

HP Cloud Service Automation 4.10

Configuring Intelligent Resource Management



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Introduction

Intelligent Resource Management provides a model to represent resource demand across different categories of providers. It also provides capacity and utilization awareness of these resources in HP CSA. HP CSA does not control management of actual resources on providers, but the goal is to manage the capacities made available to HP CSA from providers and track their utilization. HP CSA accounts for the utilization of these resource capacities for each subscription in HP CSA.

In the following discussion, any reference to the term “provider” implies reference to a “resource provider.”

Pre-Requisites

This document is targeted at individuals who are familiar with the basic concepts of HP CSA. Process definitions for out-of-the-box (OOTB) HP Operations Orchestration (HP OO) content need to have been uploaded into HP CSA successfully. For more information, refer the *HP CSA Configuration Guide*.

Note

The *HP CSA Concepts Guide* includes information on basic HP CSA concepts, including a master glossary of HP CSA-related terminology.

Concept of Resource Pools

A resource pool models the capacity and utilization of resources, which are represented as elements in the service model. Resource pools are optionally configured to represent those resources that a resource provider makes available to HP CSA.

HP CSA can model resource supply in resource pools associated with each resource provider. For example, you can create resource pools on a VMware vCenter resource provider to represent collections of virtual resources for a single hypervisor, a cluster, or the entire datacenter. You can also model HP Matrix Operating Environment infrastructure orchestration resource pools (pools of CPU, memory, and storage) as HP CSA resource pools.

HP CSA models resource demand using properties on service design components. HP CSA links the property demand to a specific resource pool's supply via resource binding actions during service instantiation.

The property on a service design that links to a specific resource pool via resource binding is known as *measurable property*. A measurable property has a resource type and a unit of measurement.

HP CSA allows to you define the following resource types for each pool:

- CPU
- IPv4 address
- IPv6 address
- License
- Memory
- Physical server
- Power
- Storage
- Subnet
- Virtual Server
- VLAN

Provider and Pool Selection Internal Actions

HP CSA provides the following internal actions to help with provider and pool selection:

Build Resource Provider and Pool List

This internal action builds a candidate list of resource providers and associated resource pools that meet the following requirements:

- The resource pool has the “Availability” option Enabled.

- One or more resource types (CPU, MEMORY, STORAGE, etc.) are added on to the pool with the Resource Availability option marked as “Available” or “Unlimited”.
- The resource pool should have enough capacity to support all the resource types defined on the pool. If resource type is marked “Available,” then the difference between Total Available to CSA and Current CSA Utilization must be greater than the value required by the measurable property.
- If the service offering that references the service design with this action is in a service catalog with resource environments selected, the candidate pool list is further restricted to only include resource providers in one or more of the selected resource environments.

Select Resource Provider and Pool

This internal action selects a resource pool and provider from the candidate list that was built by the Build Resource Provider and Pool List action. The selected resource provider and pool will then be available to resource offering actions in the token `RSC_PROVIDER_ID` and `RSC_POOL_ID`, respectively. The selected pool will, optionally, be written to a property on the associated service component if the `Pool Property Name` input to the action is provided.

Select Resource Provider and Pool from Parent

This internal action selects the resource pool and provider already chosen by a service component’s parent service component, as identified by the Parent Component ID and Pool Property Name properties. The selected resource provider and pool will then be available to resource offering actions in the token `RSC_PROVIDER_ID` and `RSC_POOL_ID`, respectively. The selected pool will also be written to a Pool Property Name property on the associated service component.

Resource Accounting Internal Actions

HP CSA provides the following internal actions to consume or release the resource types defined on the pool:

Increase Resource Utilization

- This action is configured during the Reserve state transition.
- It increases the Available to CSA resource type in a resource pool by the values of the measurable properties configured on a resource binding.

Decrease Resource Utilization

- This action is configured during Un-Reserve state transition.
- It decreases the Available to CSA resource type in a resource pool by the values of the measurable properties configured on a resource binding.

Resource Management

HP CSA provides the capability to model, manage, and track resources of providers. Resource pools are used to model the capacity and utilization of resources. To model a pool, you need to identify the resource types to be managed like CPU, MEMORY etc. and capacity of each resource type. Also, to consume these resources during service subscription, measurable properties are configured on service components to capture the demand for each resource type.

Resource Supply Management

HP CSA resource administrators take care of supply management. The following summarizes the supply management in HP CSA:

- To configure a resource supply, the administrator needs to identify the capacity of each resource that can be allocated for a provider and pool.
- Multiple pools can be configured per provider.
- Multiple resources per pool are supported. For example, a pool can have CPU, MEMORY and STORAGE resources configured.
- HP CSA supports Environment association with the pool or provider.

Resource Demand Management

The following is the summary to manage demand in HP CSA:

- Resource demand is expressed using the measurable properties, which are described as properties on a Service Component. Measurable properties have a resource type and a unit of measurement.
- A resource or multiple resources (CPU, STORAGE, etc.) in demand will be presented to provider and resource pools. The provider and the pool which satisfy the resource demand will be selected for utilization.
- If the resource demand cannot be determined during provider selection, then you can externalize the provider and pool selection. Additionally, an HP OO work flow has to be developed which will determine the resource demand and select the appropriate provider and pool. Refer to the document entitled *HP CSA 4.10 Custom Resource Provider and Pool Selection* for details.
- Once the demand criteria is satisfied, then accounting actions will utilize the resources and decrease the allocated capacity of the resource from the resource pool. These actions are defined in Reserve/Un-Reserve transitions phases.

Resource Pool Use case

HP CSA administrators configure resource pools on HP CSA to utilize the resources of the provider. The following use cases can be derived while configuring providers and pools on HP CSA.

Case 1: Administrators have to know the available resource capacity for each resource that needs to be configured on the HP CSA resource pool. During provider and pool selection, these resources will be consumed accordingly.

Case 2: Administrators cannot determine available resource capacity to configure on the resource pool. In such cases, they can still configure the pool but externalize the provider and pool selection by determining the resources available on the actual provider.

This white paper will explain the former case. For the latter case, refer to the document entitled *HP CSA 4.10 Custom Resource Provider and Pool Selection*.

For our example, let's assume the following scenario: We want to design a service to provision a simple compute server using the provider VMWARE VCENTER (vCenter). The service should consume resources from the pool while provisioning, and release the resources back to the pool during tear down of the service.

The purpose of this example is to help the reader understand how to configure resource pools, resource types for each pool, configure measurable properties, and configure internal actions on resource bindings.

The steps will not illustrate basic HP CSA operations (for example adding a resource provider, publishing a service offering etc.). To perform these basic operations, refer to the *Cloud Service Management Console Help* document.

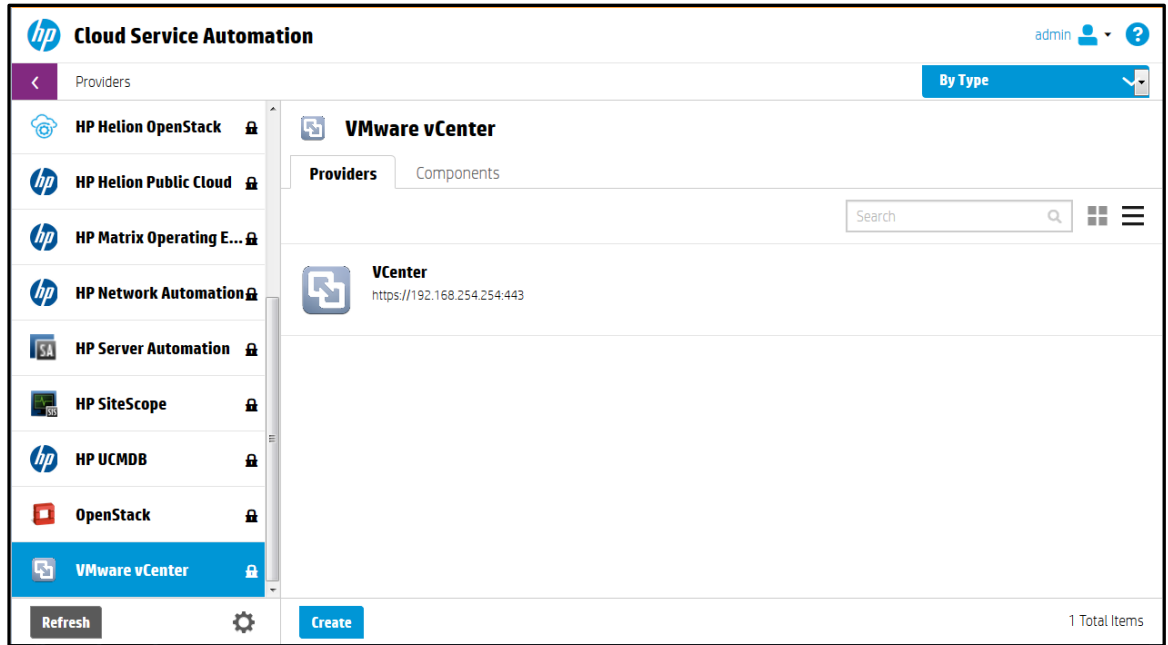
Since HP CSA ships with the out-of-the-box content VCENTER_COMPUTE_MODIFY_3.2, we will use this content to illustrate the steps. To import the content, use the **Designs** portion in the Cloud Service Management console. For this example, import the CSA_BP_VCENTER_MODIFY_v3.20.00.zip content. The content can be found at the location: `%CSA_HOME%/CSAKit-<version>/Content Archives/sequenced/vmware vcenter.`

Steps to configure resource pool

1. Add a vCenter provider.

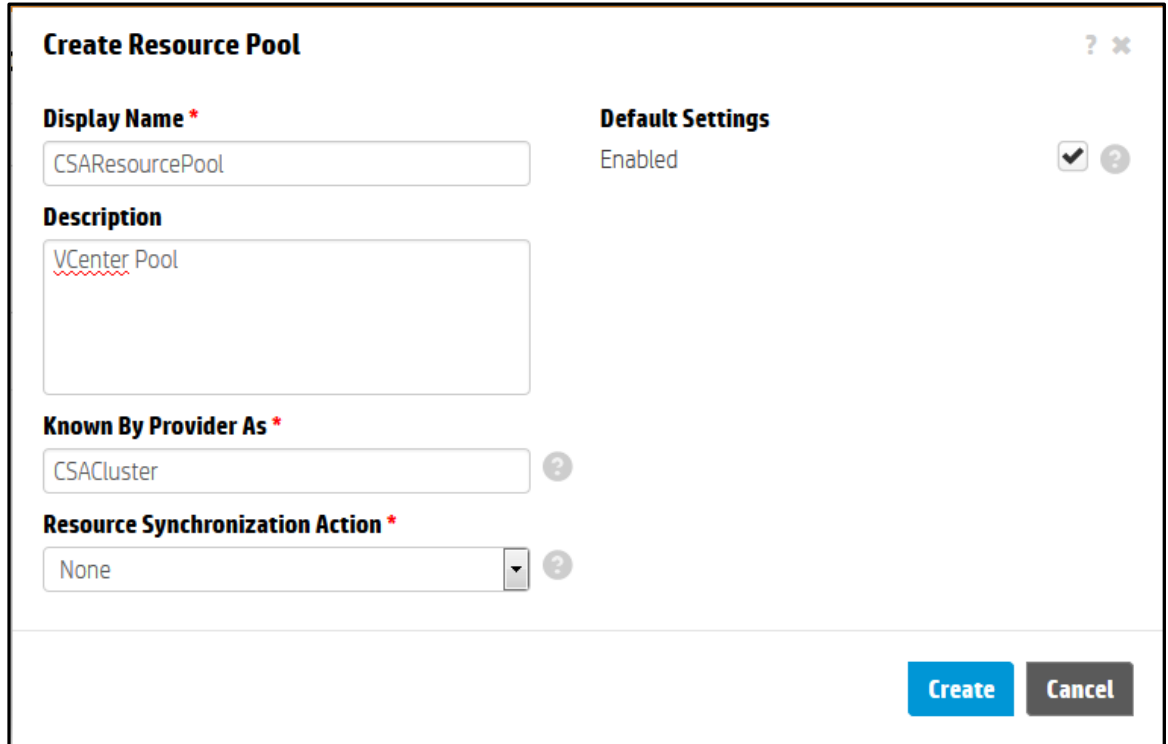
Since we are demonstrating the example based on vCenter, we will create a provider and resource pool based on the vCenter provider. Create a vCenter provider in the **Providers** area of the management console.

Figure 1. vCenter Resource Provider



2. Add a resource pool.
Click on the created resource provider to open the screen for the provider. Create a resource pool from the **Resource Pools** tab. While creating the provider in the Known By Provider As field, add either the datacenter name or the cluster name of the provider.

Figure 2. vCenter Resource Pool



3. Add a Resource Type to the Pool.


Let us consume CPU and MEMORY resources from the pool. Add these two resource types from the **Resources** tab on the pool. Add the Total Available to CSA values for the respective resource types. The Total Available to CSA value is the total capacity allocated for the resource that will be utilized by HP CSA.

Figure 3. Add Resource Types

Add Resource

Resource Type *

CPU



Resource Availability

Available

Total Available To CSA (Number of CPUs) *


100

Add **Cancel**

Add Resource

Resource Type *

Memory



Resource Availability

Available

Total Available To CSA (MB) *

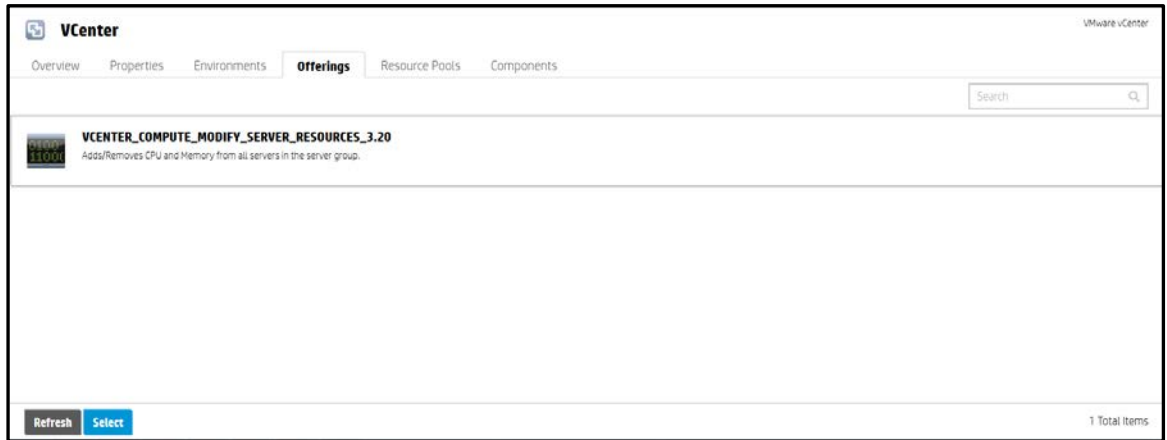
204800

Add **Cancel**

We now have two resource types, CPU and MEMORY, added to the pool.

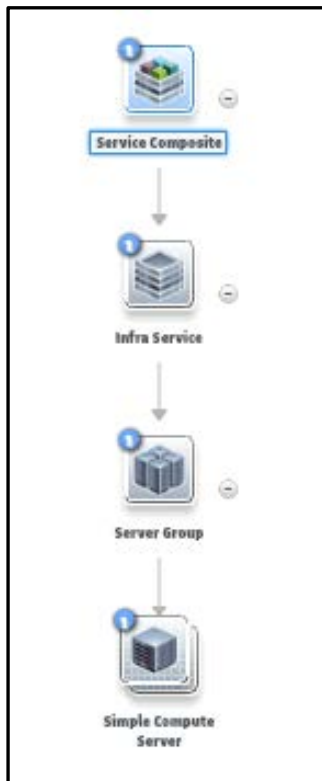
4. Associate resource offering to the provider.
Add the VCENTER_COMPUTE_MODIFY_SERVER_RESOURCES_3.20 offering to the vCenter provider.

Figure 4. Associate Resource Offering to Provider



5. Create a Service Design.
Let us create a service design with the following hierarchy of service components:
Service Composite>Infrastructure Service> Server Group>Server. The Server component is marked as a pattern component.

Figure 5. Sample Service Design

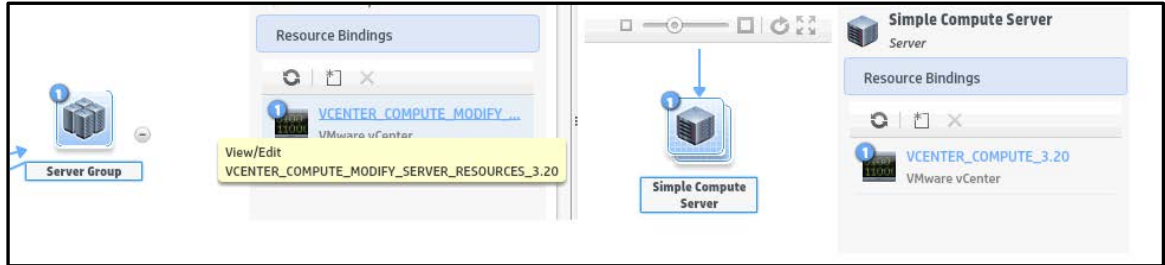


- Configure the resource offerings on the components.

The following table lists the resource offerings to be added on the components:

Component	Resource Offering
Server Group	VCENTER_COMPUTE_MODIFY_SERVER_RESOURCES_3.20
Server	VCENTER_COMPUTE_3.20

Figure 6. Resource Offerings Added on Components



- Configure the provider and pool internal actions on the components.

Add the internal actions as shown in the following table. These internal actions are added in the **Provider Selection** tab on Resource binding. Also add the provider property name on the internal actions as defined in the table:

Component	Internal Action	Provider Property Name
Server Group	Build Resource Provider and Pool List	
	Select Resource Provider and Pool	VCENTER_POOL
Server	Select Resource Provider and Pool from Parent	VCENTER_POOL

Figure 7. Internal Actions on the Server Group Resource Binding

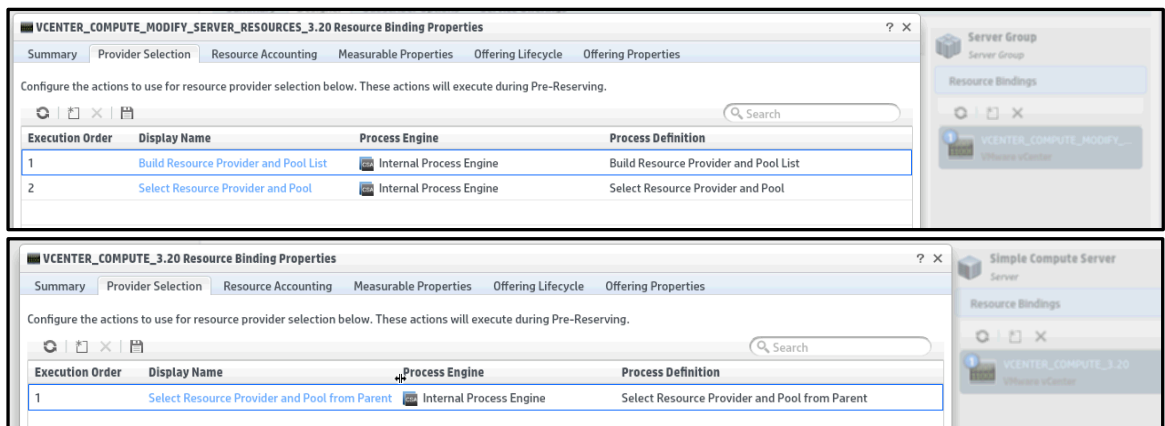


Figure 8. Setting Provider Properties Internal Actions on the Server Group Resource Binding

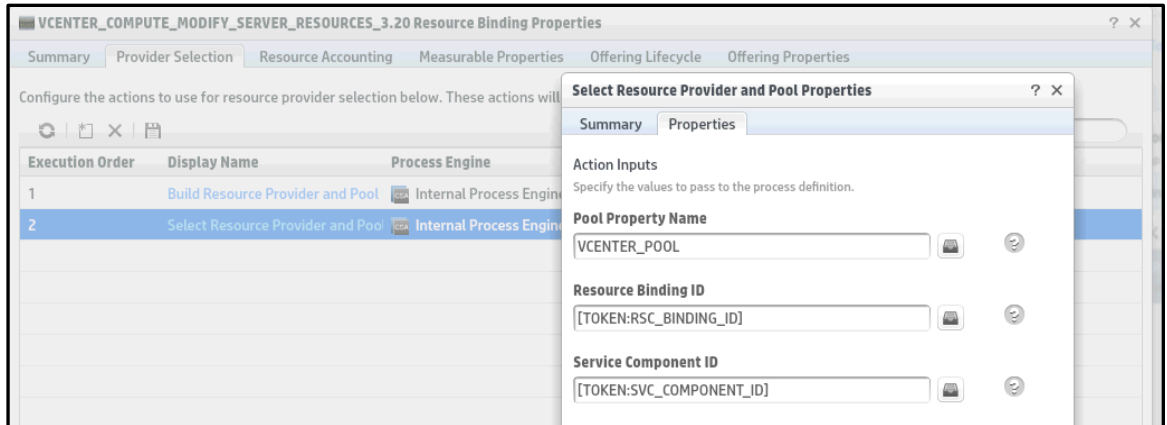
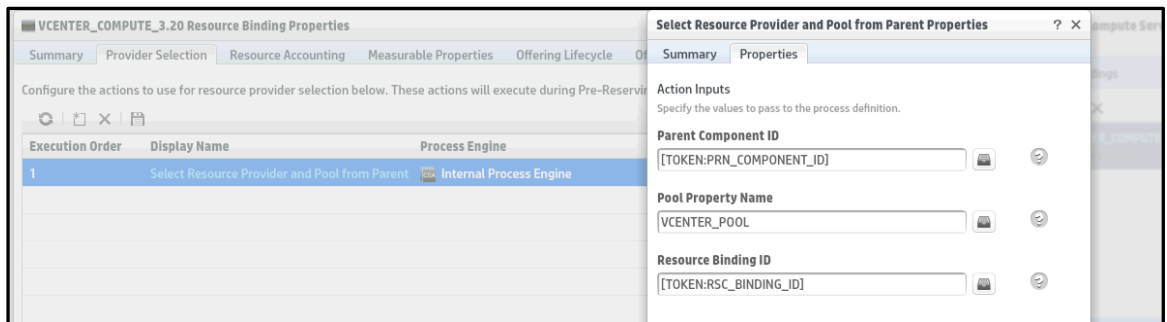


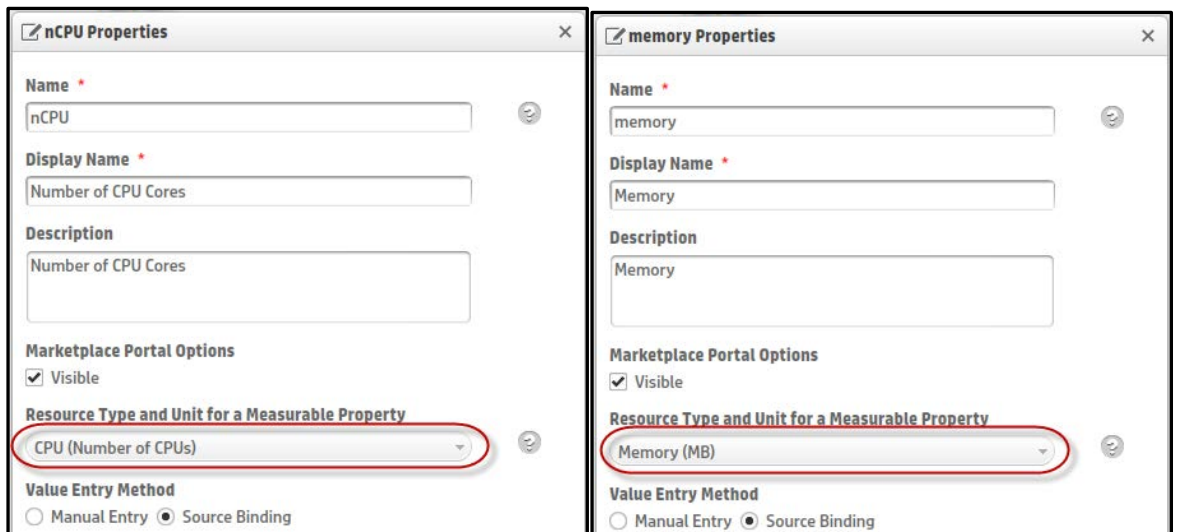
Figure 9. Provider Property Name on the Select Resource Provider and Pool from Parent Internal Action



- Configure the Resource Types on the CPU and Memory properties.

Open the **Properties** tab where the nCPU and memory properties are defined on the Server component. These properties should be marked with appropriate resource type as shown in the following figure. The resource type on the properties qualifies them to be measurable.

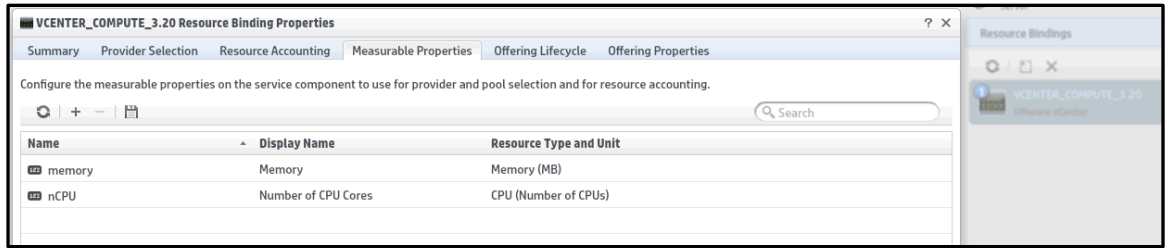
Figure 10. Measurable Properties Defined on the Component



- Configure the nCPU and Memory properties onto the Resource Binding.

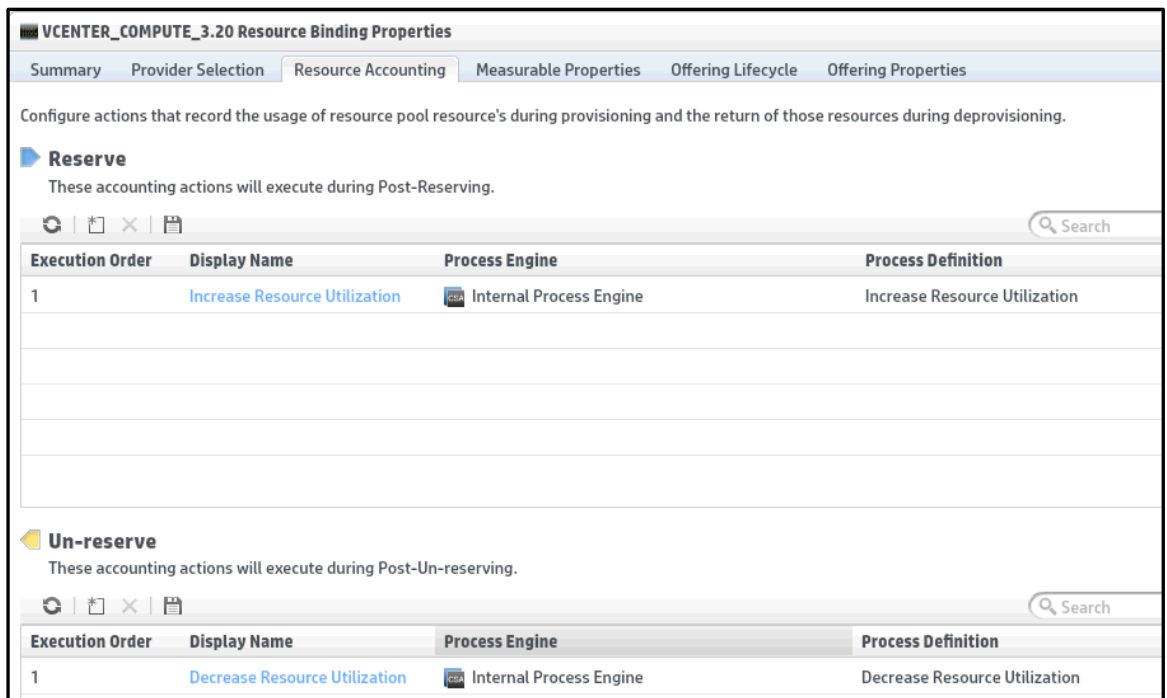
Click Resource Binding VCENTER_COMPUTE_3.20 on the Server component. Add the properties nCPU and Memory onto the **Measurable Properties** tab. The property values will be accounted during provider and pool selection.

Figure 11. Add Measurable Properties



- Configure the Resource Accounting internal actions onto the Resource Binding.
 - Add the Increase Resource Utilization internal action onto the Reserve state, and the Decrease Resource Utilization internal action onto the Un-Reserve state. These internal actions will be executed during the Reservation phase of the life cycle execution of the Server component.

Figure 12. Accounting Actions on Provider Property Name on the Select Resource Provider and Pool from Parent Internal Action



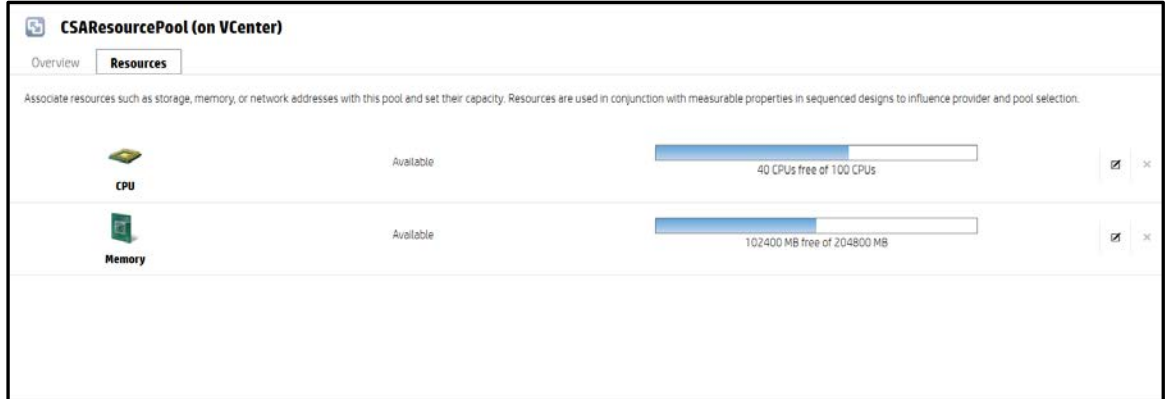
- Define property values on the components.
 - Property values have to be defined for component properties for both the Server Group and Server components. Refer to the *CSA Integration Pack* document, specifically the `VCENTER_COMPUTE_MODIFY_3.20` service design, for more details.

After these steps are executed, the service is ready to be associated with a service offering, and published to a catalog. After a user subscribes to this service, HP CSA creates a service instance which moves through the HP CSA lifecycle phases.

Resource Utilization Report

Administrators can view the resource capacity allocated and resources utilized for each resource pool from the Cloud Service console. You can manually increase the resource capacity allocated. Automatic resource capacity allocation can be set using the Resource Sync option on the resource pool.

Figure 13. Resource Utilization Report on Admin Console



Resource Synchronization

Resource capacity on the resource pool is used during provider and pool selection. Administrators can set the capacity manually or automatically. Available resource capacity units can be retrieved from a provider single hypervisor, cluster or a datacenter and update the Total Available to CSA value using the Utilization REST API. You can externalize the resource capacity update using HP OO flows wrapped to retrieve allocated units and update the resource capacity on the pool. HP CSA provides an OOTB VCenter Sync Resource Capacity HP OO flow to update the resource capacity retrieved from a vCenter provider.

You can set the HP OO action flow using the Resource Synchronization Action option on the resource pool. While configuring the Sync action, Known By Provider As should be a provider Cluster name or a Datacenter name.

Figure 14. vCenter Resource Synchronization Action

The screenshot displays the 'Edit Resource Pool' configuration page in the HP Cloud Service Automation interface. The left sidebar shows the navigation menu with 'Providers' selected, and the main content area is titled 'Edit Resource Pool'. The resource pool name is 'CSAResourcePool (on VCenter)'. The 'Overview' tab is active, showing the following details:

- Display Name:** CSAResourcePool
- Description:** VCenter Pool
- Known By Provider As:** CSACluster

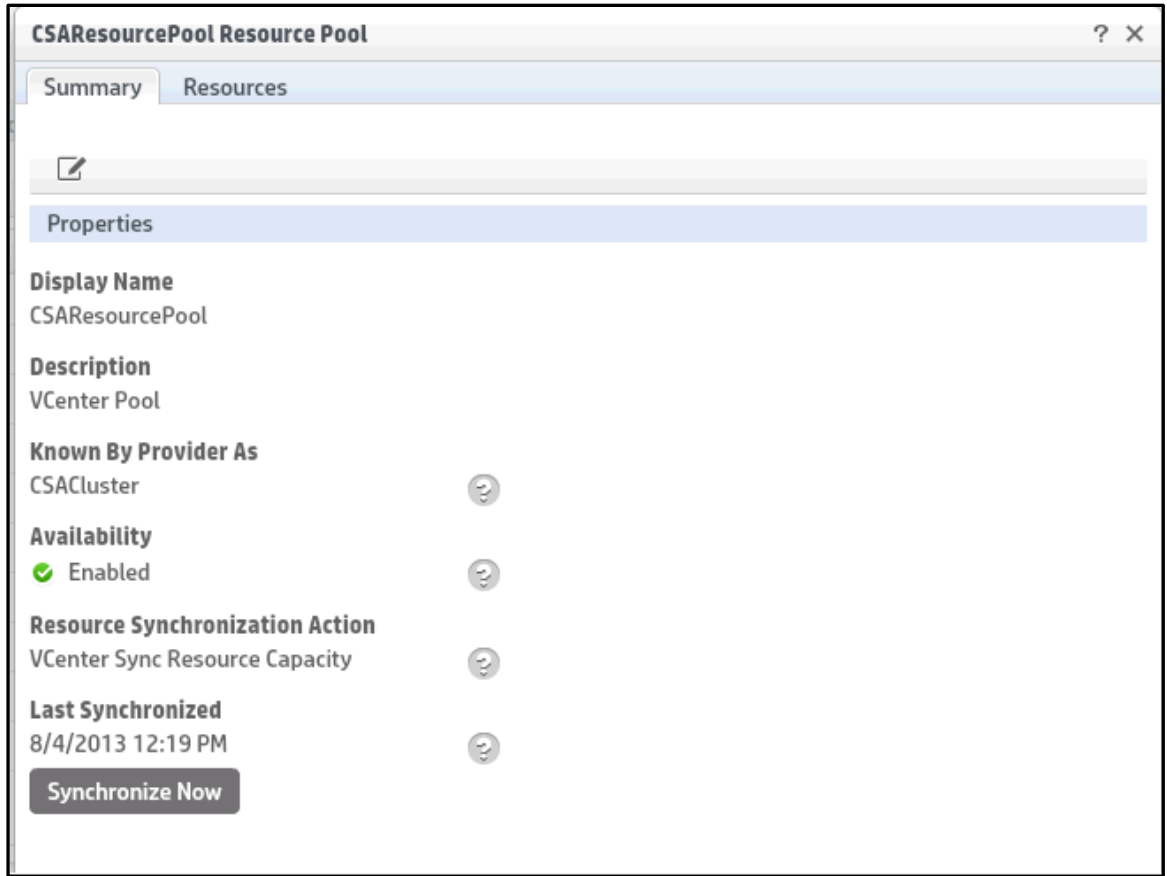
The right-hand configuration panel includes the following fields:

- Display Name *:** CSAResourcePool
- Description:** VCenter Pool
- Known By Provider As *:** CSACluster
- Resource Synchronization Action *:** VCenter Sync Resource Capacity
- Default Settings:** Enabled

At the bottom right, there are 'Save' and 'Cancel' buttons. The 'Known By Provider As' and 'Resource Synchronization Action' fields are highlighted with red circles in the original image.

Resource Synchronization can be scheduled by triggering the **Synchronize Now** button on the resource pool. On success, the Last Synchronized field will display the latest timestamp when the resource pool was updated.

Figure 15. Synchronize Now Button to Update Resource Capacity on Pool



Rest APIs

Get the Resource Pool Details

This API is used to get the resource pool artifact details.

URI	/artifact/<resourcePoolID>
Method	GET
Parameters	<p>userIdentifier=<user_id></p> <p>Required; the user ID you want to use as credentials for this API call. This user should be a consumer user who has the necessary permissions for the data you want to work with.</p> <p>scope=[base baseplusone subtree]</p> <p>Optional; default is <i>base</i>. If value is <i>base</i>, then the object is returned. If value is <i>baseplusone</i>, then the object and its first level children are returned. If value is <i>subtree</i>, then the object and all of its descendants are returned.</p> <p>detail=[required basic standard template full]</p> <p>Optional; default is <i>full</i>. See the values for the detail parameter in the HP CSA documentation. Some API calls do not support all possible values for this parameter.</p>
Returns	<p>200 - Updated</p> <p>404 - Not found</p> <p>500 - Server exception</p>

Update the Resource Pool Details

This artifact REST API call is used to update the availableToCsa or usedByCsa values.

URI	/artifact/<resourcePoolID>
Method	PUT
Parameters	<p>userIdentifier=<user_id></p> <p>Required; the user ID you want to use as credentials for this API call. This user should be a consumer user who has the necessary permissions for the data you want to work with.</p> <p>_action_=merge</p>
XML Input without Synchronize action	<pre> <ResourcePool> <name>\${name}</name> <displayName>\${displayName}</displayName> <poolReference>\${poolReference}</poolReference> <resourceProvider><id>\${providerId}</id></resourceProvider> <state> <name>ACTIVE</name> </state> <artifactType> <name>RESOURCE_POOL</name> </artifactType> <resourceCapacity> <id>\${capacityId}</id> <resourceType> <id>\${resourceTypeId}</id> <name>\${resourceTypeName}</name> </resourceType> <unit> <name>\${unit}</name> </unit> <availabilityIndicator> <name>\${availabilityIndicator}</name> </availabilityIndicator> <availableToCsa>\${availableValue}</availableToCsa> <usedByCsa>\${usedByCSA}</usedByCsa> </resourceCapacity> </pre>

XML Input with Synchronize action	<pre> </ResourcePool> <ResourcePool> <name>\${name}</name> <displayName>\${displayName}</displayName> <poolReference>\${poolReference}</poolReference> <resourceProvider><id>\${providerId}</id></resourceProvider> <action> <id>\${actionId}</id> <name>\${actionName}</name> <processDefinition> <id>\${processDefId}</id> <name>\${actionName}</name> </processDefinition> </action> <state> <name>ACTIVE</name> </state> <artifactType> <name>RESOURCE_POOL</name> </artifactType> <resourceCapacity> <id>\${capacityId}</id> <resourceType> <id>\${resourceTypeId}</id> <name>\${resourceTypeName}</name> </resourceType> <unit> <name>\${unit}</name> </unit> <availabilityIndicator> <name>\${availabilityIndicator}</name> </availabilityIndicator> <availableToCsa>\${availableValue}</availableToCsa> <usedByCsa>\${usedByCSA}</usedByCsa> </resourceCapacity> </ResourcePool> </pre>
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For more information

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

Note

General-access documentation requires that you register for an HP Passport and sign in. In some cases, access to the documentation is restricted and requires that you have an active HP support agreement ID (SAID) and an HP Passport sign-in.

Table 1. Document Revision History

Date or Version	Changes
October 2013	Initial release of document.
March 2014	Updated for HP CSA 4.00.
July 2014	Updated for HP CSA 4.10.

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

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