HP Cloud Service Automation (HP CSA) Concepts Guide

Concepts Guide *with Architectural Overview and Business Process Summary*

Version 3.10

This guide reviews the key terminology, functional architecture and significant processes of the HP Cloud Service Automation (HP CSA) solution.

HP CSA is a unique platform that orchestrates the deployment of compute and infrastructure resources and of complex multi-tier application architectures. HP CSA integrates and leverages the strengths of a hybrid cloud environment, 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 request and modify cloud service offerings with pre-defined pricing and other customer-specific features. Once the request is approved, through a policy-driven process, HP CSA deploys the cloud service offering using a structured lifecycle with pre-defined integration mechanisms for invoking external processes.

HP CSA administrators use the Cloud Service Management Console to control system access; configure cloud resources, service designs, and service offerings; and manage catalogs, organizations, and subscriptions. The management console also provides an operational interface to view and manage active service subscriptions.

HP CSA automates IT processes through a set of customizable user roles—each with its own set of structured business processes and permissions. The base software is highly customizable and extensible, furthering HP's goal of enabling IT organizations to *broker* cloud services as an integral part of their business processes.

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Service Delivery in the Hybrid Cloud

HP Cloud Service Automation (HP CSA) has been designed for optimum service delivery in a hybrid cloud environment. This guide describes how HP CSA helps you achieve flexible, on-time, and on-budget service delivery to your customers.

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, the new norm is quick response time while remaining flexible and agile.

In the slower-paced datacenter of years gone by, physical servers were dedicated to one user or business group, with limited sharing across groups or organizations. IT staff used manual processes to set up and manage the infrastructure and to configure platforms and applications. Although checklists and time-based job scheduling were in widespread use, server management was by and large time-consuming. Meanwhile, the user experience was often quite personalized and difficult. IT had to provide extensive user support to bolster its quality of service, including dedicated system administrators, help-desk teams, and various levels of technical support.

Contrast this with today's world of cloud computing, where *resources*—whether at the infrastructure, platform, or application level—are virtualized. Service offerings are standardized, rather than custom-built on demand. The setup, monitoring, and ongoing management of cloud service delivery have been automated.

In this new automated delivery model, IT becomes a *service broker*. 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. 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. The advantages of a hybrid cloud environment with flexible service delivery models are key innovations for achieving this new reality.
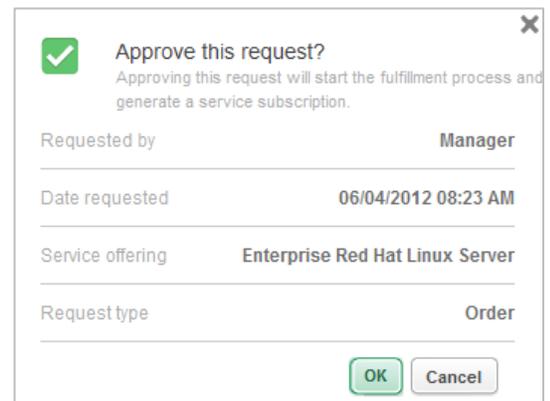
Types of Cloud Environments

To understand the 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 within 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 with both privately managed and public infrastructure. 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, hosted within the enterprise.

Enterprise-Ready Subscription

HP CSA's Cloud Subscriber Portal delivers cloud-service catalogs to customers through an innovative *enterprise-ready* design. In this design, 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 has its own view within the Cloud Subscriber Portal limited to its own service catalogs. On a larger scale, Alpha Financial Group can share cloud service delivery with Beta Banking, with each enterprise's own portal instance providing a secure window into the infrastructure and software services of the hybrid cloud.

((•)) In addition to catalogs per organization, HP CSA provides a single, global shared catalog, as indicated by the informational 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.
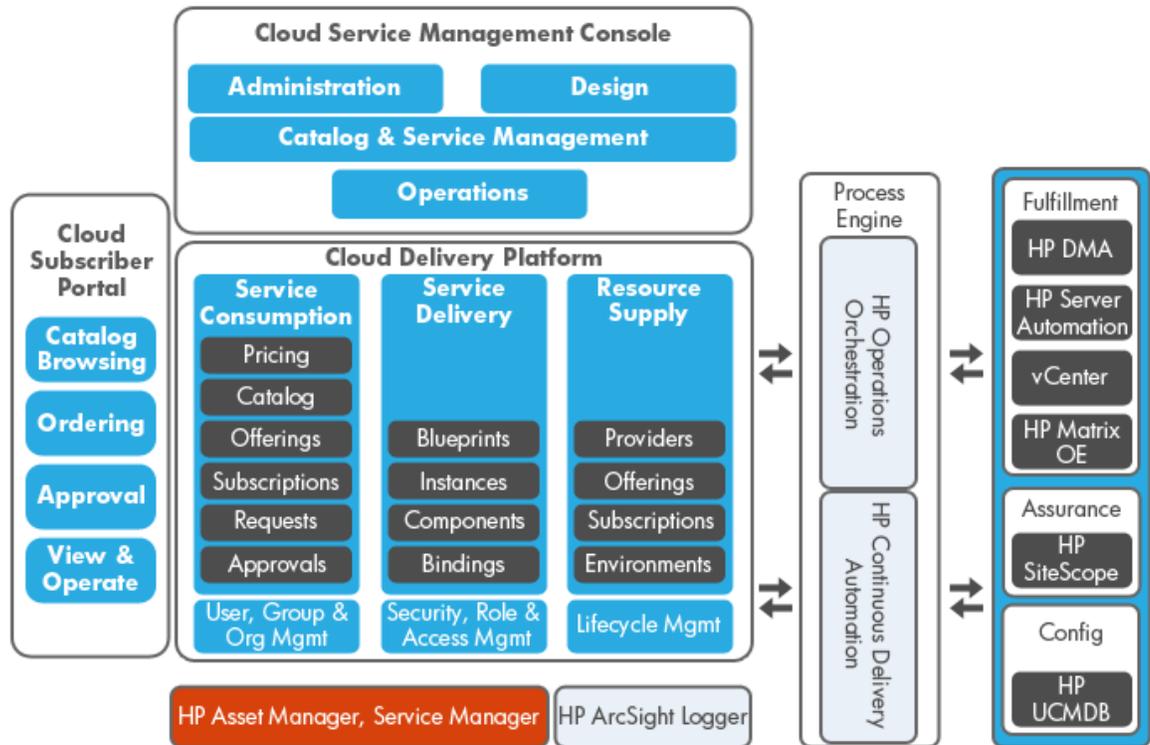
Figure 1: Example Organizational Structure
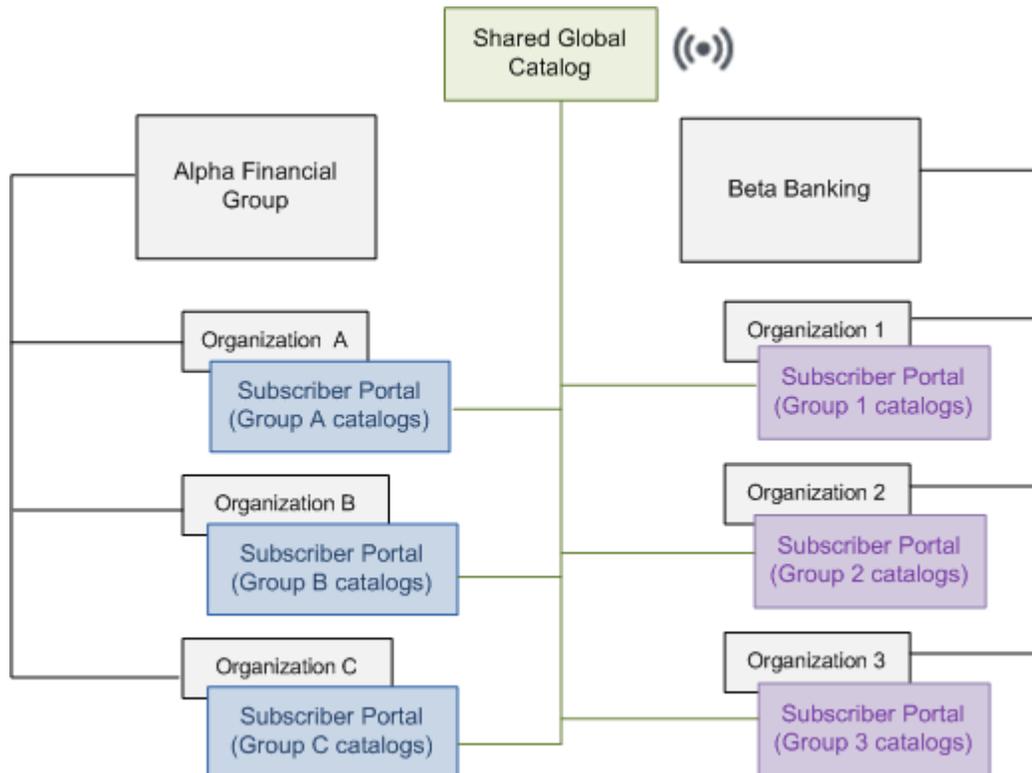
Architectural Overview and Components

From an overall solution standpoint, CSA is structured around an extensible functional architecture with component levels shown in the diagram below.

Figure 2: HP CSA Functional Architecture

The Cloud Service Management Console provides for the overall administration and configuration of the Cloud Service Automation system. The primary administration tasks are organized around the creation and configuration of organizations within the system.

CSA defines one required organization—the CSA Provider organization—which represents the service provider. Additional consumer organizations are configured in the Administration area. Each organization can be configured independently with its own directory service, portal customizations, notification infrastructure, and group access. Groups implemented in the LDAP directory service are identified here and associated with roles.

Service catalogs are associated with specific groups within organizations. There is one global shared catalog for common service offerings, but individual catalogs are configured to be accessed by one or more groups.
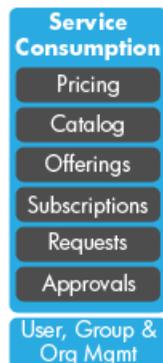
Service offerings are first created in the Cloud Service Management Console, and can then be published into one or more catalogs. Service offerings include attributes like pricing details, documentation, and custom presentation features.

Service catalogs present service offerings to subscribers. Each service offering is based upon a service design, and the Cloud Service Management Console includes the CSA Service Designer tool.

The CSA Service Designer provides a graphical design tool and framework for organizing automation actions required to realize a business service. In the Service Designer, you'll find components which can be arranged hierarchically to dictate the order in which actions attached to the components are processed. Actions can be attached directly to a component, and mapped into a particular lifecycle state of the service to be executed. Resource offerings—collections of actions required to manage a resource through the entire service lifecycle—can also be bound to components.

The CSA Administrator, the Service Designer, and the Service Business Manager all work within the Cloud Service Management Console framework.

The Cloud Delivery Platform includes three main functional areas.

In Resource Supply, the resource providers to which CSA brokers automation actions are configured. Each provider may offer one or more collections of resources which can be managed through the actions of a resource offering. Resource offerings identify the providers which are capable of executing the actions to manage a particular resource and map those actions into specific lifecycle states and transitions. Resource offerings are reusable collections of actions and can reference multiple provider instances. Environments are used to associate specific providers with catalogs of offerings to determine which providers will serve specific subscriber communities. Resource Supply provides the framework for service lifecycle management.
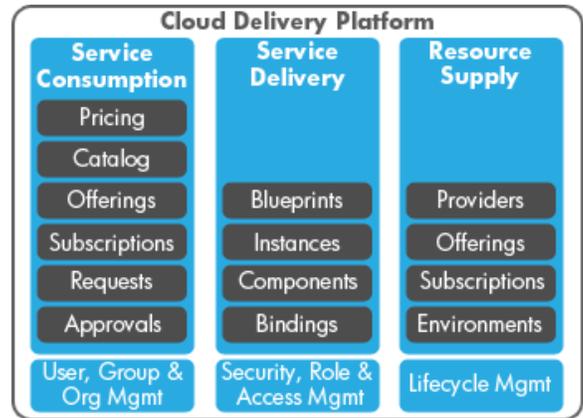
Service Delivery provides the design elements that form the basis of a service offering, and manages the creation of service instances when a subscription request is fulfilled. Service delivery selects the specific provider, and binds resource offerings in a design to specific service instances, creating a resource subscription to a provider. Actions associated with each component are executed in sequence when a service instance is processed through the service lifecycle. Service Delivery also provides the framework for security and role based access management. The Service Designer is the key role in this function.

Service Consumption refers to CSA's subscriber-facing functions. Once a service is designed, a Service Business Manager composes a service offering which adds customized subscription options, pricing, and documentation to the design. The Service Business Manager configures approval policies for individual offerings, or for catalogs of offerings. Individual offerings can be published and made visible to subscribers in one or more service catalogs. Environments for provider selection are configured for service catalogs.

The subscription process includes scheduling, approval management, and service request management. Subscription requests are fulfilled here, and subscription status information is returned to the subscriber through the portal. The Service Business Manager, the Service Operations Manager, and the Service Consumer are the key roles in Service Consumption.
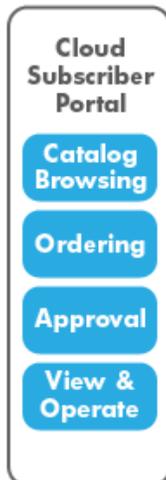
The service consumer or subscriber interacts with the Cloud Subscriber Portal to request subscriptions to service offerings published in the catalog. The service offerings from one or more service catalogs are exposed depending upon the subscriber's group membership. There is also a global catalog available to all subscribers, and any offerings published in the global catalog are also visible.

An approval policy may be associated with a catalog, or with an individual offering. The approval policy may be an automatic, passive approval or may require active approval from the subscriber's manager or other named approver. Integration with an external approval engine offers a mechanism for more complex approval policies.

Subscribers can view the status of pending approvals, pending requests, and the current status of their subscriptions, including detailed component information. Service modifications and on-demand actions are presented to the subscriber through the Subscriptions page. Cancelling a subscription is initiated on this same page, as well.

In many cases, the subscriber is also the consumer of the services and interacts directly with the service components. But it's important to note that the subscriber may not be the consumer of the service. In that case, the Consumer may never directly interact with the Subscriber Portal, but only with the service components themselves. The subscriber, in this case, is the proxy for the Consumer.

The Process Engine dispatches actions configured on the components of a service. CSA brokers actions to realize business services with a variety of fulfillment platforms. To execute actions on those platforms, CSA uses one or more Process Engines to run discrete actions to deploy and manage resources in the environment. These discrete actions are defined in the Process Engine and synchronized into CSA to be configured in the Service Design process. Actions are mapped into specific lifecycle states and transitions, and can be assembled in

reusable collections. The sequencing, concurrency, and error handling behavior of actions are configurable in the Service Designer.

CSA can interact with a variety of fulfillment platforms to realize a service subscription. Each of these platforms is configured as a resource provider—that is, they expose an interface to manage resources or perform actions.

When CSA invokes actions through the Process Engine, those actions are interacting with the exposed programmatic interfaces available through the various fulfillment platforms to deploy resources, reconfigure them, manage their state, or retire them. In additional to provisioning and fulfillment, CSA also interacts with service assurance systems, configuration management systems, or various other IT service management systems.

Authoring content or configuring access for these various platforms is outside the scope of the CSA platform itself, and must be coordinated by the CSA Administrator with the administrators of the various platforms.

CSA also supports some additional specialized integration. CSA integrates with the HP ArcSight Logger to collect and analyze log records, and to correlate logging from various process and fulfillment platforms to provide a complete picture of action execution for a subscription.

CSA external approvals can be configured to integrate with HP Service Manager to implement complex multi-level approval policies. HP Asset Manager can be integrated to help track the allocation of asset inventory to various organizations and subscribers.
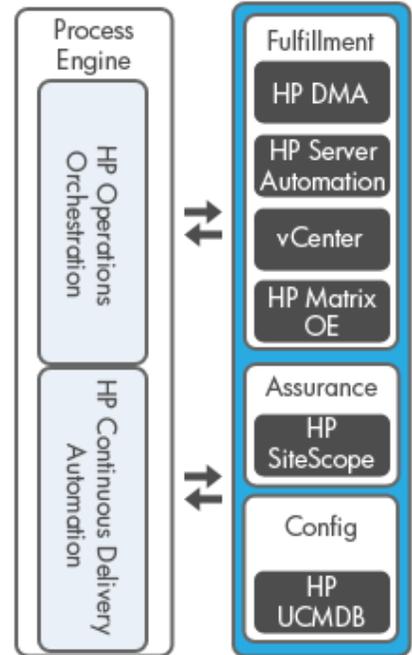
The Service Lifecycle

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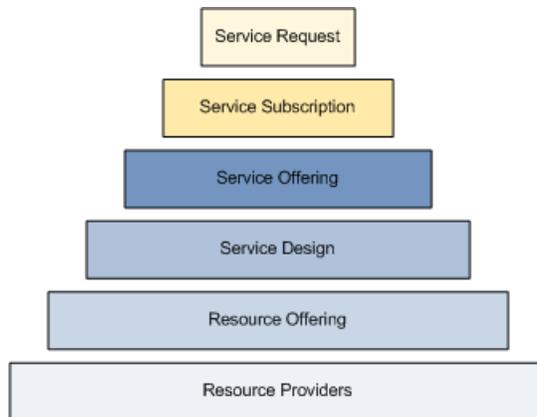
(1) When an approved request is received by HP CSA, the system matches the *service request* with a *service offering*, creating a *service subscription*—an instance of a service offering as requested by the subscriber.

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

(3) Service components create a structured framework for sequencing *lifecycle actions*. 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 resource over the lifetime of the service. For example, you could specify a lifecycle action to stop and start the provider resource after an application has been installed.

At both the component lifecycle and the resource offering level, lifecycle actions contribute to the initial deployment of the service, communicating with the service provider through a process engine such as HP Operations Orchestration. 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 3. These states can be stable states, transition states, or modifying state. For example, *Deploying* is a transition state, including pre-transition, transition, post-transition and failure sub-states. By contrast, *Deployed* is a stable state, indicating that the deployment activity has been accomplished. 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. Table 1 shows the transition states and the stable states supported by HP CSA.
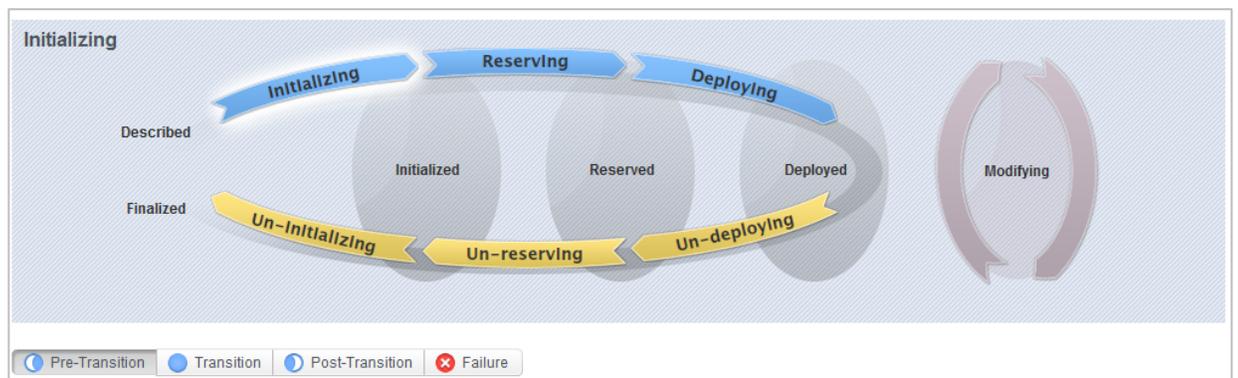
Figure 3: The Lifecycle Process

Table 1: CSA Lifecycle States

Transition 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	

Service components provide the framework for the sequencing and coordination of lifecycle actions. The relationship between service components in a service design determines the order in which the lifecycle engine will visit components to process actions configured for transition states. Actions can be configured directly on the component, and mapped into lifecycle states. Actions can also be collected and mapped into resource offerings, and then bound to a component.

Lifecycle actions are mapped to lifecycle states in the Cloud Service Management Console. Mapping can be correlated with a service design or during the development of resource offerings. For example, the *Deploying* 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

Service Design and Business Process

Automated service fulfillment can be cleanly divided into two phases:

- A **design phase** during which a team of skilled architects and administrators collaborate to create and configure cloud services, including initial system setup at the enterprise level, identifying and allocating system resources, and the interactive service design process itself.

- A **business management and operations phase** during which cloud services are presented to subscribers throughout the enterprise in accordance with pre-determined business needs and policies and fulfilled subscriptions (*service instances*) are tracked.

The HP CSA Process Flow Diagram on page 36 shows the entire end-to-end process starting with administration and resource allocation and ending with service delivery. Note that this overall process depends on pre-established user roles that must be configured at the system level. The sections below correlate HP CSA business processes with the user role identified for each process, providing prerequisites for each user role, identifying interfaces provided by the system, and defining special terms associated with each role.

HP CSA Administration

User Role	CSA Administrator
	The CSA Administrator performs initial HP CSA configuration and assigns and maintains primary user roles within the overall provider organization. The CSA Administrator has access to all functions in the Cloud Service Management Console.
Prerequisites	✓ Understands requirements for setup of enterprise-wide organizations
	✓ Understands how to configure LDAP organizations
	✓ Can identify core users and access policies
	✓ Knows which groups of users correspond to different core roles in CSA
	✓ Understands automated cloud-service lifecycle processes at an "expert" level, including options for extensibility and customization
Interface/Tools	Cloud Service Management Console
⚲ Key Concepts	**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. From http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol
	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).*
	User Roles
	Dedicated HP CSA job responsibilities that have been assigned within a CSA organization. A person may have only one role—for example, a dedicated HP CSA Service Designer—or one person can take several user roles. For example, a Service Designer could also take the role of Service Business Manager. User roles are defined under the Administration tab of the Cloud Service Management Console.

Evaluate Existing Organizational Processes

The CSA Administrator should begin with knowledge of the existing business organization and how consumers use IT services. For example, are consumers expected to be subscribers–that is, to request services directly that they consume? Or, are there designated subscribers that request services on behalf of a group of consumers? Subscribers will interact directly with the CSA subscriber portal and service catalog, while consumers will interact only with the resources that are requested.

The CSA Administrator should consider the characteristics of the subscriber. Is the subscriber a line-of-business manager that expects service offerings to be aligned with existing business functions? Or is the subscriber more aligned with technical offerings and options that they will map to business needs? How important is standardization of service offerings, as opposed to flexibility in the configuration of subscriptions?

The CSA Administrator will use these characteristics to help map groups of users into CSA organizations.

Set Up Subscriber Organizations and Catalogs

The CSA Administrator may create consumer organizations and associate service catalogs with those organizations. Note that an organization in CSA does not need to map directly into a line-of-business organization. Organizations in CSA are used to group subscribers with similar characteristics, and to expose appropriate service catalogs to those subscribers. Within an organization, the subscribers will request service offerings with a similarly granular level of customization and options. An organization's subscribers need to see service offerings oriented toward their consumers—whether aligned around their specific business or around technical offerings. Subscribers in an organization generally consume in a common model–whether entirely self-service or through designated subscribers requesting services on their behalf.

Catalogs are collections of service offerings that can share common characteristics. For example, approval policies can be applied to an entire catalog. Approvers might have a specific relationship to the subscriber—for example, the subscriber's manager. Approvals can also be specifically named individuals, which might be more appropriate when those catalogs are associated with a particular organization. Service catalogs can be associated with an environment that contains specific resource providers. When services from this catalog are requested, the resource providers in this environment are selected to fulfill the actions configured in the service design.

Catalogs are accessible to specific groups of users within an organization.

Finally, there is a global service catalog with offerings available to all subscribers. Common service offerings that span organizations belong in the global service catalog.

Identify and Manage User Roles through LDAP Groups

CSA maps user roles through membership in LDAP groups configured through the LDAP service for the organization. CSA does not directly manage the creation or maintenance of individual users. As the CSA administrator creates organizations within CSA, the corresponding LDAP group membership must exist or be created. In many cases, appropriate LDAP groups already exist that naturally map into user roles within the CSA system. In other cases, it's best to create new groups for specific roles.

Depending upon how an organization functions, it may be entirely appropriate for different roles to overlap onto the members of a single group. While CSA provides distinct roles and access based upon those roles, it is entirely flexible in the assignment of groups to roles.

About HP CSA Organizations
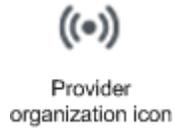
You can configure two types of organizations in HP CSA.

Provider
organization icon

One *provider organization* exists per instance of HP CSA and should be configured at initial login to the Cloud Service 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.

The following user roles can be configured with appropriate access rights to a provider organization: Consumer Service Administrator, Service Business Manager, Service Designer, Service Operations Manager, and Resource Supply Manager.

The provider organization is managed by the CSA Administrator.

In the Cloud Service Management Console, an icon designates a provider organization, as shown on the left.

Consumer organizations are associated with a provider organization and 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.

Resource Allocation

User Role	Resource Supply Manager The Resource Supply Manager identifies the resource providers and resources that can be brokered by HP CSA to provide cloud services.
Prerequisites	✓ Able to administer and allocate resources on an enterprise level ✓ Understands what discrete functions are available from resource providers to manage resources ✓ Understands existing operational processes
Interface/Tools	Cloud Service Management Console
Key Concepts	**Resource** A specific instance of software or infrastructure used to enable cloud service delivery. **Resource Offering** A capability offered by a provider (or a group of providers) associated with a service design. Resource offerings are defined in the Cloud Service Management Console. An offering has a single provider type and a single resource category. An offering is associated with providers to indicate which providers support the offering. **Resource Pool** A pool of resources associated with a resource provider. Note that resource pools apply only to certain provider types, such as HP Matrix Operating Environment 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 of HP Matrix Operating Environment services provisions infrastructure and basic applications, while a provider of HP SiteScope services monitors applications.

Identify Resource Providers

CSA is a service broker. It communicates with the element management platforms in the ecosystem that expose interfaces for consuming resources. A resource provider is a platform that directly manages one or more categories of resources, and exposes a programmatic interface to consume those resources. A resource, in this case, may be servers, storage volumes, networks, or any other resource that's required in order to fulfill a request to provide a business service.

Resources offered through a resource provider are generally organized into resource pools. A resource pool's capacity is determined by the resource provider. Different resource pools may offer resources with different characteristics, such as cost, performance, or availability.

The Resource Supply Manager configures *resource offerings* through which CSA can broker services.

Create Resource Offerings

A resource offering is a reusable design element within the CSA system. A resource offering describes a collection of discrete actions required to consume and manage a resource through a business service lifecycle. These actions may include deployment and retirement, and may also include actions which a subscriber can execute on demand during the life of the service. Resource offerings can be associated with one or more resource providers which are capable of servicing these actions. When a subscriber orders a service, a specific

resource provider is selected and bound to the resource offering to provide the necessary resources to fulfill the request.

Resource offerings are composed by the Resource Supply Manager in the Resource Management area of the Cloud Service Management Console.

For the subscriber, 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 Matrix Operating Environment, 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 includes selection processes. Resource providers can be grouped by type or by environment, and resource offerings can be grouped by provider type or by category.

For example, you can have a resource offering category of Infrastructure and a provider type of HP Matrix Operating Environment. Furthermore, you can divide resources into environments, which can be linked to a service catalog. For example, a specific instance of HP Matrix Operating Environment 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. Demonstrated 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 Network Automation*, which executes commands or command scripts to manage network infrastructure devices.
- *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 Matrix Operating Environment*, which delivers Infrastructure-as-a-Service (IaaS) solutions for private and hybrid cloud environments.
- *VMware vCenter,* which deploys virtual servers in a VMware vSphere environment.
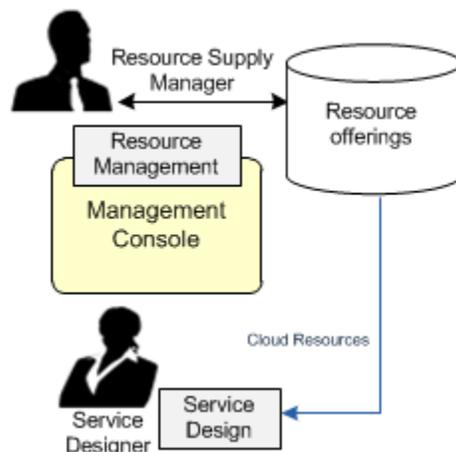
The **Resource Supply Manager** coordinates resource capacity and utilization. This user role also has the important task of introducing new resources into the system. For example, if a resource provider team such as HP Matrix Operating Environment administration develops a new template, the Resource Supply Manager can decide to place that template into a resource offering, which makes it available for incorporation into CSA service designs.

The Resource Supply Manager uses the Cloud 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 Matrix Operating Environment resource offering called HP MOE 1—then associates the resource offering with one or more resource providers used to provision the service.

- 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*.
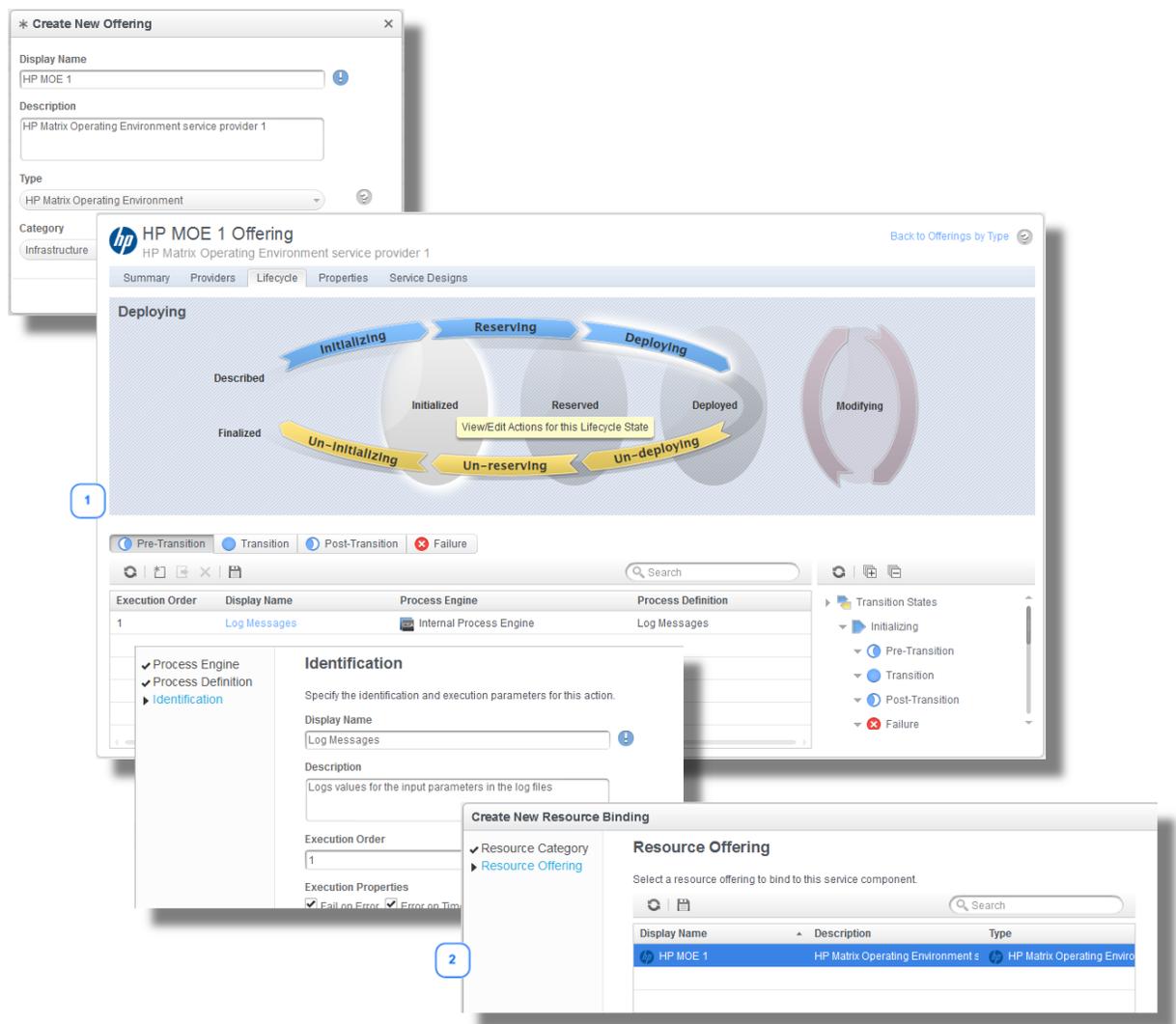
Import Reusable Content for System Resources

Once composed, resource offerings can be exported and imported between instances of CSA. Resource offerings created by other Resource Supply Managers and other administrators can be reused throughout a CSA instance as well as exported and imported between instances, and pre-built resource offerings for common resource providers are available from HP and from our partners.

Resource Supply Managers can import pre-built content and identify the resource providers in the environment which are capable of provisioning the resource offering.

Resource offerings embody discrete, specific actions for working with resources. Most are designed to be flexible and generally applicable—qualities that provide for reuse in multiple service designs. Resource offerings help standardize the consumption and management of resources around discrete tasks.

Service Design

User Role	Service Designer
	The Service Designer selects the appropriate components to realize services and configures actions—either directly or through a binding to one or more resource offerings—in order to run the tasks needed to provide the resources for service deployment. The Service Designer collaborates with the Resource Supply Manager to create services designs that call upon existing resource offerings
Prerequisites	✓ Skilled enterprise solution architect
	✓ Understands design and execution of HP Operations Orchestration flows
	✓ Expert understanding of enterprise system design requirements in order to relate these to the HP CSA component type hierarchy
Interface/Tools	Cloud Service Management Console
Key Concepts	**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.
	Service Composite
	The root component of a service design.
	Service Component
	Represents one element required to realize a service subscription, and provides a framework to describe the actions and resource offerings required to realize, manage, and retire this element.
	Service Component Type
	A hierarchical classification of service components that is used in service design. 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.
	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.

Build Automation Topology

CSA service designs provide a graphical palette for creating an automation topology. An automation topology describes how discrete automation tasks are associated with service components, sequenced and ordered, and how they relate and depend upon each other. Each component in a service design is visited by the lifecycle engine, and the actions configured on that component in the current state of the service lifecycle are run in order to move to the next state. Actions configured for components can execute sequentially or run simultaneously. The Service Designer arranges individual tasks and relationships for each component of the service.

Identify Service Components and Component Types

In a CSA service design, actions are configured on service components. Actions can be directly configured on the component to run in any lifecycle state transition by the lifecycle engine. Actions can also be configured in the *Deployed* stable state, to be available to a subscriber through the portal to be run on demand. As we discussed earlier, resource offerings are reusable collections of actions required to manage a resource through the entire service lifecycle. The actions in a resource offering are already mapped to the appropriate lifecycle transitions, and resource offerings can be bound to components in a design. The CSA lifecycle engine will run all of the actions associated with a component in the correct order.

Components are organized into component types, and the default types can be easily extended. Component types support specific relationships with other types, to help define sequencing through a design. Each component type can support associations with specific categories of resource offerings. Only resource offerings of these types will be available to bind to the component. The supported categories can also be extended.

The Service Designer selects the appropriate components to realize services and configures actions—either directly or through a binding to one or more resource offerings—in order to run the tasks needed to provide the resources for the deployment of the service.

Identify Component Properties

In addition to configuring actions associated with each component, properties are also defined and may be dynamically populated with values. Properties are configured in the designer for each component, and may receive values from subscriber selections, properties on other components, or values collected when actions are run. These properties provide context for the actions configured on the component, and persist values to be shared between actions.

Properties can be selectively exposed to the subscriber through the portal, and provide for presenting service specific information to the subscriber about the components that make up the service. For example, the hostname of a server is a property that can be presented to the subscriber.

Actions can read, update, or create properties on a component. Properties provide the mechanism to communicate subscriber choices into actions, and then to convey to the subscriber the specific results and information from the execution of actions. The Service Designer specifies the property values required for the configured actions and defines which properties are exposed to the subscriber.

Designing Services

The Service Designer uses HP CSA's built-in design and administration interface, the HP Cloud Service Management Console. In addition to handling resource management, service delivery, catalog management and other administration tasks, the Cloud Service Management Console handles the process of creating and maintaining *service designs*, which provide the basis for orderable services.
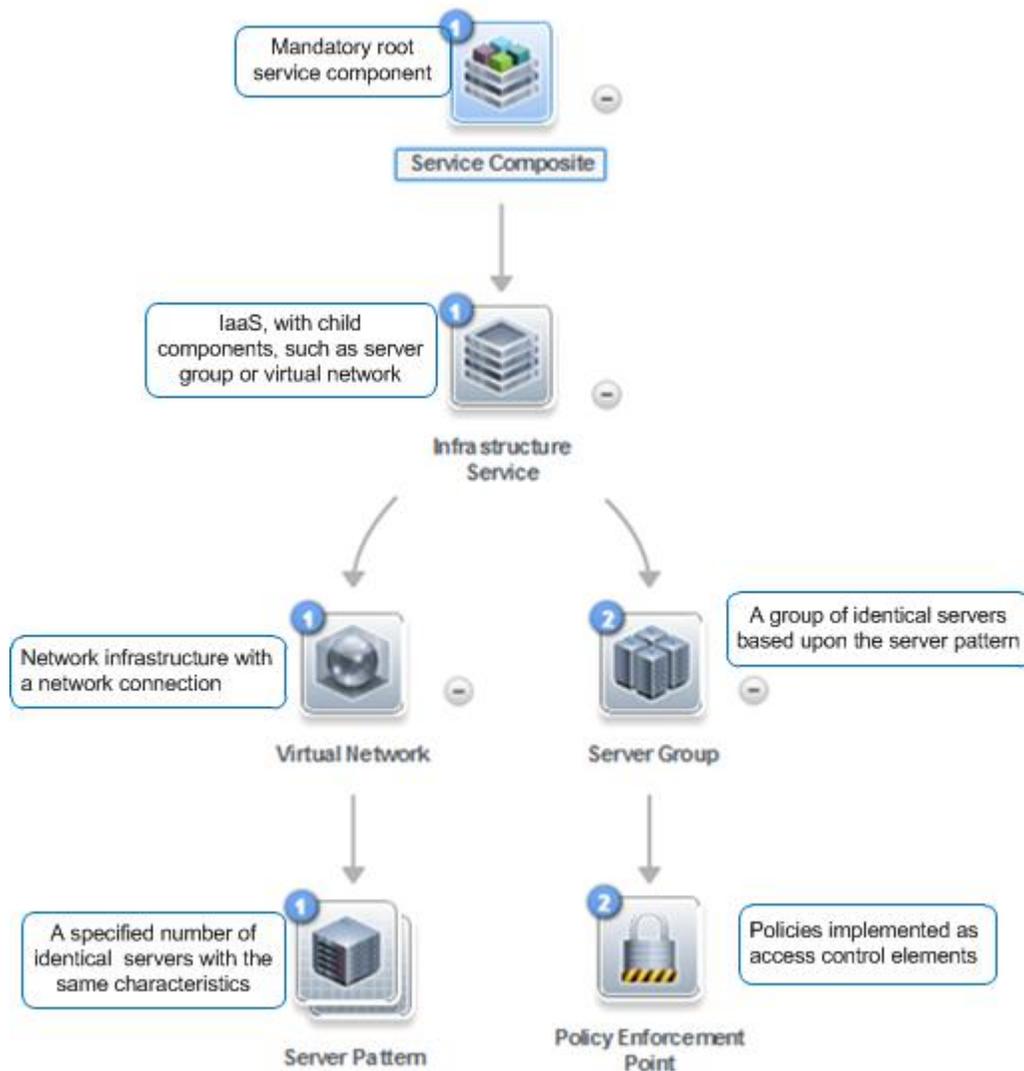
Before going into details, let's consider the fundamentals of this process.

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

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 provision a service. The Service Designer uses a graphical interface in the Cloud 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 4 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 Infrastructure Service, Network Connection, or Software Application Service, are provided with HP CSA.
Resource bindings	Elements of a service design used to assign or *bind* 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.

Component properties	User-defined values used to specify information to HP Operations Orchestration during service or resource provisioning, or alternatively, to pass values between components of a service design. 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 in the Cloud Subscriber Portal. Subscriber options can be designated as non-selectable (view-only) or available for editing and modification.

Figure 4: 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 reviewed the lifecycle process earlier (page 8). Recall that:

> 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.

> The lifecycle process executes hierarchically. At the highest or macro level, the lifecycle engine provisions the entire service. Further, at the lower or micro level, each service component has individual lifecycle processes, which coordinate with the whole. That is, in addition to the overall lifecycle sequence, individual service components have their own configurable lifecycle actions. The numerals in the illustration above indicate the *order* in which the processing of each 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.

Business Process Management

User Role	Service Business Manager
	The Service Business Manager creates and manages service offerings and service catalogs.
Prerequisites	✓ Understands how businesses are consuming services
	✓ Understands business organizations, and how groups of subscribers are configured
	✓ Can map collections of service offerings to groups of subscribers
	✓ Understands how to categorize service offerings meaningfully for subscribers
	✓ Able to decide how services are priced, or how costs are internally allocated
	✓ Has a clear understanding of the business approval process for service requests
	✓ Can identify appropriate service level or legal attachments to service offerings
Interface/Tools	Cloud Service Management Console
Key Concepts	**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. **Service Category** A collection of service offerings, configured in the Cloud Service Management Console. Subscribers see service offerings from organization-specific catalogs when they log into the Cloud Subscriber Portal. **Approval Policy** An approval policy defines the steps that HP CSA follows to determine how and when to approve a service request from a subscriber. Approval policies are only needed when the service offering's approval process is *active* rather than *passive*. Passive approval processes require no intervention for a service request to be fulfilled. Approval policies may require approval based upon the relationship of the approver to the subscriber (e.g., the subscriber's manager), a specifically named approver in the organization, or a reference to an external approval system. **Environment** A mechanism for grouping related resource providers. One or more resource environments can be linked to a service catalog to restrict provider selection 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. This provides a mechanism for ensuring that requests from specific populations are fulfilled with resources from a specific group of resource providers.

Identify Business Requirements

The Service Business Manager begins with an understanding of the business, and how it consumes cloud based services. While this sounds simple, it requires an understanding of both the technical components of the service designs, and an ability to map those technical elements into business capabilities.

Cloud based services utilize standardized component configurations, but they must offer the subscriber options sufficient to customize a service subscription to deliver specific business value. While the service designer is creating service design blueprints with the most flexible option set for reusability, the service business manager must decide how and which service options to expose to the subscriber for a particular offering. The same service design blueprint may form the basis for several offerings, each exposing different subscriber options. The service business manager works closely with the service designer to ensure that subscriber options are presented in an appropriate context for the subscriber population and mapped to technical properties that will produce consistent results.

When the service design process is complete, the Service Business Manager 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 Cloud Service 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. This user role also decides what service offerings are available per organization across the enterprise.

The service business manager must create catalogs of offerings for an organization which will be mapped to specific groups. This requires an understanding of the needs of different groups of subscribers within an organization and the services—and the relevant subscriber options—to expose to each group.

Groups of subscribers are defined by membership in the LDAP directory service for the organization. As each catalog is created, access to the catalog is configured by reference to the LDAP group. Multiple groups can be associated with a single catalog, and multiple catalogs can be configured for each group. The service business manager must understand the group structure in the organization's LDAP directory service and how to map catalogs of services to groups in the organization. Typically, these are groups that already exist in the organization, rather than groups that are created explicitly for CSA subscribers.

The service business manager also creates service categories and assigns service offerings to these categories. Service categories reflect logical groupings of related services into a context that is relevant and intuitive for the subscriber to navigate. Offerings within a service category should also make use of a consistent structure and business meaning for subscriber options.

Establish Pricing Structures

The Service Business Manager also establishes a pricing structure for each offering. Note that service pricing is the cost to the business subscriber, and not the cost to the infrastructure provider. Pricing is configured for the base service, in both an initial one-time value, and a recurring periodic charge. The Service Business manager can configure both the currency and the period for the fixed recurring charge.

Each service option that is exposed may also be configured with an initial one-time charge and a recurring fixed charge over a configurable period. As the subscriber selects different service options, the pricing is automatically adjusted to reflect the total price for the basic service and options. Default options may be specified in the offering configuration.

Design and Manage Service Offerings

Each service offering can be customized for the business subscribers with an offering name, a relevant contextual description of the service, and a custom logo that will represent the offering in the catalog. The description may provide a link which offers additional background information about the service for the subscriber.

Service offerings may also include attachment documents which can be downloaded and reviewed by subscribers. Typically, these attachments to the offering would include formal Terms and Conditions, Service Level Agreements, or licensing agreements.

Publish to Service Catalogs

Finally, the Service Business Manager must publish service offerings to one or more catalogs. Each catalog is exposed to one or more groups within an organization, and there is one shared global catalog visible to all

subscribers. The Service Business Manager must consider the needs and expectations of each group with access to a catalog in deciding how to publish service offerings.

When a subscriber accesses the subscriber portal, all of the service offerings in the catalogs to which this subscriber's group has access will be represented in the catalog view. The Service Business Manager decides how to present offerings in categories which are relevant to the subscriber and easy to navigate.
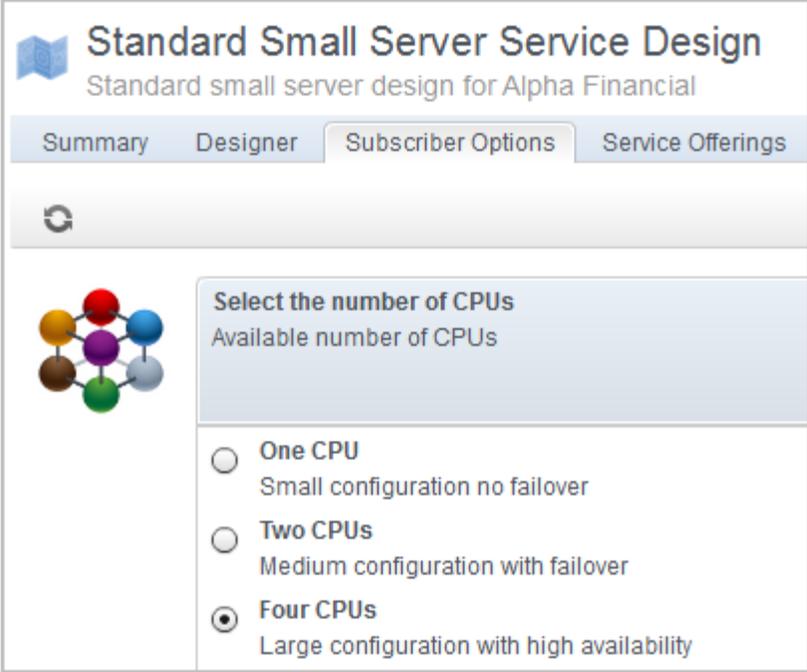
Designing Service Offerings

A service design forms the basis of a service *offering*. The Service Business Manager adds pricing, logos or other images and other specific information required for subscription.

For a better understanding of 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 we want to make a particular service 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.

Per Organization A's Service Level Agreement (SLA), all servers used by Organization A must have some recovery or redundancy mechanism. Accordingly, the Service Business Manager restricts the original design, designating that the service offering has two selectable options—one option with failover and the other with high availability—as shown below.
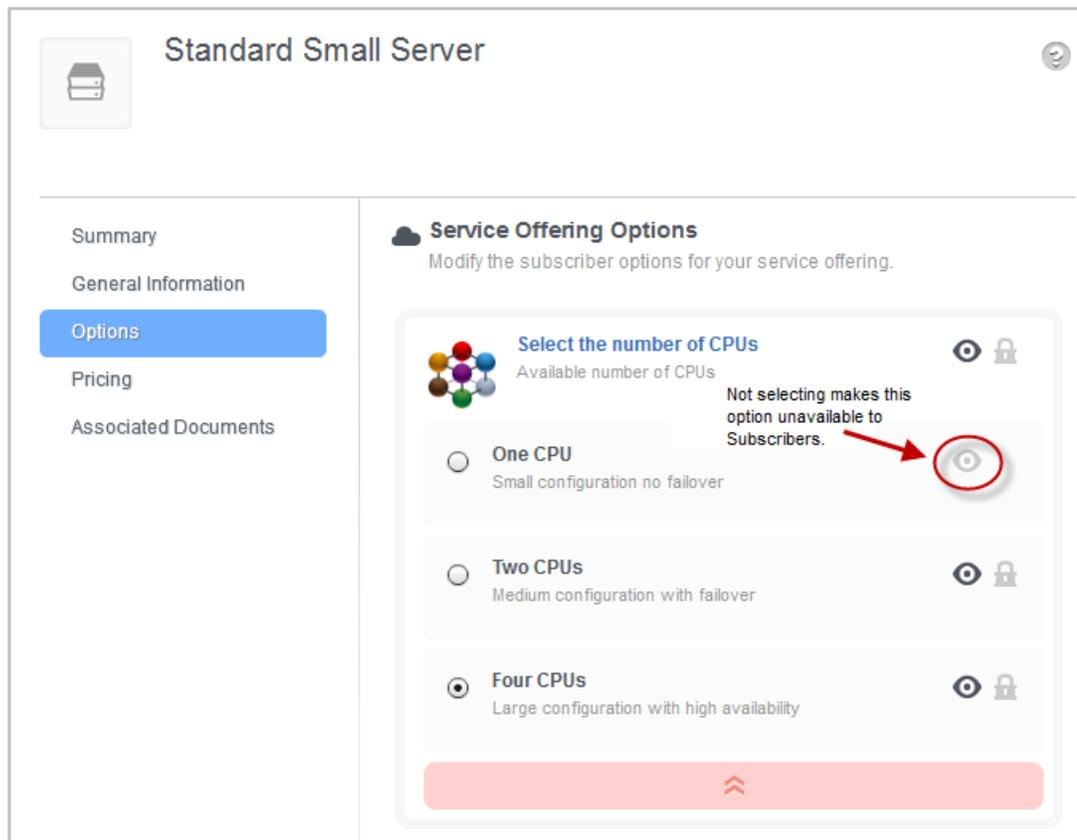
Furthermore, the SLA for Organization A requires that users be able to modify the service offering after the service has been deployed by reducing or increasing the number of CPUs. Modification applies globally to all compute resources in the service; in other words, if the subscriber modifies the number of CPUs from two to four, the number of CPUs for all servers increases. 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 Service Business Manager could decide *not* to allow the subscriber to change underlying characteristics at all after initial subscription.

Consumer Service Administration

User Role	Consumer Service Administrator
	The Consumer Service Administrator configures and manages consumer and provider organizations. The Consumer Service Administrator *only* has access to the Administration tab of the Cloud Service Management Console.
Prerequisites	✓ Understands the LDAP service access, attributes, and directory structure for each organization
	✓ Understands how LDAP groups map to each role in both the provider and consumer organizations
	✓ Provides SMTP server access information for email based notifications for each organization
Interface/Tools	Cloud Service Management Console
Key Concepts	**CSA Provider**
	Each CSA instance represents a single Provider organization, which is the service provider. This organization references an LDAP directory service for authentication and defines groups to access each provider role. The provider organization is customized with name, logo, and description.
	CSA Consumer
	Multiple consumer organizations may be configured. Each consumer organization represents groups of service subscribers. Each organization is created and configured in the Administration tab of the Cloud Service Management Console. Configuration of the consumer organization includes custom name, logo, and description, as well as an LDAP directory service and SMTP relay. Each consumer organization defines only one role, the Service Consumer role.

Subscriber Access per Organization

The Consumer Service Administrator creates new consumer organizations and configures both the provider and consumer organization attributes. These attributes include the customizations for each organization—the name, a description of the organization, and a logo which can be selected from a default library or uploaded and reused.

CSA works with an LDAP instance to authenticate users, and with group membership to establish access controls. CSA does not directly provide for user administration.

Each organization is configured to reference an LDAP service instance. Multiple organizations can share the same LDAP service, but each organization must be configured independently. Each organization must reference only a single LDAP service.

Access controls for various roles, and for service catalogs are described through references to LDAP groups. A "distinguished name", or "DN", is a reference that can describe a group in an LDAP service, and roles for each organization are associated with one or more DNs to establish user access.

Each organization is also configured to reference an SMTP (Simple Mail Transfer Protocol) server for email based notifications to users in the organization.

Operations and Production

User Role	Service Operations Manager The Service Operations Manager views and manages subscriptions and service instances.
Prerequisites	✓ Understands how execution engines are configured and accessed through CSA ✓ Has administrative access to execution engines and resource providers to resolve operational failures while running actions ✓ Understands service design topologies and how actions are sequenced to run
Interface/Tools	Cloud Service Management Console
Key Concepts	**Service Design** A service design represents the initial component configuration and actions for a service instance. When a subscriber requests a service, the service design provides the framework and sequencing for actions which are executed to realize an instance of this service. The service design represents only the starting state of the components in a service instance. The service design also provides a structure for service options which can be expressed at the time a new service is requested. **Service Instance** A service instance is a specific individual collection of components and actions created to fulfill a subscription request. A service instance begins by executing the actions configured on the components in the service design, using values expressed either directly in the design or in the subscription request. Once the service instance is created and begins to dynamically execute actions, the topology of a specific service instance can grow beyond what was expressed in the initial service design.

Track Subscriptions and Service Instances

The Service Operations Manager accesses the Service Operations tab in the Cloud Service Management Console to navigate to specific service instances. For each consumer organization, the Service Operations Manager selects a subscriber, and then views a list of subscriptions requested by that subscriber. Selecting an individual subscription presents a subscription details view.

In the subscription details, the Service Operations Manager can see information specific to this subscription request—the date requested, the subscription period, the offering and service design this subscription is based upon, and the current status. In the service topology view, the service instance is represented in a graphical presentation which is based upon the same layout used to create the service design. In this view, however, the actual components created for this instance from the initial design are shown, along with a history of the actions which were executed for each component. Components dynamically created throughout the life of the subscription—for example, servers which are cloned from a pattern expressed in the initial design—are displayed in this view.

This view is a near-real time view of the service instance, and can be configured to auto-refresh over the life of the service.

Administer Subscription Ownership

The Service Operations Manager can reassign the ownership of a subscription in the subscription details for any subscriber. If the initial subscriber leaves the company or moves to another organization, the subscriptions can be selected and transferred to another subscriber known to the system. In this case, future subscription modification requests can be initiated from the new subscriber, and approval policies based upon relationship with the new subscriber—manager approvals, for example—will forward requests correctly to the new subscriber's approver. The new subscriber will receive notifications, can execute actions, and can request service cancellation.

Customers and End Use

User Roles	Approver Service Consumer Subscriber Of these three user roles, only Service Consumer appears as an explicit role in the Cloud Service Management Console. The Service Consumer is the user role configured for consumer organizations. As discussed earlier, service consumers may self-subscribe or may depend on separate subscribers who place service requests on their behalf. Approvers are members of consumer organizations who explicitly grant subscription requests when service offerings have active approval processes.
Prerequisites	✓ Subscribers must be able to access the subscriber portal with appropriate credentials and group membership ✓ Subscribers must be familiar with the service catalog, and must be knowledgeable to select the appropriate services for their business needs ✓ Consumers of provisioned components must be able to access the resources of the service, but may or may not interact directly with the subscriber portal
Interface/Tools	Cloud Subscriber Portal
Key Concepts	**Subscriber** A Subscriber interacts directly with the Cloud Subscriber Portal to request services from a catalog which is presented based upon the group membership of the Subscriber. Subscribers access details of subscription requests, and the details of components deployed to realize service subscriptions. Subscribers receive status notifications through the subscriber portal, and request actions to be performed during the deployed phase of the service lifecycle. Subscribers initiate cancelation requests to terminate service subscriptions. **Service Consumer** A consumer of a service uses the resources of the deployed service subscription. A consumer may or may not also be a Subscriber.

Subscription Requests

Subscribers are members of a group in an organization's LDAP directory who are configured to authenticate into the subscriber portal. Based upon the subscriber's membership in one or more groups, various offerings may be visible to a particular subscriber. The subscriber selects an offering and creates a subscription request.

The subscription request includes identifying details and the selections from options configured by the Service Business Manager to be presented for this offering. The subscriber reviews the initial and recurring pricing information for the service and the selected options, and submits the request.

The subscriber can schedule the starting and ending dates for the service.

Approval and Authorization Process

Service Offerings can be configured with approval policies which are specified at either the catalog or individual service offering level. Service approval policies can be configured to specify approvers based upon their relationship to the subscriber—for example, the subscriber's manager. Approvers can also be specifically named individuals in the organization. Approval policies can also reference an action which integrates with an existing external approval management system to implement more complex approval policies or to provide seamless integration with existing processes.

When a service with an approval policy is requested, the approver is notified through the subscriber portal that an active approval is required. The service provisioning process does not begin until the request is approved.

The subscriber will see the service request in their view of the portal as "pending approval" until the approver takes action. The subscriber can review the details of all service requests in the subscriber portal.

Service offerings can also be configured for pre-approval, with a passive approval process. Requests for these services are immediately approved, and the service begins deployment on the scheduled date.

Modify and Delete Cloud Service Subscriptions

Once a subscription is active, the subscriber can view service components and request actions configured on these components to be run. The requests for actions and the results are reported back through the subscriber portal, and specific error information can be provided to the subscriber in the event of a failure.

The subscriber can also request modification of the service through the subscription management panel. When modifying a service, the subscriber is presented with some or all of the original subscription options. The subscriber can modify those options, and actions will run to re-configure the service based upon the new option values. The service designer must incorporate actions into the service design that will accomplish this reconfiguration, and must designate the options which can only be specified on the initial service request.

The subscriber can review service requests for individual subscriptions, or review and filter all service requests.

From the subscription details view, the subscriber can also request service cancellation. Service cancellation requests are processed immediately, and initiate the execution of actions designed to gracefully retire the service components.

End-Use

One additional role that's important to mention is the role of the consumer. A consumer uses the resources deployed to realize a service subscription. Consumers may be developers that log into systems deployed as CSA service subscriptions, or they may be end-users of a web based application that's exposed to the public internet when a service is deployed.

Consumers may not be aware that CSA was the system used to deploy the resources they are using. They may or may not be aware of the subscriber that requested the subscription to the service that deployed their application. The subscriber and the Service Business Manager may need to work together to ensure that consumers understand any applicable policies for the use of provisioned resources and understand operational support processes for requesting technical support. The subscriber may also be responsible to communicate access credentials to consumers or otherwise configure access to specific resources for consumers.

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 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 wait until June 30— the new date that Bob requested—before cancelling the service and returning all resources.

The approval workflow within the Cloud Subscriber Portal requires these dedicated *user roles*.
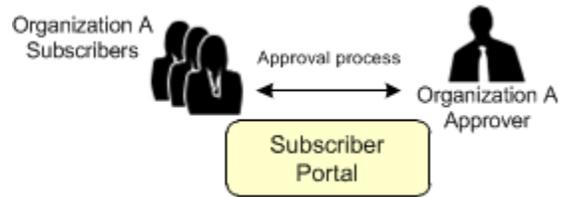
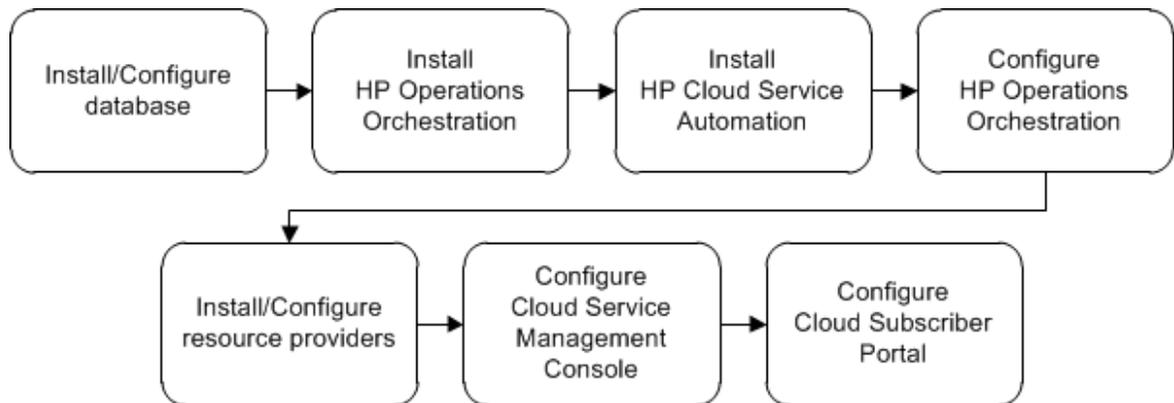**Approvers** authorize service requests according to one of the pre-determined approval methods shipped with HP CSA. An approval process is recommended, but not required.

Subscribers select services from the catalog listing, making a *service request* that (when approved) becomes a *subscription.* Subscribers may be able to modify subscription options after the subscriptions have been fulfilled.

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 basic network and storage set up 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*.

```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│Install/Configure│  │    Install   │   │    Install   │   │   Configure  │
│   database    │──▶│ HP Operations│──▶│HP Cloud Service│─▶│ HP Operations│
│              │   │ Orchestration│   │  Automation  │   │ Orchestration│
└──────────────┘   └──────────────┘   └──────────────┘   └──────────────┘

        ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
        │Install/Configure│  │  Configure  │   │   Configure  │
        │resource providers│─▶│Cloud Service│─▶│Cloud Subscriber│
        │              │   │ Management   │   │    Portal     │
        │              │   │   Console    │   │              │
        └──────────────┘   └──────────────┘   └──────────────┘
```

Extending and Customizing 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 Cloud Service Management Console. Service design content is packaged into "Portable Content Archives" which contain service designs and the resource offerings they reference. When importing design content, the import function will determine if the resource offerings required by the service design are already present on the system, and reference existing resource offerings where appropriate. New resource offerings will be imported and automatically referenced by the service 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

HP CSA 3.x resource management is partly *externalized*. While CSA is aware of the resource providers in the environment, it has no specific domain knowledge of the resources available from each provider. CSA incorporates a simple provider selection mechanism by default, but also supports provider selection decisions based on user created policies. Provider selection logic must be implemented in user created actions.

Create a Provider Type

You use the Cloud Service Management Console to create new types of providers. For instance, you may want to add a provider type for database provisioning—say HP Database and Middleware Automation (HP DMA). To do this, you use the Cloud Service Management Console to create a provider type, populating this new type with resource 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 Cloud Service Management Console to create a new component type, as shown below.
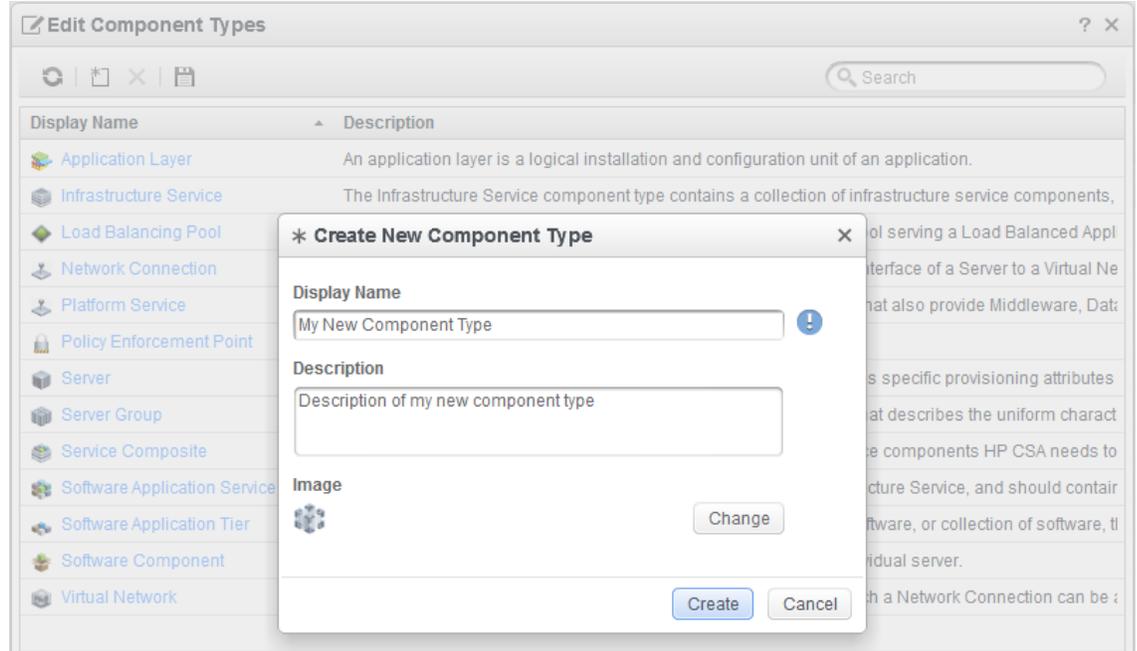

Create a Customized Lifecycle Action

You use the Cloud Service Management Console to create lifecycle actions for both service components and resource offerings. For example, perhaps you want to email notification to a subscriber when a provisioned server 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 11), the CSA Administrator creates *organizations* across an enterprise. Organizations are presented with a customized view of the Cloud Subscriber Portal, and may be served from either a dedicated or shared portal instance. . 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 Cloud Service Management Console, which by default creates a service catalog whenever you create a new organization. For each catalog in an organization, you can associate the required approval process, access control policy, and catalog image.
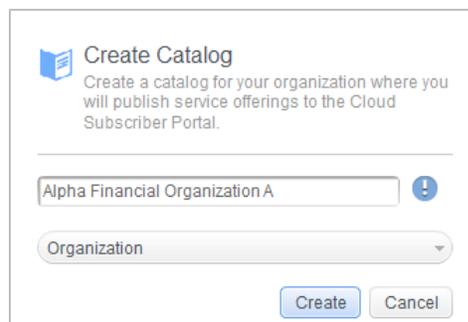
Sample Service Designs and Resource Offerings

HP CSA is shipped with pre-developed service designs and resource offerings that can be customized for your use. You can import and export this integrated "content" developed for specific HP CSA applications, and adapt it to your business needs. The out-of-the-box integrations shipped with this version of HP CSA are stored in a library folder on the HP CSA media.

You can also download integrations at the HP Live Network website: https://www.www2.hp.com/. Access to this site is restricted. HP customers must have an active HP support agreement ID (SAID) for HP Cloud Service Automation and an HP Passport sign-in to access the data on this site. For more sample services designs and sample resource offerings, see your HP Professional Services Representative.

The HP CSA Application Program Interface

A set of Application Program Interface (API) calls underlie HP CSA functionality. These REST APIs are designed to provide a clean separation of Cloud Subscriber Portal functions from Cloud Service Management Console functions. Therefore, organizations can build their own catalogs and subscription mechanisms on top of HP CSA, replacing the Cloud Subscriber Portal with their own alternate portal.

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 Process Flow Diagram
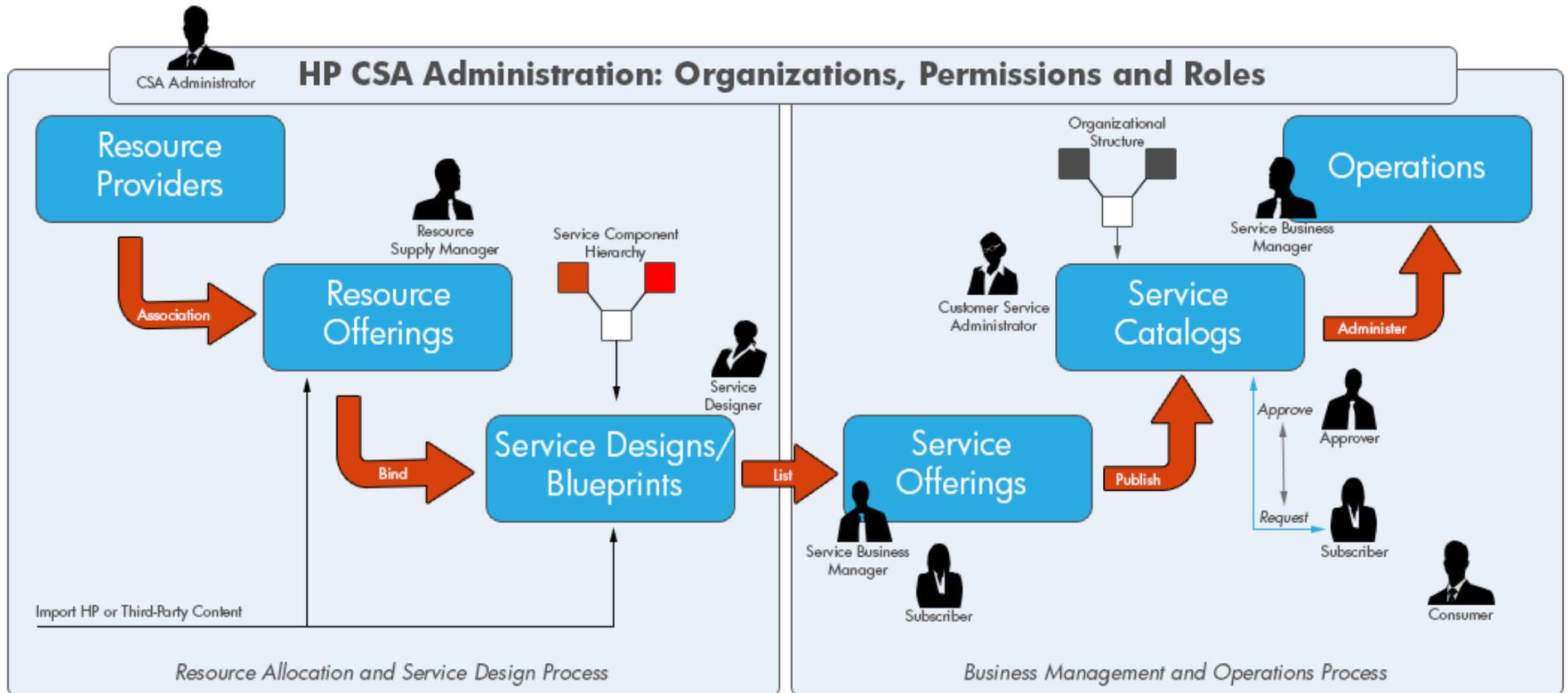
The diagram above represents an overview of the key processes and their relationships to the personas that interact with HP CSA. These processes are grouped into three functional areas, around Resource Allocation and Service Design, Business Management and Operations, and the administrative processes to configure organizations, permissions, and roles.

In the resource allocation and service design area, the Resource Supply Manager is responsible for identifying and configuring the resource providers available in the datacenter. CSA must have credentials available and the URL to access the provider interfaces that support allocating and managing specific resources. Collections of actions required to manage provider resources are configured as resource offerings, and providers that expose the interfaces required for these actions are associated with resource offerings by the Resource Supply Manager.

HP or partner service design content—resource offerings and service designs—are imported by the Service Designer, who must coordinate the configuration and association of resource providers with resource offerings with the Resource Supply Manager.

Resource offerings are bound to components described in service designs, which express a hierarchy of service components with actions to manage the lifecycle of each component of a service instance. Actions can be bound through resource offerings or directly associated with a component by the Service Designer.

Once the service design has been created, a service offering is composed by the Service Business Manager. The service offering is based on a service design and includes the configuration of pricing for the service options, customization of the presentation attributes, default values, exposed options, and attached documentation. The Service Business Manager selects a single service design that forms the basis of the service offering from a list of enabled designs. An approval policy is configured for the service offering or applied to an entire service catalog. The approval policy can designate a named approver, specify an approver with a relationship to the subscriber, or configure a passive approval process. Approvals can also be routed to an external system.

Service offerings are published by the Service Business Manager to one or more individual service catalogs. The Consumer Service Administrator configures service catalogs associated with organizations and access to catalogs based upon the group membership of the subscriber within the organization's LDAP structure. The Service Business Manager determines how offerings in the catalog are organized and presented to subscribers and exactly which offerings are available in each catalog. There is generally one Service Business Manager for each organization.

When a subscriber requests a service, the request must first be approved. Once the request has been approved, a subscription to the service is created. The subscription runs the actions specified in the service design to create an instance of the service for the subscriber. The subscriber is notified when the service instance is deployed and presented with detailed information about the components of the service. The service is now available for use by the subscriber directly or by other consumers of the service.

Service instances are managed by the Service Operations Manager. The Service Operations Manager can reassign the ownership of a service to another subscriber or view detailed action execution information about the components of a service instance. The Service Operations Manager can also review the resource providers selected to deploy this service instance.

The CSA Administrator's role spans both of these functional areas. The CSA Administrator defines organizations and how subscribers access their organization's portal. For each role in the system, the CSA Administrator defines the permissions and access control. The CSA Administrator has overall responsibility for the access to resource providers, specific resources, design content, offerings and catalogs, and the operations of service instances.

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:

 Cloud Subscriber Portal

 Cloud Service Management Console

A

Access Control

Allows a CSA Administrator or Consumer Service Administrator to control assignment of HP CSA user roles. User roles authorize access to specific parts of the Cloud Service Management Console or access to the Cloud Subscriber Portal. Access control also 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.

Action

Command available in the Cloud Subscriber Portal for active subscriptions. For example, if your subscription includes a server component, while the subscription is active you might be able to issue commands that start, stop, or suspend the server. Selecting an action in the Cloud Subscriber Portal creates a request for the action. Service Designers configure lifecycle actions in the Cloud Service Management Console and designate which lifecycle actions are visible to subscribers as actions. See also *Lifecycle Action*.

Administrator

See *CSA Administrator* and *Consumer Service Administrator*.

Approval

Response indicating the approval or denial of a service request. If you are a designated approver of requests, you can view your responses to service requests in the Cloud Subscriber Portal under the My Approvals for Others category of the Requests tab.

Approval Policy

Steps that HP CSA follows to determine how and when to approve a service request for a published offering with an active approval process. The CSA Administrator specifies the approval policy for an offering or a catalog by selecting one of three HP CSA templates: Named Approver Template, User Context Template, or Delegated Template. Policies can optionally refer to LDAP settings when applied to service requests. See also *Approval Process*, *Approver* and *Lightweight Directory Access Protocol* (*LDAP*).

Approval Process

One of two methods—*Passive* or *Active*—for granting service requests, configured for a service catalog and optionally overridden for individual service offerings. A passive approval process automatically approves requests. An active approval process follows the steps defined in the associated approval policy to determine approval. See also *Approval Policy*, *Approver* and *Lightweight Directory Access Protocol* (*LDAP*).

Approver

An individual who is authorized to approve service requests from a set of subscribers (members of an organization who request cloud services). See also *Subscriber* and *Service Request*.

Artifact

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

Automation Sequencing Topology

A representation of a service lifecycle and the lifecycle of each service component. The automation sequencing topology specifies how automation tasks are associated with service components, how tasks are sequenced and ordered, and how they relate and depend upon each other. The Service Designer lays out the automation topology to define the processing order of the actions associated with each service component and the overall service lifecycle sequence. See also *Service Topology*.

B

C

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. From the 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). Consumer organizations provide enterprise-ready access to HP CSA cloud services. Members of a consumer organization place cloud service requests from service catalogs assigned to their organization. Consumer Service Administrators or CSA Administrators use the Cloud Service Management Console to set up and maintain consumer organizations. 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, Service Operations Manager*, 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 and the configured Operations Orchestration process engine 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 and authorization for HP CSA access. See also *Consumer Service Administrator, Resource Supply Manager, Service Business Manager, Service Designer, Service Operations Manager*, and *User Roles*.

Custom Properties

User defined values configured on a service component, resource offering, or resource provider, typically read by HP Operations Orchestration flows during service provisioning. Custom properties can also be used to pass values between components of a service design and are used in conjunction with subscriber options to set properties on a service instance based on subscriber option selections. Certain properties can be made visible and/or editable in the Cloud Subscriber Portal. See also *HP Operations Orchestration (HP OO)* and *HP Operations Orchestration Flow*.

D

E

Environment

A mechanism for grouping related resource providers. One or more resource environments can be linked to a service catalog to restrict provider selection 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 HP CSA instance. Service offerings published to the global shared catalog are visible to all users in all Cloud Subscriber Portals. 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 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 Cloud Service Management Console

Software that provides an HP CSA 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, Service Designer, and Service Operations Manager. See also *HP Cloud Subscriber Portal*.

HP Cloud Subscriber Portal

Software that delivers cloud-services to subscribers (customers) by providing one or more service catalogs per organization. The Cloud 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 Operations Orchestration Flow

A run-book automation workflow composed of operations, subflows, and integrations which implement a discrete action. Flow are synchronized with HP CSA, and presented as actions which can be configured with Resource Offerings or directly attached to components. HP Operations Orchestration flows are created, modified, and saved using HP Operations Orchestration Studio. HP CSA includes a set of sample HP Operation Orchestration flows used by HP CSA's sample service designs. See also *HP Operations Orchestration (HP OO)*.

HP Professional Services Organization (PSO)

The HP service professionals who install and deploy the HP CSA solution.

Hybrid Cloud

A type of cloud-computing that features a flexible, scalable infrastructure that can be deployed using both privately managed and publically hosted resources. 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). From the 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. Lifecycle actions can also be configured on stable states and made visible to subscribers in the Cloud Subscriber Portal. See also *Actions, 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 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. From http://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol

In production environments, HP CSA requires configuration of an LDAP directory of users and groups for authorization, authentication and access control.

M

Management Console

See *HP Cloud Service Management Console*.

Modifying State

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

N

Notification

An email communication indicating that a subscription-related event has occurred, for example, 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 configuration, which CSA accesses to authenticate 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. From the 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 ((•)) icon in the Cloud Service Management Console. See also *Organization* and *Consumer Organization*.

Provider Type

A way to classify resource providers and resource offerings for improved filtering and identification. HP CSA includes pre-defined, out-of-the-box provider types. Each instance of a resource 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. 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 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.

Resource Offering

A capability offered by a provider (or a group of providers) associated with a service design. Resource offerings are defined in the Cloud Service Management Console. An offering has a single provider type and a single resource category. An offering is associated with providers to indicate which providers support the offering.

Resource Pool

A pool of resources associated with a resource provider. Note that resource pools apply only to certain provider types, such as HP Matrix Operating Environment 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 of HP Matrix Operating Environment services provisions infrastructure and basic applications, while a provider of HP SiteScope services 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*, *Service Operations Manager*, and *User Roles*.

S

Service Business Manager

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

Service Blueprint

See *Service Design*.

Service

See *Cloud Service*.

Service Catalog

A collection of service offerings, configured in the Cloud Service Management Console. Subscribers see service offerings from organization-specific catalogs when they log into the Cloud Subscriber Portal.

Service Component

Represents one element required to realize a service subscription and provides a framework to describe the actions and resource offerings required to realize, manage, and retire this element.

Service Component Type

A hierarchical classification of service components that is used in service design. 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.

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, Service Operations 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 Operations Manager

An HP CSA user role. The Service Operations Manager views and manages subscriptions and service instances. See also *Consumer Service Administrator*, *CSA Administrator*, *Resource Supply Manager, Service Business Manager, Service Designer*, and *User Roles*.

Service Request

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

Service Topology

A topology diagram of a deployed service design (or blueprint), which allows you to see the service components and their relationships.

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. From the 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. A subscriber initiates service delivery and resource provisioning by making a service request in the Cloud 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 subscribers (end users) in the Cloud Subscriber Portal. Subscriber options can be designated as non-selectable (view-only) or available for editing and modification. See also *Service Design, Service Offering*, and *HP Cloud Subscriber Portal*.

Subscriber Portal

See *HP Cloud Subscriber Portal*.

Subscription

An instance of a service offering as requested by a subscriber and granted through the relevant approval process. Subscriptions incur costs according to a cost structure developed by the Service Business Manager. See also *Subscriber, Service Offering, Service Request, Service Business Manager,* and *Service Operations Manager*.

T

Transition State

A lifecycle state indicating change from one stable state to another within the service lifecycle. Transition states include Initializing, Reserving, Deploying, Un-deploying, Un-reserving, Un-initializing and Modifying. 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 a CSA organization. A person may have only one role—for example, a dedicated HP CSA Service Designer—or one person can take several user roles. For example, a Service Designer could also take the role of Service Business Manager. User roles are defined under the Administration tab of the Cloud Service Management Console. See also *CSA Administrator, Resource Supply Manager, Service Consumer Administrator, Service Designer, Service Business Manager, Service Operations Manager*, and *Subscriber*.

V

W

X

Y

Z

For More Information

To access other toolkits to design and extend 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 ArcSight
- HP Operations Orchestration
- HP Server Automation
- HP SiteScope
- HP Universal CMDB

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