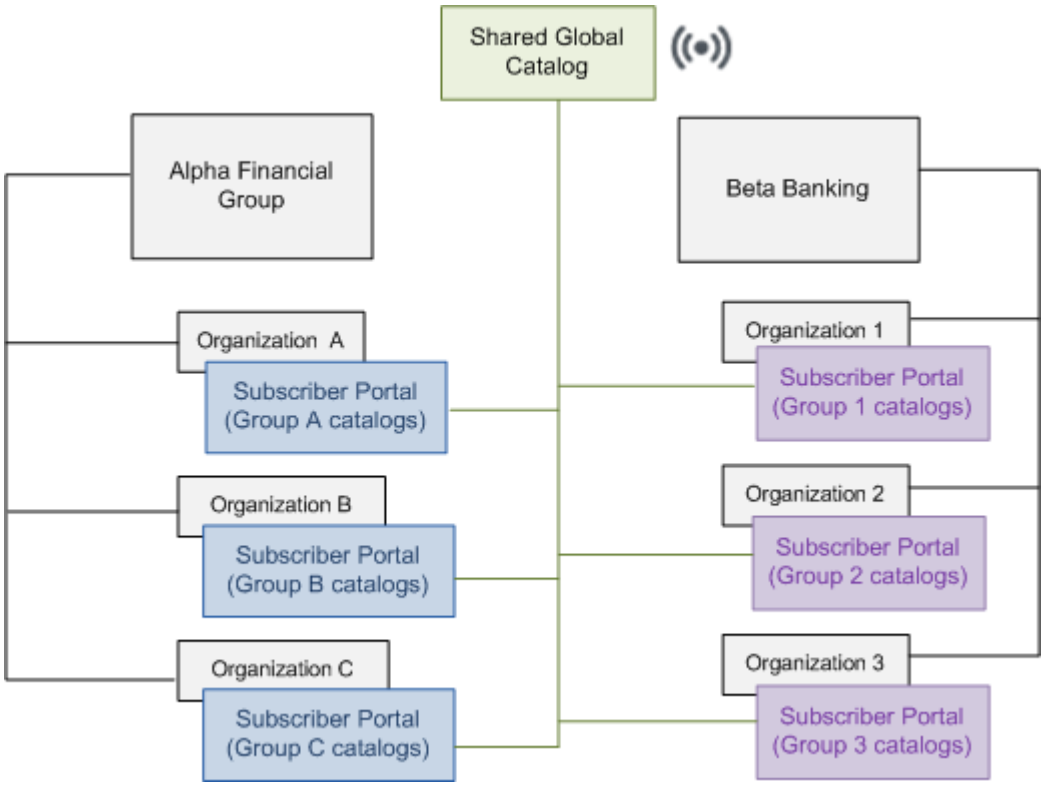
HP Cloud Service Automation (HP CSA) has been designed for optimum service delivery in a hybrid cloud environment. The sections below show a few of the ways that HP CSA helps you achieve flexible, on-time, and on-budget service delivery to your customers.

Enterprise-Ready Subscription

HP CSA Cloud Subscriber Portal delivers a cloud-service catalog to customers through an innovative design that is *enterprise-ready*; in other words, a dedicated instance of the Subscriber Portal can be available per organization across any enterprise. The users in each organization order services tailored specifically to their needs, and unless they have proper authorization, cannot access the service catalogs that belong to any other organization. For example, if Alpha Financial Group Organization A shares cloud-service delivery with Alpha Organizations B and C, each organization within the enterprise has (by default) its own, customizable instance of the Subscriber Portal with one or more service catalogs. On a larger scale, Alpha Financial Group can share cloud service delivery with Beta Banking, with each enterprise having a secure window into the infrastructure and software necessary for a building a hybrid cloud.

In addition to catalogs per organization, HP CSA provides a single, global shared catalog, as indicated by the icon on the left. Any changes and additions made to the global shared catalog can be seen in all the other catalogs, as shown in Figure 1.

Figure 1: Example Organizational Structure

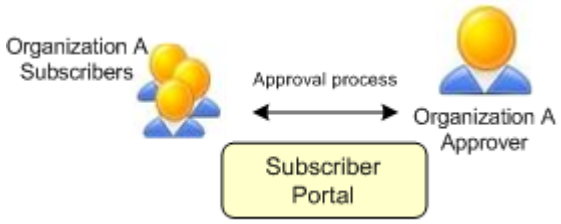


For enterprise business users or **Subscribers**, service delivery is cleanly divided into two phases: *request* and *subscription*. For instance, Bob (Subscriber) places a request for a cloud-service subscription—say, a financial application that runs within his corporation's data center at Alpha Financial. According to company policy, this type of request must go through a notification and approval process, which HP CSA manages through one of three pre-defined approval templates:

- Named Approver Template -- Assigns one or more users from the organization to approve all subscription requests.
- User Context Template – Generates an approval path based on Lightweight Directory Access Protocol (LDAP) membership settings and directory structure.
- Delegated Template – Provides a pathway for third-party approvals through communication with HP Operations Orchestration.

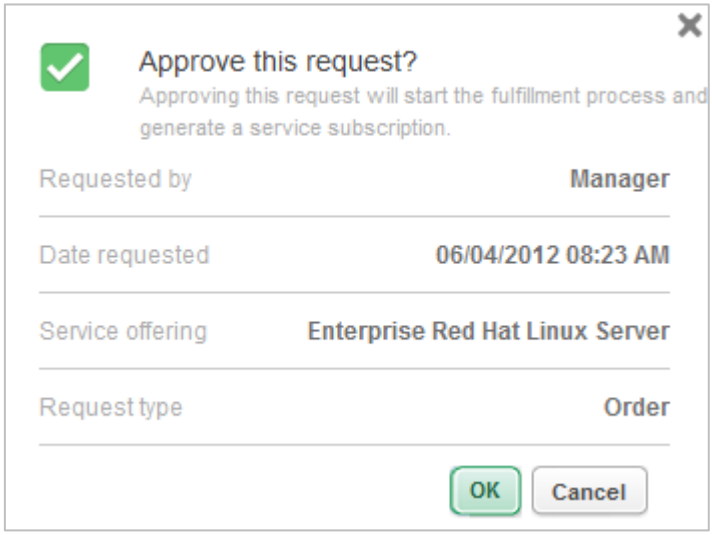
In this case, Bob's request requires the approval of Shelley, Bob's immediate manager (per LDAP lookup). After Shelley approves the request, the service subscription begins. From Bob's standpoint, it's as if he has subscribed to a magazine, which is now being delivered to him. He begins to incur subscription costs with limited ability to modify subscription options. For example, having initially selected a Microsoft SQL Server database for his financial service offering, Bob may not be able to request an upgrade to an Oracle 11g database (which would increase overall cost). For options that *can* be changed, requests for modification are routed through the same approval process as the initial request. For instance, Bob may have requested service availability beginning on November 1 and ending on December 30. Perhaps he wants to change the end date to June 30. Like the initial request, this request for modification would be routed for approval to Bob's manager. If approved, HP CSA would automatically cancel the service and return all resources on June 30—the date that Bob requested.

The approval workflow within the Subscriber portal requires these dedicated *user roles*.[1]



Approvers authorize service requests according to one of the pre-determined approval methods shipped with HP CSA. An approval process is recommended, but not required.

Subscribers (HP CSA users) select services from the catalog listing, making a *service request* that (when approved) becomes a *subscription*. Subscribers have limited options to modify subscriptions after they have been fulfilled.

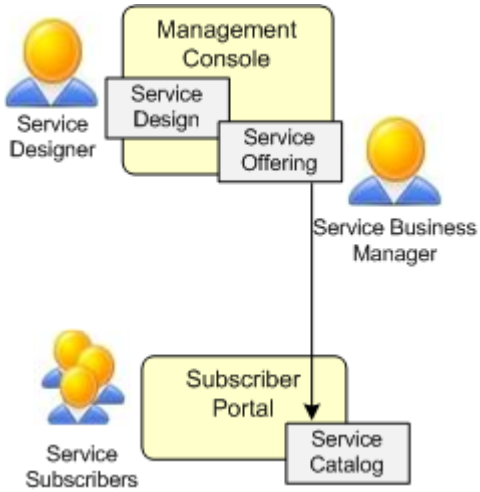


[1] The term "user roles" refers to dedicated HP CSA job responsibilities that have been assigned to a group or organizational unit. Depending on business needs, a correspondence can exist between individuals and user roles—for example, dedicated Service Designers, who have no other roles. Or a group can take several user roles—for example, Service Designers can also be Business Managers. User roles are defined under Administration tab of the HP CSA Management Console.

Service Designs and Service Offerings

HP CSA features a built-in design and administration interface called the *HP CSA Cloud Service Management Console*. In addition to handling resource management, service delivery, catalog management and other administration tasks, the Management Console handles the process of creating and maintaining *service designs*, which provide the basis for orderable services.

Before going into details, let's consider the fundamentals of this process.



A cloud service begins life as a *service design* created by the **Service Designer**—a skilled architect who uses the Management Console. A service design contains a hierarchy of *service components*, basic building blocks with all the information and restrictions necessary to deploy a service.

When the service design process is complete, the **Service Business Manager**—a designated "controller" user role—can create a *service offering* based on the service design. To make a *service design* into a service offering, the Service Business Manager uses the Management Console to add pricing, logos or other images, and other specific information required for subscription. The Service Business Manager also has the final say over what service options are exposed to the Subscriber, and whether or not options can be modified. And this user role decides what service offerings are available per organization across the enterprise.

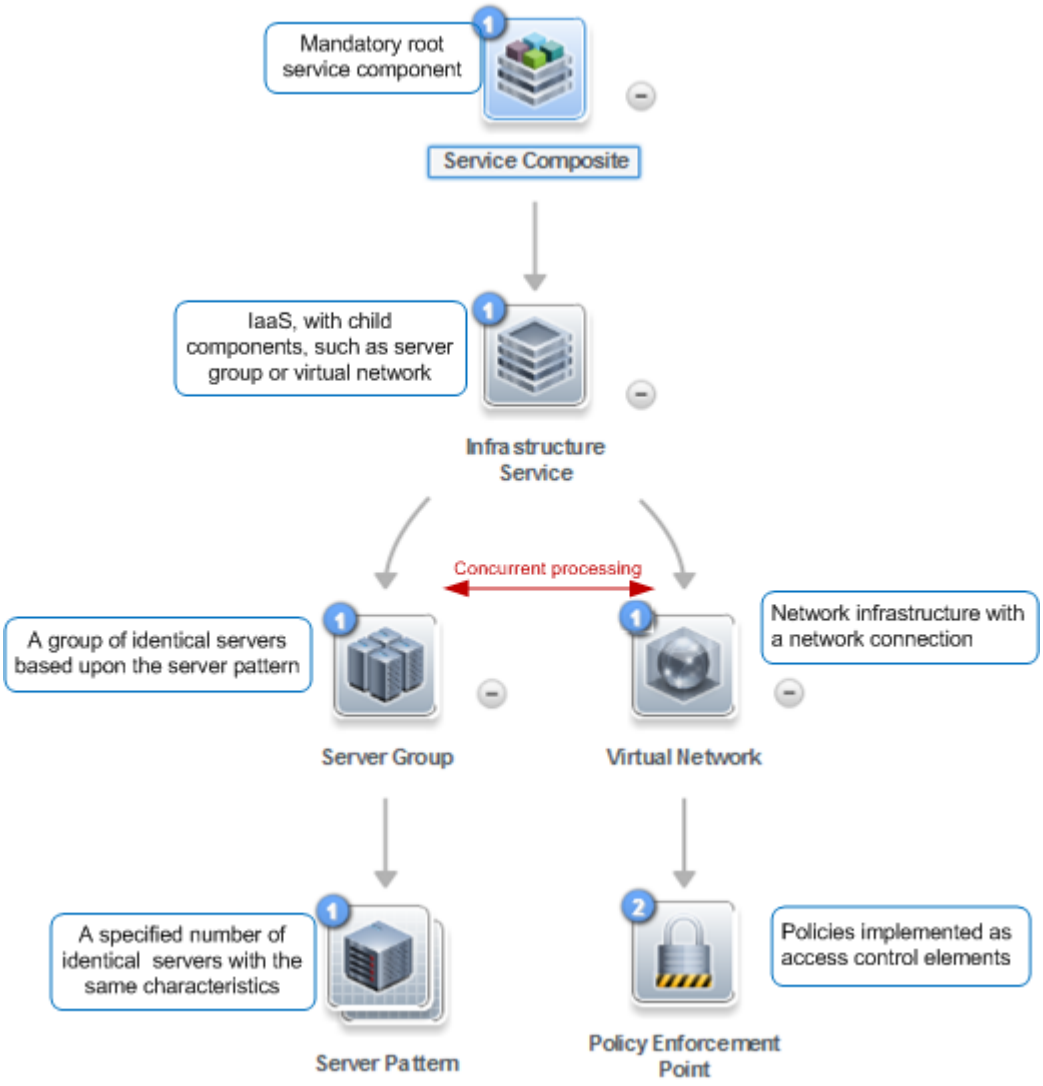
Finally, Subscribers (end users) select services from the catalog listing, making a service request that (when approved) becomes a subscription.

Designing Services

From the Designer's point of view, each service design has several important parts.

Service components	The building blocks of a service design. Service components offer a framework to define and sequence actions necessary to broker resource management. The Service Designer uses a graphical interface in the Service Management Console to designate the components of a service. Components are arranged hierarchically according to component relationships; for example, an infrastructure service (parent component) may contain one or more server groups (child components). Figure 2 shows an example hierarchy of service components. Note that the mandatory *root* component type is called the *service composite*. Service components can be defined according to the needs of your organization; however, out-of-the-box service component types, such as an infrastructure service, a network connection, or application service, are provided with HP CSA.
Resource bindings	Elements of a service design used to assign or *bind* types of resource providers and resource offerings to a service component.
Lifecycle actions	References to internal or external process definitions, which perform the specified actions, such as *initializing*, *reserving*, or *deploying*. Lifecycle actions apply to the following: • Service components – Lifecycle actions are used to provision or de-provision service components. • Resource offerings – Lifecycle actions are used to provision or de-provision infrastructure resources. • Resource bindings – Lifecycle actions are used for resource provider selection.
Custom properties	Optional, user-defined values that are used to specify information to HP Operations Orchestration during service or resource provisioning, or alternatively, to pass various internal variables within HP CSA. For example, an HP OO flow can read and write property values during service provisioning.
Subscriber options	Elements of a service design used to provide the options that may be shown to the Subscriber (end user) in the Subscriber Portal. Subscriber options can be designated as non-selectable (view-only) or available for editing and modification, depending on the needs of the business.

Figure 2: An Example Hierarchy of Service Components



The service component model shown above builds an *automation sequencing topology* that includes the lifecycle of a service and the lifecycles of each service component. We will go into the lifecycle process in detail later (page 15). For now, the following concepts are important:

First, an individual service component (such as the infrastructure service component shown above) can contain lifecycle actions and custom properties. *Actions* can be attached to service components, so as to execute during a specific lifecycle phase; or they can be attached to a resource offering to manage a resource through the entire service subscription lifecycle, eventually deploying or retiring the infrastructure, software, and other resources required for the cloud service.

Second, the lifecycle process executes hierarchically. At the highest or "macro" level, the lifecycle engine provisions the entire service; however, at the lower or "micro" level, each service component has individual lifecycle processes, which coordinate with the whole. In this "wheels within wheels" context, service components have a specific processing order, which you can configure. The numerals in the illustration above indicate the *order* in which the processing of each lifecycle component is initiated in relation to its peer.

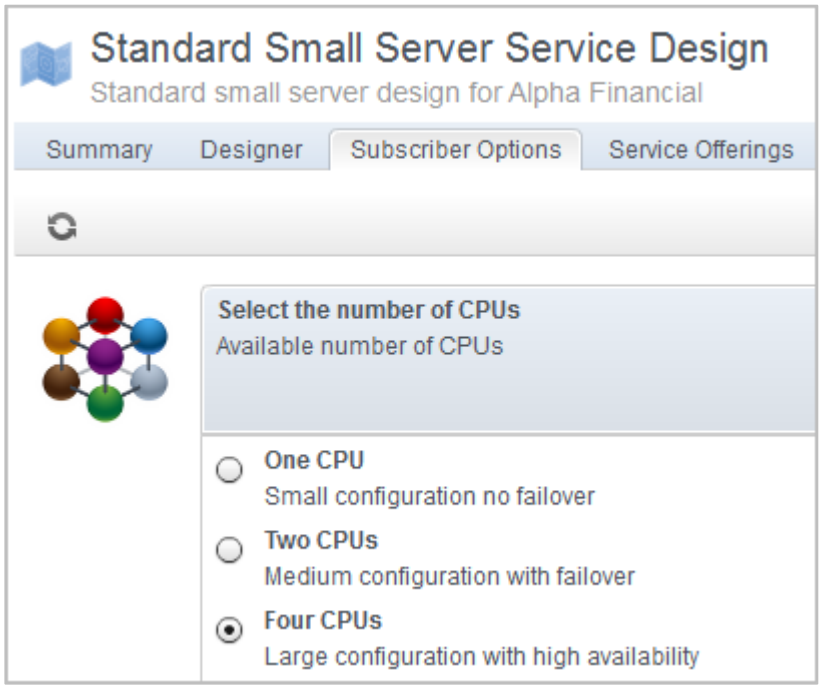
Within the larger context of service delivery, the Service Designer creates a database of designs, which can be stored, reused, cloned, or modified. For example, a Service Designer at Alpha Financial could create a reusable design called *Standard Small Server*, which deploys virtual machines (VMs) running in a Linux operating environment. This design could include each of the components shown above with links (via resource bindings) to the resource providers that make the service run.

Designing Service Offerings

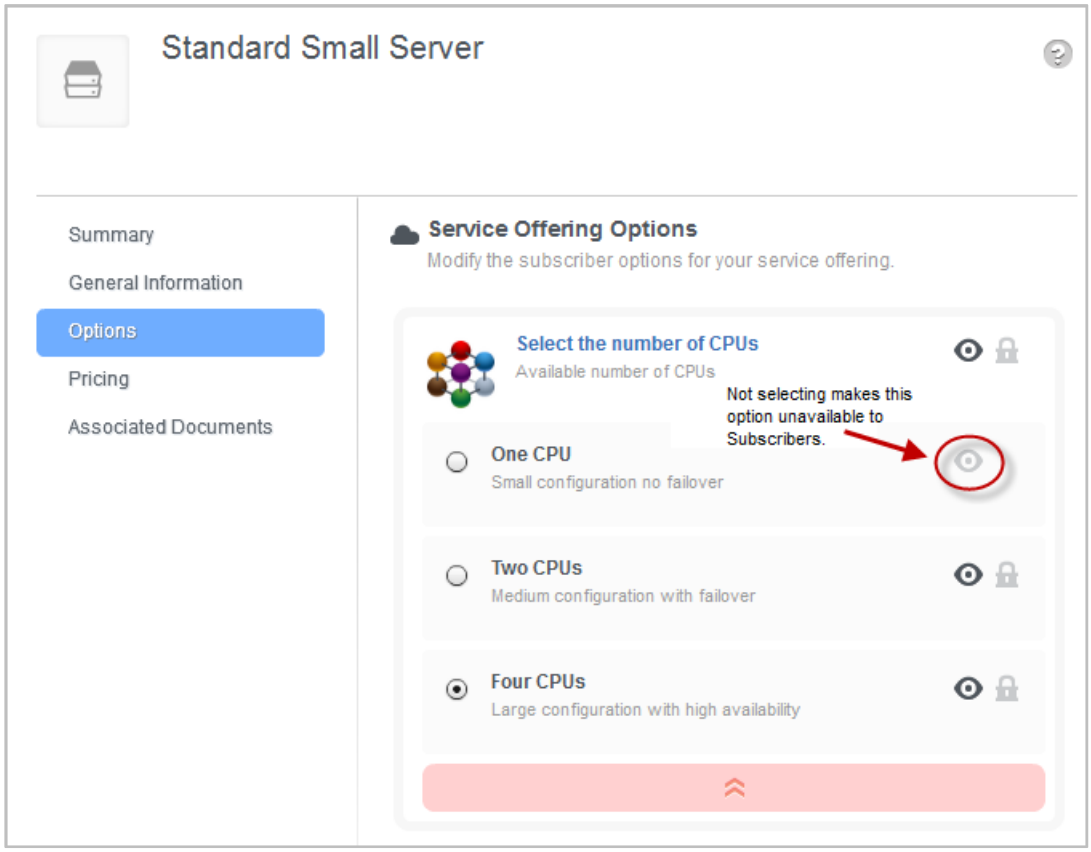
When further refined and customized by the Service Business Manager, a service design forms the basis of a service *offering*. To better understand this process, let's return to our example. As previously mentioned, the Service Designer develops a design called *Standard Small Server,* creating a hierarchical set of service components, together with resource bindings, lifecycle actions, and associated properties. The Service Designer also specifies subscriber options, such as the number of CPUs, memory, hard drive, processor, and database, to be associated with the service design.

When the *Standard Small Server* design is enabled, the Service Business Manager takes ownership. This user role associates various price points with the service depending on the type of systems to be ordered, and optionally attaches a logo and associated documents (such as a PDF) to the service. Most importantly, the Service Business Manager makes the final determination as to which options are viewable in the service catalog and whether these options can be edited, and later modified, by the Subscriber.

For example, suppose our example service is to be made available exclusively to Alpha Financial Organization A. The Service Designer has created a design with subscriber options for one, two, or four CPUs, shown below.



According to the Service Level Agreement (SLA), Organization A must have high availability for all servers, so the Service Business Manager restricts the original design, designating that the service offering has a selectable option of two or four CPUs only, as shown below.



Furthermore, the SLA for Organization A requires that users be able to modify the service offering after the service has been deployed by reducing or increasing the number of CPUs. Modification applies globally to all compute resources in the service; in other words, if the Subscriber modifies the number of CPUs from two to four, the number of CPUs for all servers increases. And if flex capability has been previously added as a service option, the Service Business Manager can make a *flex option* available, so that when a demand threshold is surpassed, infrastructure resources increase—or decrease when demand lessens.

From design to subscription, the whole process is honed to automate the timely delivery of services to customers. Each service is increasingly refined to pinpoint delivery options and to add administrative detail. For instance, the Service Business Manager could list the *Standard Small Server* offering at different price points depending on the number of CPUs, with links to a PDF with pricing details. If the associated service design supports it, options like weekly or monthly backup could be added at an additional cost, each with its own recurring service fee. Alternatively, the Business Manager could decide *not* to allow the Subscriber to change underlying characteristics at all after initial subscription—for example, service offerings could simply be distinguished as *small*, *medium*, and *large,* with details in "read-only" format.

Managing Resource Providers

From the Subscriber`s viewpoint, the delivery of cloud services is a "push-button" affair, with an initial request resulting in a subscription of a pre-determined cost and duration. Underlying this catalog-based ordering system are powerful automated-management programs, called *resource providers*.

Resource providers are associated with the tasks that need to be accomplished to deliver cloud services. For example, *compute* resource providers furnish infrastructure resources to the cloud. They can run hundreds of virtual machines simultaneously, so that physical servers can be used at optimal capacity across the datacenter. In HP CSA, compute resource providers include *HP CloudSystem Matrix with the HP Matrix Operating Environment (Matrix OE),* which delivers Infrastructure-as-a-Service (IaaS) solutions for private and hybrid cloud environments.

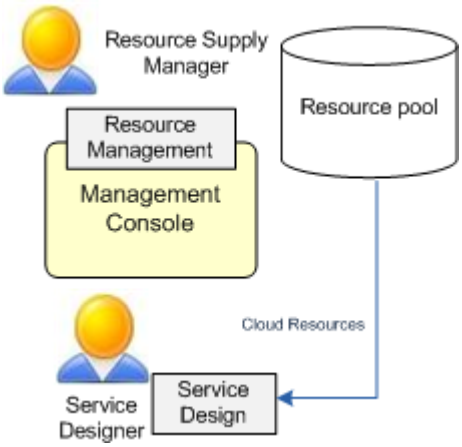
In the same way that compute resource providers furnish IaaS capability to the cloud, *application providers* deliver Software-as-a-Service (SaaS) capability. For example, Alpha Financial could select a payroll or financial application as an integral part of a new service offering, adding other resources for monitoring, networking, and database capability, as required.

In HP CSA, resource provider management is based on a sophisticated selection processes. Resources are identified by type, and then grouped by category and (optionally) into environments.

For example, you can have a resource category of "infrastructure" with a provider type of HP CloudSystem Matrix. Furthermore, you can divide resources into environments, which can be linked to a service catalog. For example, a specific instance of HP CloudSystem Matrix can be part of a group of resource providers for the Asia-Pacific division of Alpha Financial (Alpha AP). When creating a service catalog, you can specify that this resource environment is used to provision the service. Or you can set up a resource environment for the European division of Alpha Financial (Alpha AMEA) to filter on the associated list of resource providers available in that geography.

In HP CSA, resource providers are fully extensible—in other words, the list of available providers is not limited by out-of-the-box support, but can be extended or customized according to the needs of your organization. Integrated resource providers include the following:

- *HP Server Automation*, which deploys operating systems and policies to managed devices, and optionally, controls application deployment through Application Deployment Manager (ADM).
- *HP SiteScope*, which monitors servers, storage, and other managed devices.
- *HP Universal CMDB*, which maintains accurate, up-to-date information regarding the relationships between infrastructure, applications, and cloud services.
- *HP CloudSystem Matrix with the HP Matrix Operating Environment (Matrix OE)*, which delivers Infrastructure-as-a-Service (IaaS) solutions for private and hybrid cloud environments.



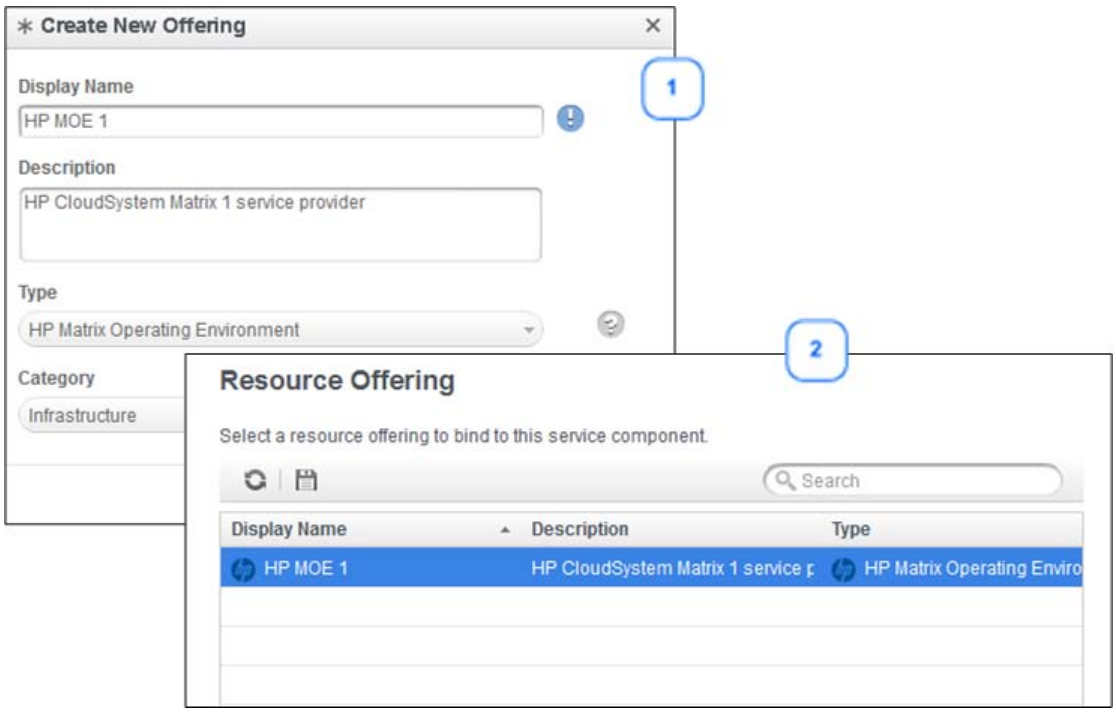
The **Resource Supply Manager** coordinates resource capacity and utilization. This user role also has the important task of introducing new resources into the system. For example, if a resource provider team, such as HP CloudSystem Matrix administration, develops a new template, the Resource Supply Manager can decide to place that template into a resource offering, which make it available for incorporation into CSA service designs.

The Resource Supply Manager uses the Service Management Console to make new resources available to **Service Designers**. These resources can then be incorporated into service designs.

The Resource Supply Manager administers resource providers by defining a *resource offering*. A resource offering associates resource providers with a service design when provisioning takes place. A resource offering can also contain a reusable, importable collection of actions that manages the lifecycle of the provider resource. Here's a simplified scenario:

- The Resource Supply Manager first creates a resource offering—for example an HP CloudSystem Matrix resource offering called HP MOE 1—then associates the resource offering with one or more resource providers used to provision the service—in this case a Matrix OE resource provider.
- The Service Designer selects the HP MOE 1 resource offering when designing the *Standard Small Server* service. After the resource offering is associated with a component in the service design, the provisioning of compute resources can take place.

The screen illustration below shows this process at work with dialogs to 1 create a resource offering and 2 associate this offering with a service design. To accomplish, the Service Designer selects the service component, creates a resource binding, selects a resource category, and then binds the resource offering to the service component. For more information about the resource providers supported by the current version of HP CSA, see the *HP Cloud Service Automation Solution and Software Support Matrix*.



HP CSA Administration

To keep things running smoothly, the HP CSA solution requires an overall administration strategy. User roles for administrators reflect the basic setup of organizational privileges and permissions throughout the system.

CSA Administrator

This user's main task is to assign and maintain primary user roles within the overall provider organization and to set up consumer organizations across the enterprise. The CSA Administrator has access to all function in the Cloud Service Management Console.

Consumer Service Administrator

This user's main task is to administer consumer organizations, which have been initially created by the CSA Administrator. The Consumer Service Administrator *only* has access to the Administration tab of the Management Console.

Before we explore the contrasting tasks of these two administrative user roles, it is important to understand what the concept of *organization* means in HP CSA.

About HP CSA Organizations

Provider organization icon

In HP CSA, you can configure two types of organizations; like much else, the organizational structure is a set of programmatically defined relationships.

A *provider organization* is the foundation of the structure—one provider organization exists per instance of HP CSA and is automatically configured at initial login to the Management Console. Membership in the provider organization enables an administrator to create and manage *consumer organizations*, and to manage cloud resources and services, including those offered by third-party or public clouds. Consequently, the following user roles can be configured with appropriate access rights to a provider organization: Service Designer, Service Business Manager, Resource Supply Manager, and Consumer Service Administrator. The provider organization is managed by the CSA Administrator. In the Service Management Console, an icon designates a provider organization, as shown on the left.

Consumer organizations are associated with a provider organization; they furnish enterprise-ready access to HP CSA. Members of a consumer organization use the Subscriber Portal to access services and resources available *only* through their consumer organization. (Access to other organizations is by permission only.) Each consumer organization is managed by the Consumer Service Administrator and the CSA Administrator.

When subscribers log in, LDAP authenticates login credentials and verifies the appropriate role through group membership. LDAP directories must be pre-configured for the access process to function correctly in HP CSA

Both provider organizations and consumer organizations are configured and maintained through the HP CSA Management Console. The lists below compare tasks done by the CSA Administrator to tasks done by the Consumer Service Administrator.

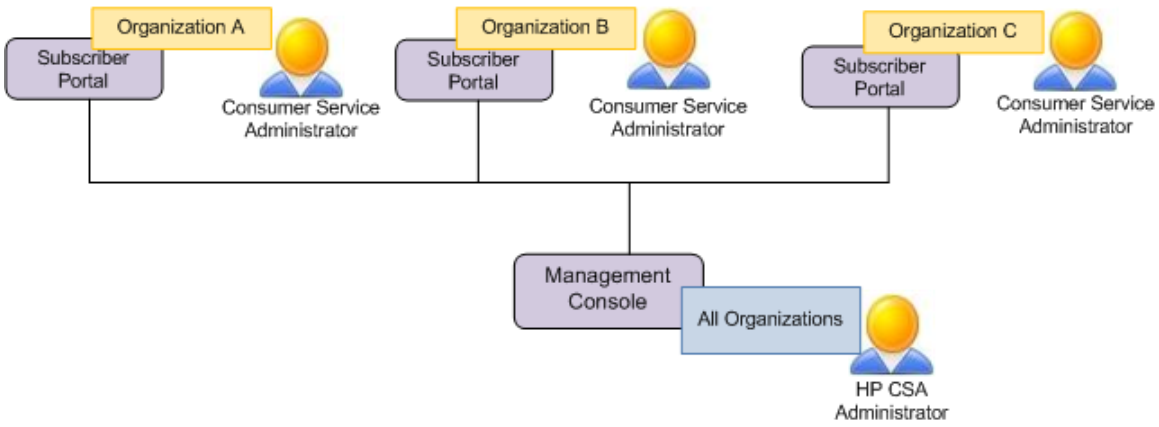
CSA Administrator

- Initiates set up of consumer organizations.
- Initiates the assignment of the key user roles required to access the Management Console.
- Accesses all of HP CSA functionality.
- Provides assistance for Consumer Service Administrators or other users of the Service Management Console.

Consumer Service Administrator

- Customizes the consumer organization name and logo, as displayed in the Management Console and the Subscriber Portal.
- Customizes the login screen of the Subscriber Portal.
- Configures LDAP authentication to access information in HP CSA.
- Assigns group members and grants authorization per organization.
- Configures the SMTP server to send email notifications.

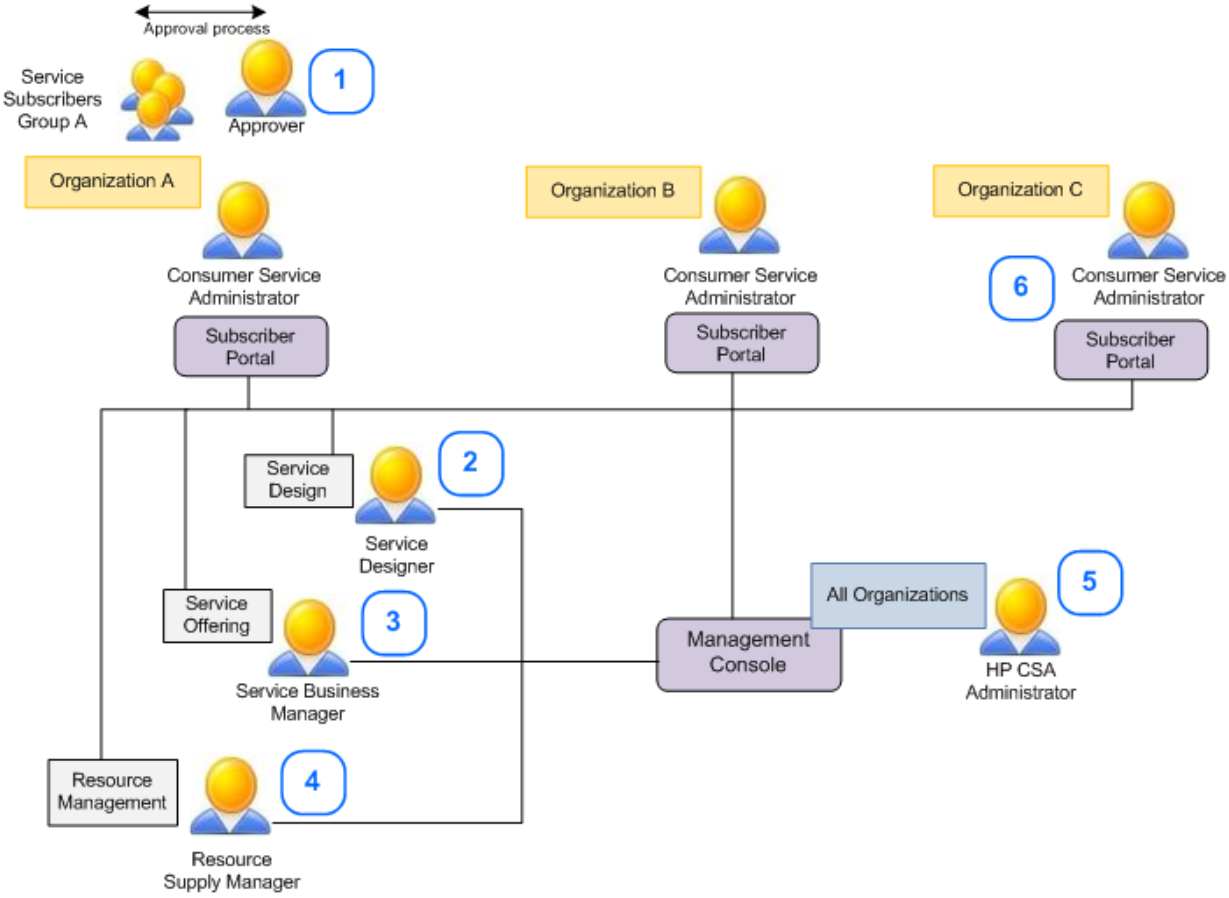
These two types of administrative user roles work to together to provide enterprise-ready system access according to the needs of your business. For example, service administration can be configured so that one consumer service administrator has access to all organizations within an enterprise. Or each organization can have its own service administrator, or any combination in between. The graphic below shows a possible design for a large enterprise installation with a diverse (and perhaps geographically dispersed) set of organizations.



Putting IT All Together

HP CSA has a complex, automated service lifecycle requiring installation and maintenance of important software and infrastructure components; however, in many ways, successful implementation of HP CSA depends upon people—expert designers and administrators within your organization who work in partnership to deliver cloud services across the enterprise. Figure 3 summarizes the user roles that are shipped out-of-the box with HP CSA.

Figure 3: Summary of User Roles



1 Cloud service delivery begins when the Subscriber (end user) makes a request using a catalog in the HP CSA Subscriber Portal. This request may be changed or later modified depending on pre-defined subscriber options. All subscriptions and subsequent modifications go through an approval process, as defined by your organization.

2 For cloud service delivery to take place, the Service Designer first creates a *service design,* using the Cloud Service Management Console to define the components that make up a service.

3 When the service design process is complete, the Service Business Manager uses the Cloud Service Management Console to change the service design into a service offering, adding pricing, logos or other images, and other specific information required for subscription. This user role also controls what service options are available to the Subscriber and how they are presented.

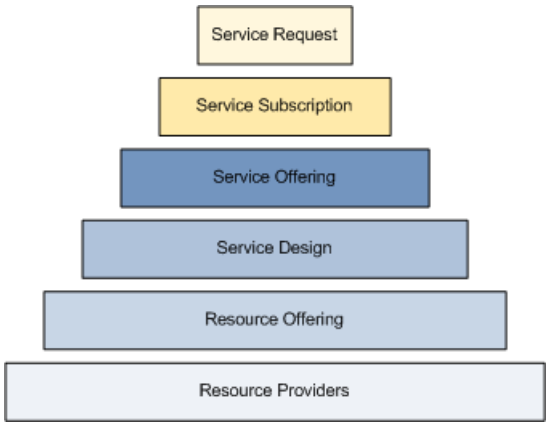
4 The Resource Supply Manager contributes to the service delivery by creating resource offerings, which associate resource providers (such as VMware VCenter or HP CloudSystem Matrix) with a service design, so that provisioning can take place.

5 The CSA Administrator initiates the set up of consumer organizations and the assignment of user roles in the Management Console. This user role has access to all system function.

6 The Consumer Service Administrator maintains and manages consumer organizations that have been previously defined by the CSA Administrator. This user role has access to the Administration tab in the Management Console.

The Service Lifecycle

When HP CSA receives an approved service request, a sophisticated provisioning process called the **Service Lifecycle** begins. This process is aptly named because it touches upon all aspects of service delivery from the moment the service is initiated until the time that the service is no longer needed and resources are freed for other use. The service lifecycle is executed programmatically with management and communications accomplished through the basic building blocks described below:



(1) When an approved request is received by HP CSA, the system matches the *service request* with a *service offering*, creating a *service subscription*—an instance of a service offering as requested by the subscriber.

(2) The service offering contains *service components* defined by an associated *service design*.

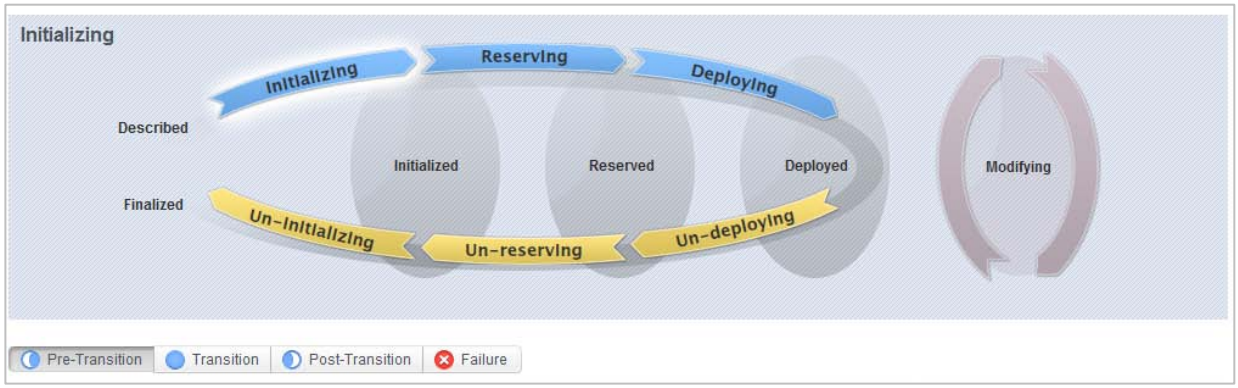
(3) Service components have *lifecycle actions* mapped to them. For example, you could specify a lifecycle action to add extra disk space to a server group component. Or you could specify lifecycle actions to send email notification after each infrastructure component has been deployed.

(4) The service design uses a *resource binding* to call a *resource offering*. Like service components, resource offerings contain lifecycle actions—in this case, a set of actions for provisioning and managing a service provider over the lifetime of the service. For example, you could specify a lifecycle action to stop and start the provider service after an application has been installed.

At both the service design and the resource level, lifecycle actions contribute to the initial deployment of the service, communicating with the service provider through HP Operations Orchestration (HP OO) flows. Lifecycle actions also provide other important functions, such as actions required to modify the service upon request or actions required to remove the service from deployment.

The lifecycle actions are executed programmatically during *lifecycle states*, as shown in Figure 4. These states can be stable states, transitional states, or modifying state. For example, *deploying* is a transitional state, including both pre-transition and post-transition sub-states. By contrast, *Deployed* is a stable state, indicating that the deployment activity has been accomplished. Lifecycle actions must map to a transitional state or modifying state. Figure 4 shows the transitional states and the stable states supported by HP CSA. The *modifying state* is shown to the right of the others, indicating that a Subscriber has chosen to modify a subscription and that the changes are being processed by the lifecycle engine.

Figure 4: The Lifecycle Process



Transitional States	Stable States
Initializing	Described - lifecycle actions cannot be specified at this state
Reserving	Initialized
Deploying	Reserved
Un-deploying	Deployed
Un-reserving	Finalized - lifecycle actions cannot be specified at this state
Un-initializing	

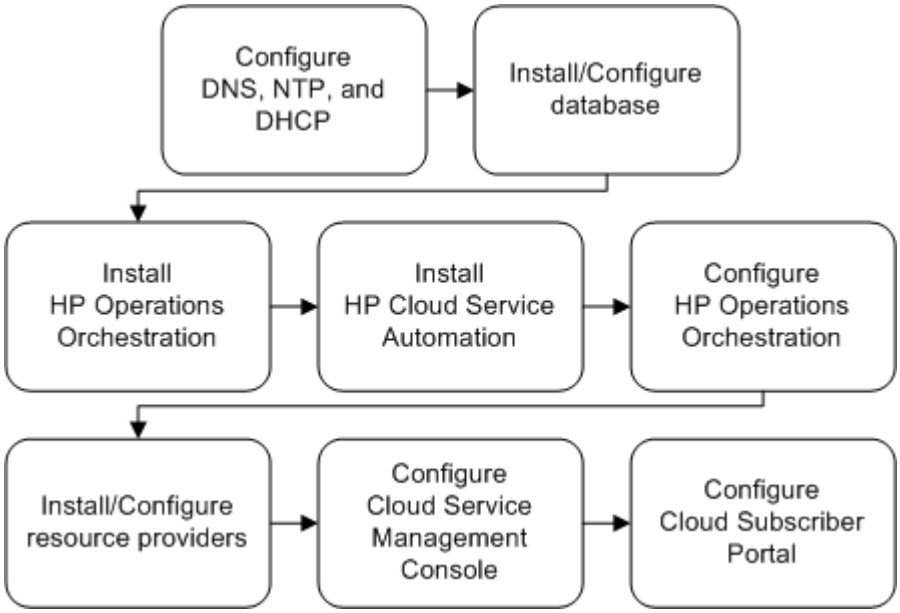
Lifecycle actions are mapped to lifecycle states in the Service Management Console. Mapping can be correlated with a service design or during the development of resource offerings. For example, the Deployed lifecycle state includes the following commonly used lifecycle actions:

- Start/stop a server
- Send email notification
- Deploy a server
- Deploy an application
- Configure monitoring
- Add to Universal CMDB

Deploying HP CSA

HP CSA deployment services are provided by the HP Professional Services Organization. Deployment activities must be closely coordinated with on-site personnel, including set up for basic network and storage function, and server installation for the HP CSA foundation and its component products.

The diagram below shows the sequence of installation activities for HP CSA. For more information about HP Professional Services or to plan for HP CSA deployment, contact your HP representative. For installation and configuration procedures for HP CSA, refer to the *HP Cloud Services Automation Installation and Configuration Guide*.



Customizing and Extending HP CSA

To integrate into business processes across an enterprise, HP CSA must be agile, extensible, and highly customizable. In fact, almost every "container" object or entity in HP CSA can be customized to some degree. Here are a few of the ways you can extend out-of-the-box HP CSA features to meet the needs of your organization.

Import and Export

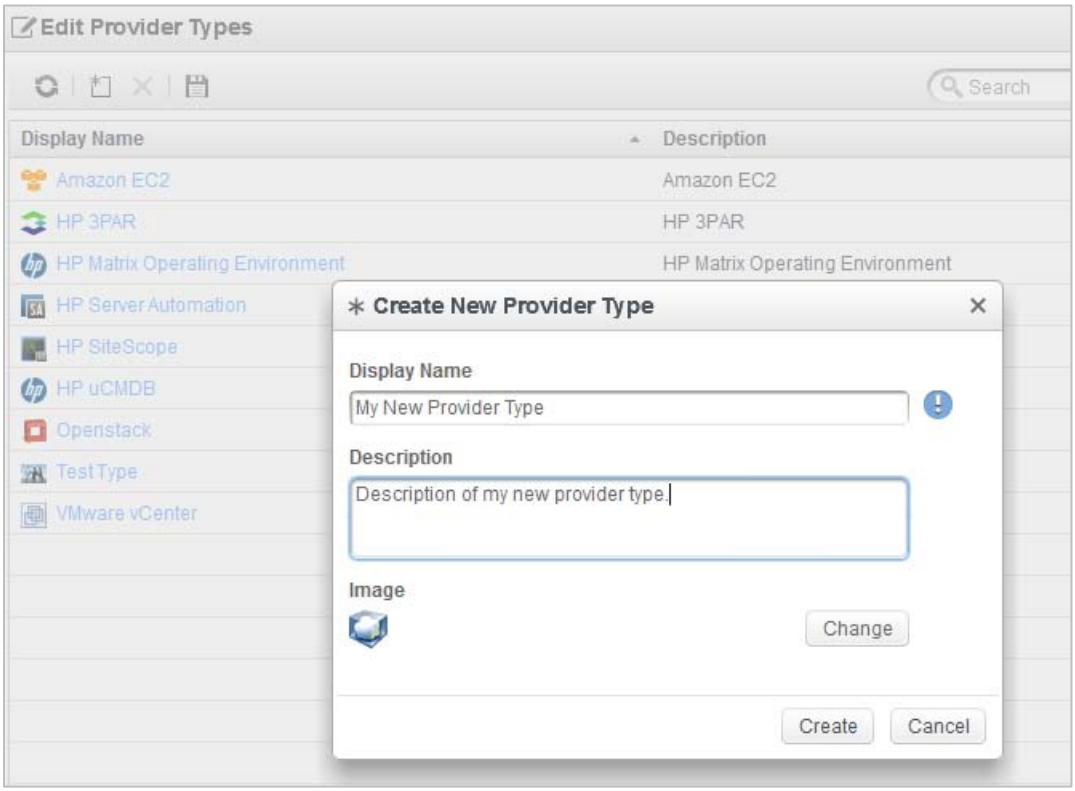
To expedite enterprise-ready service delivery, you can import and export service designs and resource offerings among running instances of HP CSA. You do this from the Service Management Console. To successfully prepare for import/export, you must include all lifecycle information necessary with the target service design or resource offering. For example, if you import a service design, you must also import resource offerings associated with the design. In addition, for the import/export function to work correctly, you must first synchronize HP CSA with HP Operations Orchestration (HP OO) to include all HP OO process definitions referenced by HP CSA.

Extending Resource Management Capability

In this version of HP CSA, resource management has been *externalized*. In other words, HP CSA no longer selects among a static list of resource providers and provider types. Therefore, you can extend out-of-the-box resource management to meet the needs of your organization because provider selection is not hardcoded into the system.

Create a Provider Type

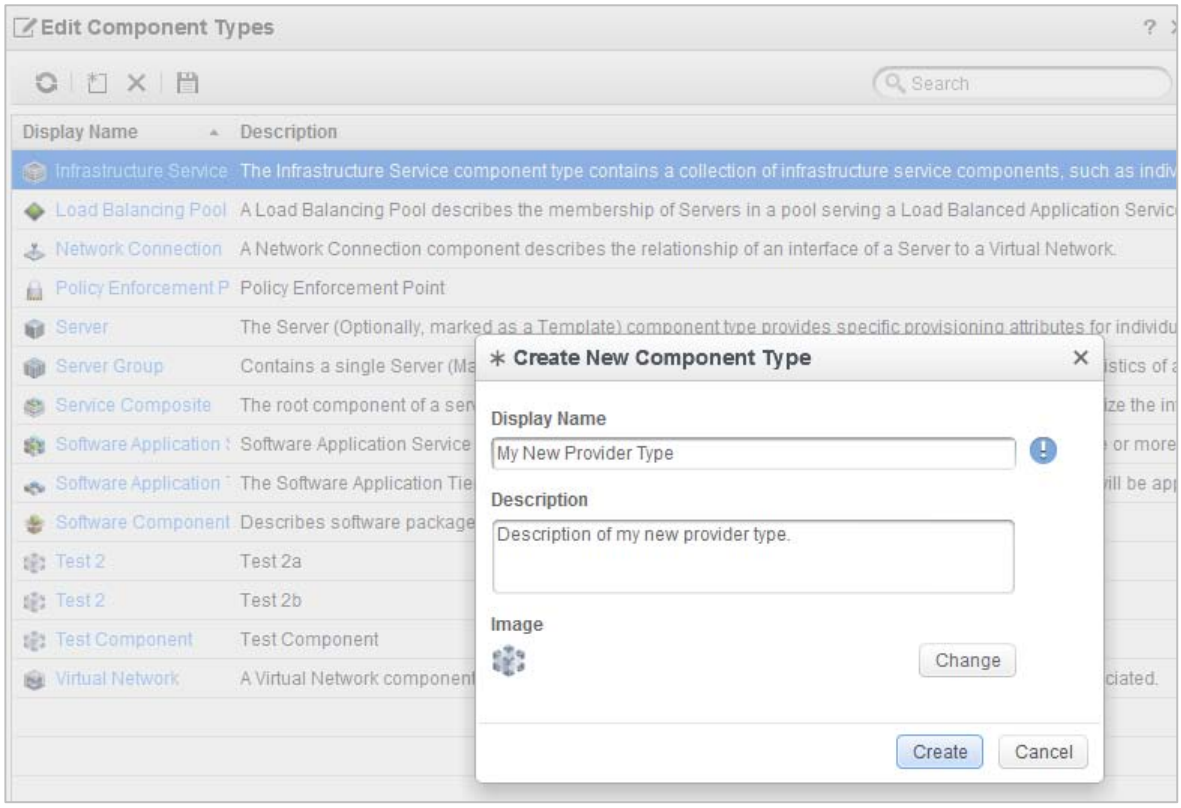
You use the Service Management Console to create new types of providers. For instance, you want to add a provider type for database provisioning—say HP Database and Middleware Automation (HP DMA). To do this, you use the Management Console to create a provider type, populating this new type with service providers, such as specific HP DMA servers. Then you create resource offerings with a category—database—that can be filtered to be visible to certain service components.



Create a Component Type

In the same way that resource providers are associated with provider types, service components are associated with component types. Component types are subdivided into *supported categories*, which can be used to filter the resource offerings attached to the component. For example, the out-of-the-box Server Group component type includes Compute as a supported category, which indicates that resource offerings with the category of Compute can be assigned to Server Group service components.

You use the Management Console to create a new component type, as shown below.

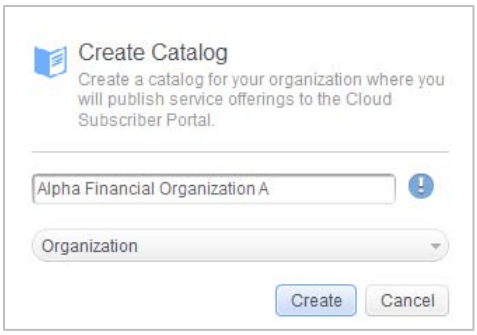


Create a Customized Lifecycle Action

You use the Management Console to create lifecycle actions for both service components and resource offerings. For example, perhaps you want to email notification to inform you when a new service provider, such as HP DMA, comes online. You add the appropriate lifecycle action to the service design to trigger the notification process, first making sure synchronization with HP OO is in place, so that the service design generates the correct calls to HP OO flows. Then you edit the service component to create and associate the new lifecycle action.

Create a Service Catalog

As previously described (page 13), the CSA Administrator creates *organizations* across an enterprise, each having a customized instance of the Subscriber Portal. Although you can have only one Global Shared Catalog (cross-organizational), you can create multiple service catalogs per organization, each with a different selection of service offerings. Like the customizations above, this is done using the Management Console, which by default creates a service catalog whenever you launch a new organization. For each catalog in an organization, you can associate the required approval process, access control policy, and catalog image.



Sample Service Designs and Resource Offerings

HP CSA is shipped with service designs and resource offerings developed for specific applications by HP or third-party organizations. You can import and export this "content". You can then adapt these service designs to your own business needs, creating service offerings tailored for your customers.

The out-of-the-box content shipped with each version of HP CSA is stored in a library folder on the HP CSA media. Content includes sample HP CSA service designs and resources offerings, and sample HP Operations Orchestration flows. For more sample services designs and sample resource offerings, see your HP Professional Services Representative.

The HP CSA Application Program Interface

A new set of Application Program Interface (API) calls underlie HP CSA functionality. These REST APIs have been designed to be stand-alone, resulting in a clean separation of Subscriber Portal function from the Management Console function. Therefore, organizations can build their own catalogs and subscription mechanisms on top of HP CSA, replacing the Subscriber Portal according to business needs.

Partner with HP Professional Services

To learn more about extending and customizing HP CSA, contact the HP Professional Services Organization. HP Professional Services provides initial on-site deployment, working closely with your IT personnel. In addition, HP Professional Services can help integrate HP CSA into your existing business processes, developing customized solutions that meet the needs of your organization. For more information about HP Professional Services or to plan for HP CSA deployment, contact your HP representative.

HP CSA Feature Matrix

Table 1: Service Subscription

User Role	Task	How to...
Service Subscribers (end users)	Request a service offering.	Use the **Catalog** tab in the Subscriber Portal.
	Modify a service.	Use the **Subscriptions** tab in the Subscriber Portal.
	Run an action on a service instance.	Use the **Subscriptions** tab in the Subscriber Portal.
Approvers	Approve or deny a request for a subscription to a service offering.	Use the **Dashboard** tab or the **Requests** tab in the Subscriber Portal.
	Approve or deny a request for a modification to a subscription.	Use the **Dashboard** tab or the **Requests** tab in the Subscriber Portal.
	Monitor requests for approval.	Use the **Dashboard** tab or the **Requests** tab in the Subscriber Portal.
Consumer Service Administrator	Per organization, create users (also, modify, delete).	Use the **Administration** tab in the Service Management Console.
	Manage catalogs per organization.	Use the **Service Catalogs** tab in the Service Management Console.

Table 2: Service Design

User Role	Task	How to...
Service Business Manager	Create a service offering. (Also, view, copy, edit, and delete a service offering.)	Use the **Service Offerings** tab in the Service Management Console.
	Edit service offering options.	Use the **Service Offerings** tab in the Service Management Console.
	Configure pricing for a service offering.	Use the **Service Offerings** tab in the Service Management Console.
	Attach documents to a service offering.	Use the **Service Offerings** tab in the Service Management Console.
	Create and publish catalogs per organization.	Use the **Service Catalogs** tab in the Service Management Console.
Service Designer	Create a service design. (Also, view, copy, edit, and delete a service design.)	Use the **Service Design** tab in the Service Management Console.
	Use the **Designer** to design services. (Includes creating service components, custom service component properties, resource bindings, and lifecycle actions.)	Use the **Service Design** tab in the Service Management Console.

	Configure subscriber options.	Use the **Service Design** tab in the Service Management Console.
	Configure component relationships.	Use the **Service Design** tab in the Service Management Console.

Table 3: Provider Management

User Role	Task	How to…
Resource Supply Manager	Create a resource offering. (Includes creating custom resource offering properties and lifecycle actions.)	Use the **Resource Management** tab in the Service Management Console.
	Create a provider. (Includes creating custom provider properties.)	Use the **Resource Management** tab in the Service Management Console.
	Associate a provider with a resource offering.	Use the **Resource Management** tab in the Service Management Console.

Table 4: Administration

User Role	Task	How to…
CSA Administrator	Configure LDAP authentication.	Use the **Administration** tab in the Management Console.
	Assign members to roles.	Use the **Administration** tab in the Management Console.
	Assist users of the Cloud Service Management Console.	Use all tabs in the Management Console.
Consumer Service Administrator	Configure provider and consumer organizations.	Use the **Administration** tab in the Management Console.
	Configure authentication.	Use the **Administration** tab in the Management Console.
	Assign members to roles.	Use the **Administration** tab in the Management Console.
	Customize the Cloud Subscriber Portal.	Use the **Administration** tab in the Management Console.

Master Glossary

This glossary defines terminology used throughout HP CSA. Whenever possible, definitions indicate *where* the term is most frequently used, as indicated by these icons:


HP CSA Cloud Subscriber Portal


HP CSA Cloud Service Management Console

A

Access Control


Allows a Service Business Manager or CSA Administrator to choose whether a service catalog is visible to all authenticated users of a consumer organization, or to a subset of authenticated users of a consumer organization. Also allows an Administrator to control membership to HP CSA user roles, which authorizes access to specific parts of the Cloud Service Management Console or access to the Cloud Subscriber Portal.

Actions


Commands the Subscriber issues on a service instance's components. For example, if your subscription is for a server, you might be able to issue commands that start, stop, or pause the server. When you issue an action, a request is created for the action.

Administrator


See CSA Administrator and Consumer Service Administrator.

Approval Objects


Objects related to the approval and denial of service requests. If you are a designated approver of requests, you can view the approval object for a request in the My Approvals for Others category on the Requests tab.

Approvers


Individuals who are authorized to approve service requests from Subscribers (members of an organization who request cloud services). See also *Subscriber* and *Service Request*.

Approval Processes


Processes for approval of cloud service requests that are managed through pre-defined approval templates provided with HP CSA. Approval processes can be optionally generated by means of LDAP membership settings. See also *Approvers* and *Lightweight Directory Access Protocol* (*LDAP*).

Artifact


A lifecycle object that contains the necessary information to create and manage top-level model elements and their relationships.

B

C

Category

A classification of resource offerings for improved filtering and identification. HP CSA includes some pre-defined categories out-of-the-box. A category is associated with a resource offering and is also used when assigning resource offerings to service designs.

Cloud Computing

A model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (for example, networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. National Institute of Standards and Technology, Information Technology Laboratory: *The NIST Definition of Cloud Computing* by Peter Mell and Tim Grance. (http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf)

Cloud Service

An entity for the delivery of cloud-computing capability to customers that can employ any of the following service models: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), or Software-as-a-Service (SaaS).

Consumer Organization

An organization composed of HP CSA Subscribers (or consumers), which provides enterprise-ready access to HP CSA cloud services. Members of a consumer organization use a service catalog to select or modify cloud-service requests. Consumer organizations are set up and maintained by the HP Consumer Service Administrator or the CSA Administrator. See also *Organization* and *Provider organization*.

Consumer Service Administrator

An HP CSA user role. The Consumer Service Administrator configures and manages consumer and provider organizations. See also *CSA Administrator*, *Resource Supply Manager*, *Service Business Manager*, *Service Designer*, and *User Roles*.

Content

Programming entities such as HP Operations Orchestration flows and actions, or HP CSA resource offerings and service designs. Content is imported into running instances of HP CSA to drive functionality.

CSA Administrator

An HP CSA user role. The CSA Administrator has access to all functionality in the Cloud Service Management Console and initially configures authentication to access information in HP CSA. See also *Consumer Service Administrator*, *Resource Supply Manager*, *Service Business Manager*, *Service Designer*, and *User Roles*.

Custom Properties

Optional, user-defined values that are used to specify information to HP Operations Orchestration during service or resource provisioning, or alternatively, to pass various internal variables within HP CSA. See also *HP Operations Orchestration (HP OO)* and *HP Operations Orchestration Flow*.

D

E

Enterprise-Ready Subscription

A cloud-service delivery model that can be scaled to meet the needs of an enterprise business structure, to provide security, multi-tenancy, notification, and approval processes for enterprise customers.

Environment

A mechanism for grouping related providers. Environments can be linked to a service catalog. You can specify one or more resource environments for a service catalog. The resource environments restrict the set of resource providers that can be chosen at subscription time. When provider selection occurs during service provisioning, only providers belonging to one or more of the environments associated with the service catalog will be eligible for selection.

F

G

Global Shared Catalog

A single cloud-service catalog that is shared across all organizations per instance of HP CSA. Any changes made to the global shared catalog can be seen in all other catalogs. The global shared catalog is indicated by the following icon:  See also *Provider Organization*.

H

HP Cloud Service Automation (HP CSA)

A unique platform that orchestrates the deployment of infrastructure resources and complex multi-tier application architectures. HP CSA integrates and leverages the strengths of several HP datacenter management and automation products, adding resource allocation management, service offering design, and a customer portal to create a comprehensive service automation solution.

HP CloudSystem Matrix

An integrated HP CSA component that provides a converged infrastructure platform for private cloud deployments, including HP Matrix Operating Environment infrastructure orchestration (infrastructure orchestration) software for interactive service design and HP BladeSystem for blade architecture.

HP Deployment Services

The HP service professionals who install and deploy the HP CSA solution and are part of the HP Professional Services Organization (PSO).

HP CSA Cloud Service Management Console

Software that provides a design and administration interface. The Cloud Service Management Console is designed to support the following user roles: Consumer Service Administrator, CSA Administrator, Resource Supply Manager, Service Business Manager, and Service Designer. See also *HP CSA Cloud Subscriber Portal*.

HP CSA Cloud Subscriber Portal

Software that delivers cloud-services to Subscribers (customers) by providing one or more service catalogs per organization. The HP CSA Subscriber Portal is integrated into and shipped with HP CSA.

HP Operations Orchestration (HP OO)

A software product that coordinates communication between integrated products and managed devices. Customized HP OO flows are essential to implementing the HP CSA service lifecycle. See also *HP Operations Orchestration Flow*.

HP Operation Orchestration Flow

A set of linked actions that automate lifecycle actions within an HP CSA service offering. HP Operations Orchestration flows are created, modified, and saved using HP Operations

Orchestration Studio, the workflow designer embedded in HP Insight Orchestration. See also *HP Operations Orchestration (HP OO)*.

Hybrid Cloud

A type of cloud-computing that features a flexible, scalable infrastructure that can be deployed on either side of a firewall. HP Cloud Service Automation (HP CSA) is optimized for a hybrid cloud environment.

I

Infrastructure-as-a-Service (IaaS)

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (for example, host firewalls). National Institute of Standards and Technology, Information Technology Laboratory: *The NIST Definition of Cloud Computing* by Peter Mell and Tim Grance. (http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf)

J

K

L

LDAP

See *Lightweight Directory Access Protocol*.

Lifecycle

The stages of programmatically deploying a cloud service: initializing, reserving, deploying. Or conversely, the stages of removing a cloud service from deployment: *un*-deploying, *un*-reserving, and *un*-initializing. The service lifecycle also has a separate modification state.

Lifecycle Action

A function that is run automatically at a specified lifecycle state and sub-state. Lifecycle actions reference internal or external process definitions, which perform the specified action, such as initializing, reserving, or deploying a service subscription. Lifecycle actions can be applied to service components or resource offerings as part of the service lifecycle. See also *Lifecycle* and *Process Definition*.

Lifecycle State

A lifecycle state represents a step within the CSA service provisioning and de-provisioning lifecycles. States are either transition states stable states, or modifying state.

Lifecycle Sub-state

A lifecycle sub-state is a further refinement of a lifecycle transition state. Stable states and modifying state do not have sub-states.

Lightweight Directory Access Protocol (LDAP)

An application protocol for accessing and maintaining distributed directory information services over an Internet Protocol (IP) network. Directory services may provide any organized set of records, often with a hierarchical structure, such as a corporate electronic mail directory. Similarly, a telephone directory is a list of subscribers with an address and a phone number. http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

M

Management Console

See HP CSA Cloud Service Management Console.

Modifying State

A lifecycle state indicating that subscriber options are being modified and that those changes are being processed by the *Lifecycle Engine*. See also *Lifecycle, Lifecycle Action, Stable State, Transition State, Lifecycle State*, and *Lifecycle Sub-state*, and *Subscriber Options*.

N

Notification

An email communication indicating that a subscription-related event has occurred, such as when a request for a subscription is approved, cancelled, or a subscription fails or expires. Subscribers are notified about any change in subscription status. Approvers are notified when subscriptions requiring approval are requested or modified.

O

Offering

See *Resource Offering* and *Service Offering*.

Organization

An entity defined by the CSA Administrator, who determines a member's entry point into the cloud system and associates its members with services and resources. An organization can be a company, business unit, department, or group. Membership in an organization is determined by the organization's LDAP, which authenticates the user's login credentials. See also *Provider Organization*, *Consumer Organization*, and *Lightweight Directory Access Protocol (LDAP)*.

P

Platform-as-a-Service (PaaS)

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations. National Institute of Standards and Technology, Information Technology Laboratory: *The NIST Definition of Cloud Computing* by Peter Mell and Tim Grance. (http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf)

Process Definition

A configuration that runs a specified internal (HP CSA) or external (HP OO flow) action.

Provider

See Resource Provider.

Provider Organization

A required organization that hosts HP Cloud Service Automation, manages consumer organizations, and manages resources and services, including those offered by third-party or public clouds. Members of the provider organization can create one or more consumer organizations, manage configured organizations, and manage resources and services (such as designing, offering, and publishing resources and services for consumption). A provider organization is indicated by the following icon in the HP CSA Management Console:  See also *Organization* and *Consumer Organization*.

Provider Type

A way to classify service providers and resource offerings for improved filtering and identification. HP CSA includes pre-defined, out-of-the-box provider types. Each instance of a service provider can have a single provider type, and each instance of a resource offering can also have a single provider type. In addition, resource offerings can only be associated with providers that share the same provider type.

Public Cloud

An environment where cloud applications are owned by one or more public service providers (such as HP Cloud Services, Amazon, or Google) and accessed on a fee-basis by individuals or organizations.

Properties

See *Custom Properties*.

Q

R

Resource

A specific instance of software or infrastructure used to enable cloud service delivery. Resources provision Infrastructure-as-a-Service (IaaS), Platform-as-a-service (PaaS), and Software-as-a-Service (SaaS). See also *Resource Provider*.

Resource Binding

A link in a service design between a resource offering and a service component. For example, a resource offering for a specific VMware vCenter VM template can be linked to a Server Group service component. The resource binding ensures that the resource offering is provisioned as part of the service component deployment.

Resource Offering

A capability offered by a provider (or a group of providers) associated with a service design. For example, to configure a service design to use a VMware vCenter VM template rhel53x64, first create a corresponding resource offering in the Cloud Service Management Console. Then the resource offering is available for selection when you create a service design. An offering has a single provider type and a single category. For example, the rhel53x64 offering has a provider type of VMware vCenter and a category of Compute. In addition, an offering is associated with providers to indicate which providers support the offering.

Resource Pool

A grouping associated with a particular provider. In VMware vCenter, a resource pool is a pool of CPU and memory resources. In HP Matrix Operating Environment Infrastructure Orchestration, a resource pool also includes storage and networking. Note that resource pools apply only to certain provider types, such as HP Matrix Operating Environment Infrastructure Orchestration and VMware vCenter.

Resource Provider

A management platform that provides either Infrastructure-as-a-Service (IaaS) or Software-as-a-Service (SaaS) to the cloud. For example, a provider such as HP CloudSystem Matrix deploys virtual machines, while a provider such as HP SiteScope monitors applications.

Resource Supply Manager

An HP CSA user role. The Resource Supply Manager creates and manages cloud resources, such as providers and resource offerings. See also *Consumer Service Administrator*, *CSA Administrator*, *Service Business Manager*, *Service Designer,* and *User Roles*.

S

Service Business Manager

An HP CSA user role. The Service Business Manager creates and manages the service offerings and service catalogs. See also *Consumer Service Administrator*, *CSA Administrator*, *Resource Supply Manager*, *Service Designer*, and *User Roles*.

Service Blueprint

See *Service Design*.

Service

See *Cloud Service*.

Service Component

An element of a service design that has an associated component type constraining its allowed children and assignable resource categories. See also *Service Component Type*.

Service Component Type

A hierarchical classification of service components that is used in service design. Example service component types include service composite (required), infrastructure service, server groups, virtual networks, and applications. A component type contains rules that constrain how service designs can be constructed, helping a Service Designer to properly construct a service design. HP CSA allows you to create your own component types and also ships with a number of out-of-the-box component types, including the following: Infrastructure Service, Load Balancing Pool, Network Connection, Policy Enforcement Point, Server, Server Group, Service Composite, Software Application Service, Software Application Tier, Software Component, and Virtual Network.

Service Composite

The root component of a service design.

Service Consumer

An HP CSA user role. Service Consumers request and manage subscriptions offered to their organizations. See also *User Roles*.

Service Design

A template (or blueprint) for an orderable service. A service design includes a hierarchy of service components, plus resource bindings, subscriber options, lifecycle actions, and custom properties, as defined by the Service Designer. See also *Service Designer* and *Service Offering*.

Service Designer

An HP CSA user role. The Service Designer designs, implements, and maintains service designs (also referred to as blueprints). See also *Consumer Service Administrator*, *CSA Administrator*, *Resource Supply Manager, Service Business Manager,* and *User Roles*.

Service Offering

An entity developed by the Service Business Manager to refine existing service designs (or blueprints) and then publish them to a service catalog. A service offering adds pricing, images, and other specific information required for the subscription process. See also *Service Business Manager*, *Service Designer*, and *Service Design*.

Service Request

A request for delivery of cloud services that is initiated by the Subscriber (end user) using the service catalog. After the service request is approved, the request becomes a subscription. See also *Subscriber* and *Subscription*.

Software-as-a-Service (SaaS)

The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through a thin client interface such as a web browser (for example, web-based email). The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. National Institute of Standards and Technology, Information Technology Laboratory: *The NIST Definition of Cloud Computing* by Peter Mell and Tim Grance. (http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf)

Stable State

A lifecycle state indicating that an activity has been accomplished. Stable states include the following: Described, Initialized, Reserved, Deployed, and Finalized See also *Lifecycle, Lifecycle action, Modifying state,* Transition *state*, *Lifecycle state*, and *Lifecycle Sub-state*.

Subscriber

Enterprise business users who *subscribe* to HP CSA cloud services. The Subscriber initiates service delivery and resource provisioning by making a service request in the HP CSA Subscriber Portal, which must be approved according to a pre-configured process. See also *Approval Process*, *Service Request, Service Offering,* and *User Roles*.

Subscriber Options

Elements of a service design used to provide the options that are shown to the Subscriber (end user) in the Subscriber Portal. Subscriber options can be designated as non-selectable (view-only) or available for editing and modification, depending on the needs of the business. See also *Service Design*, *Service Offering*, and *HP CSA Cloud Subscriber Portal*.

Subscriber Portal

See *HP CSA Cloud Subscriber Portal*.

Subscription

An approved service request. Subscriptions are associated with service offerings, and incur costs according to a cost structure developed by the Service Business Manager. See also *Subscriber*, *Service Offering*, *Service Request*, and *Service Business Manager*.

Supported Category

A group associated with a component type that defines and constrains how service designs are created. You can define which resource categories can be associated with a service component of a particular component type. For example, the out-of-the-box Server Group component type includes Compute as a supported category, which indicates that resource offerings with the category of Compute can be assigned to Server Group service components. See also Service *Component type* and S*ervice Component Type*.

T

Transition State

A lifecycle state indicating change from one stable state to another within the service lifecycle. Transition states include the following sub-states: Initializing, Reserving, Deploying, Un-deploying, Un-reserving, and Un-initializing. See also *Lifecycle, Lifecycle Action, Modifying state, Stable state*, *Lifecycle state*, and *Lifecycle Sub-state*.

U

User Roles

Dedicated HP CSA job responsibilities that have been assigned within your organization. Depending on business needs, a one-to-one correspondence can exist between an individual and a user role—for example, a dedicated HP CSA Service Designer. Or one person can take several user roles—for example, the Service Designer could also take the role of the Service Business Manager. User roles are defined under Administration tab of the HP CSA Management Console. See also *Subscriber*, *Service Designer*, *Service Business Manager*, *Resource Supply Manager*, *CSA Administrator*, and *Service Consumer Administrator*.

V

W

X

Y

Z

For More Information

To access other toolkits to design and extend cloud services running on HP CloudSystem, go to http://www.hp.com/go/csdevelopers.

For more information on HP CloudSystem, visit http://www.hp.com/go/cloudsystem.

HP software product manuals and documentation for the following products can be found at http://h20230.www2.hp.com/selfsolve/manuals. You will need an HP Passport to sign in and gain access.

- HP Cloud Service Automation
- HP Server Automation
- HP Operations Orchestration

To help us improve our documents, please send feedback to csa.docs@hp.com.

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