Technical white paper

HP Cloud Service Automation 4.10

Custom Resource Provider and Pool Selection

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Introduction

This document describes how to implement custom provider and pool selection. HP CSA comes with out-of-the-box resource provider selection actions. These actions select a list of resource providers and pools that are capable of providing a resource offering and select a provider and pool from this list. This selection functionality can be further refined by filtering the list of providers based on a desired condition, before the final resource provider and pool is selected.

In this white paper, any reference to the term provider implies reference to a resource provider.

Prerequisites

This document is targeted at individuals who are familiar with the basic concepts of HP CSA. Experience with HP Operations Orchestration (HP OO) flow authoring is also required. You should have run the Process Definition tool for the out-of-the-box content. 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

HP CSA provides capability to configure demand and utilization of resource capacity across categories of providers. Resource Pool is the model to capture the demand and express the utilization consumed on HP CSA per provider. Each pool can be configured with multiple capacities like CPU, Memory etc., which will be consumed by HP CSA during subscription fulfillment. Capacity is consumed during the Reservation phase and released during Un-Reservation phase of the Lifecycle process.

Resource pools can be configured on HP CSA for the following two cases:

1. To manage (increase or decrease) resource capacity and select the provider and pool which satisfy the demand.
2. To manage only the utilization of resource capacity, but externalize the selection of provider and pool.

This document will explain the latter case.

The following internal actions help with provider and pool selection:

- Build Resource Provider and Pool List.
- Select Resource Provider and Pool.

These actions are explained in the following sections.

Build Resource Provider and Pool List

This action does the following:

- Builds a list of resource providers and pools.
- Filters the list belonging to at least one of the resource environments that are associated with the corresponding service catalog. By corresponding service catalog, we mean that catalog through which we publish the service offering related to the service design having this action.

The criteria to build a candidate list of resource providers and pools are as follows:

- They must have the provider availability option set to Enabled.
- They must have the pool availability option set to Enabled.

This action also sets the valid list of resource providers to the list resulting from this action

Select Resource Provider and Pool

This action selects a resource provider and a pool from the valid list of pools built by the previous action. The resource provider is selected randomly from the list of valid providers. The selected provider is then written to a property on the associated service component. Users specify the name of this property through a well-known property of this action.

Example

Use Case

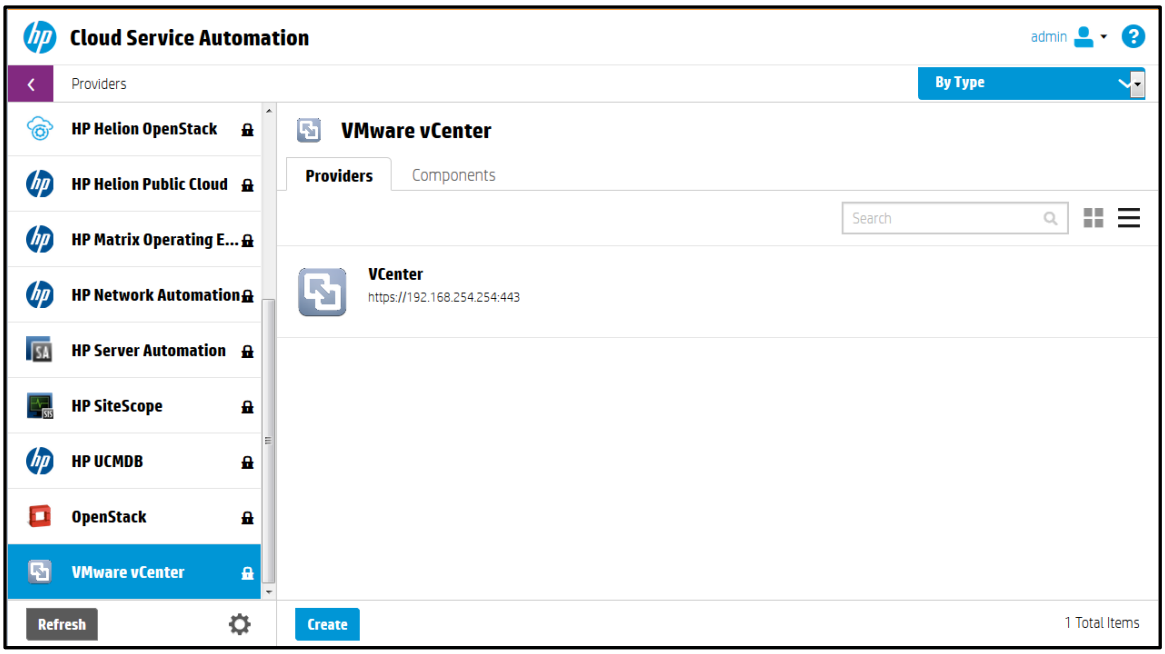
Data store is an essential resource capacity that is consumed by various applications in a data center. Consider a VMware vCenter provider having three data stores in a data center. Subscription request fulfillment requires selecting a data store having enough disk space to provision the server instance. Each data store can be configured as a provider pool on the VCenter resource provider. During provider selection, appropriate data stores can be selected by comparing the disk size request from the customer subscription against the provider's data store disk space.

Since HP CSA contains out-of-the-box sample content for VMware vCenter, you will import it into the Designs area of the Cloud Service Management console and use it to illustrate the steps. Import the VCENTER_COMPUTE_CUSTOM_POOL_SELECTION content now. The content can be found at the location: `%CSA_HOME%/CSAKit-<version>/Content Archives/sequenced/vmware vcenter`.

Steps to Configure Provider Selection

1. Add a VCenter resource provider.

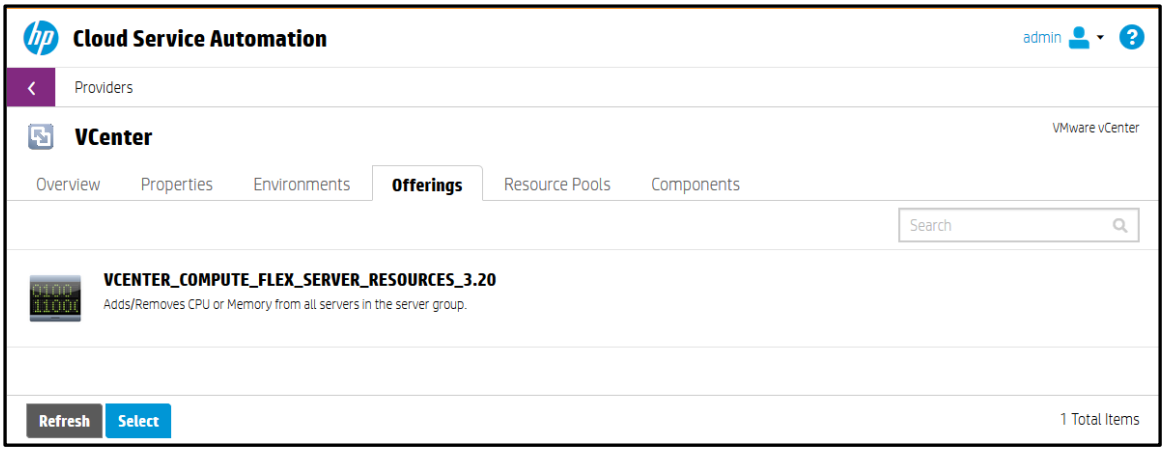
Figure 1. VCenter Resource Provider



2. Associate resource offerings to resource providers capable of offering the resource.

   For this example, we will associate the VMware vCenter provider with the resource offering named VCENTER_FLEX_COMPUTE_SERVER_RESOURCES.

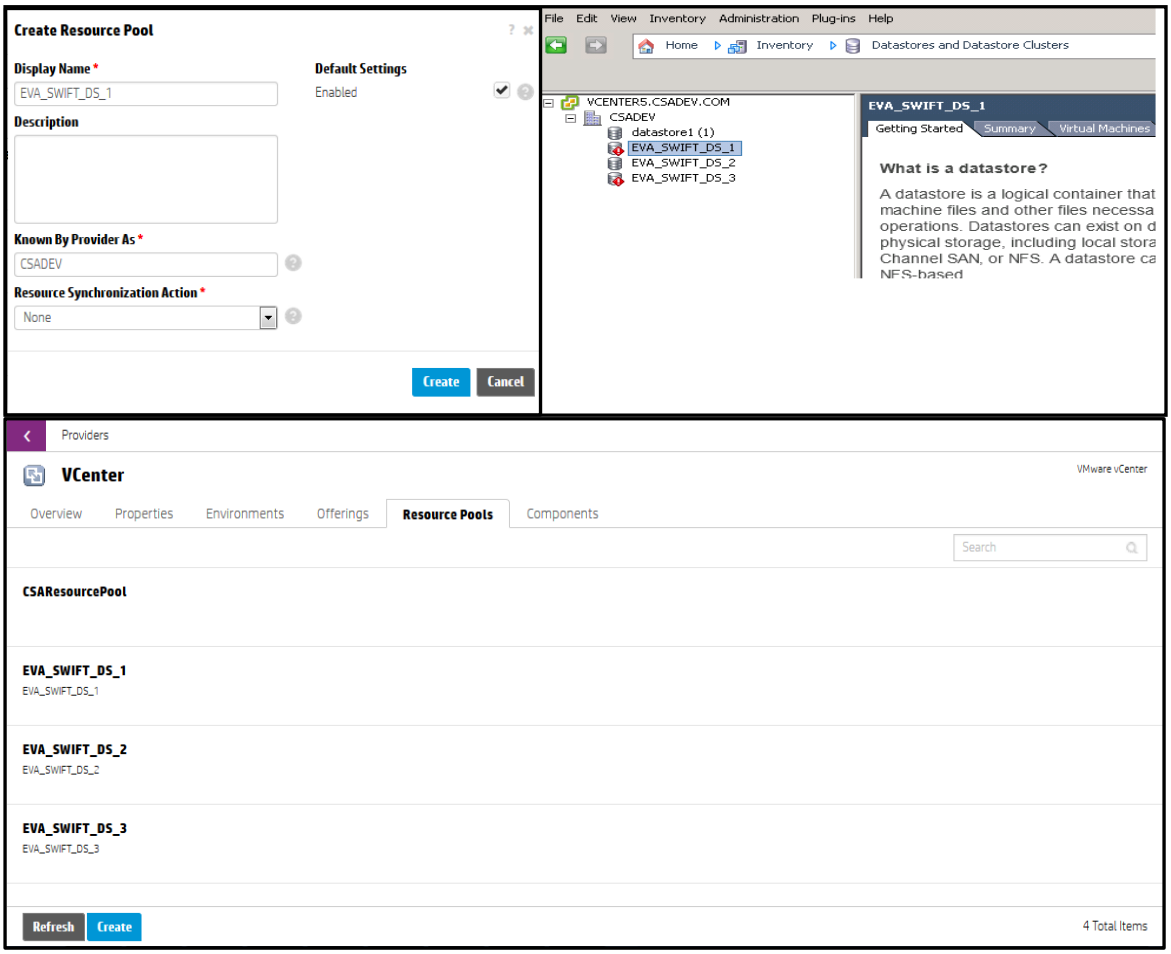
Figure 2. vCenter Flex Resource Offering



3. Create resource pools.

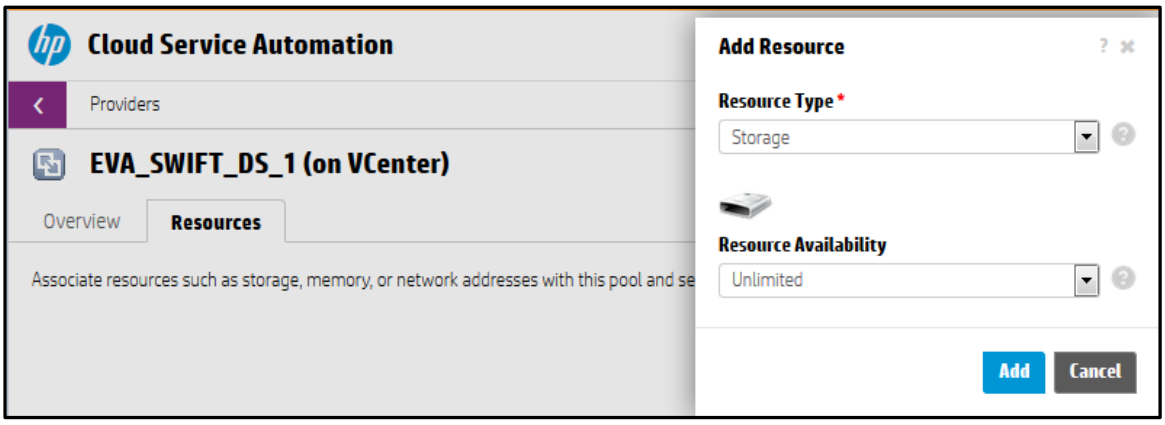
   Create data store pools on HP CSA so that they have display names that are the same as the name on the VMware vCenter provider. Figure 3 shows that there are three data store pools for the provider, and that they have been given the same display names in HP CSA.

Figure 3. Datastore Pools



4. Add the resource capacity and availability for each resource pool.
   Add storage capacity for the data store resource pool. Select “Unlimited” resource availability option.

Figure 4. Resource Capacity of a Pool



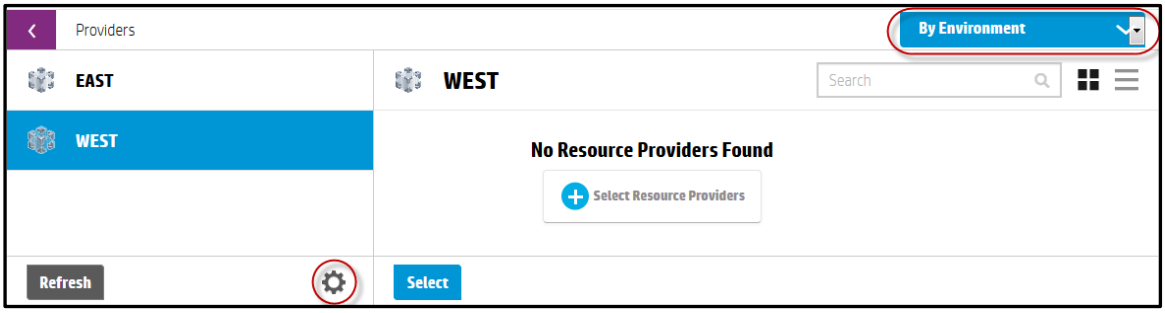
5. Add the providers to the resource environment.

Note
This is an optional step during provider configuration.

Providers can be grouped together by *resource environment*. One or more resource environments can be linked to a service catalog to restrict provider selection at subscription time. The steps to do this are indicated in the following example:

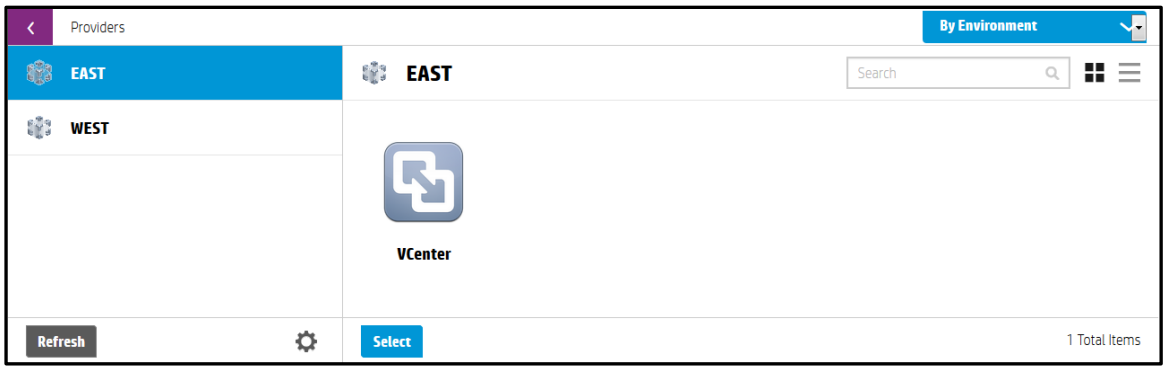
A. Add two regions, East and West, by first selecting **By Environment** in the upper-right drop-down field and clicking on the gear icon to add the regions.

Figure 5. East and West Regions Added



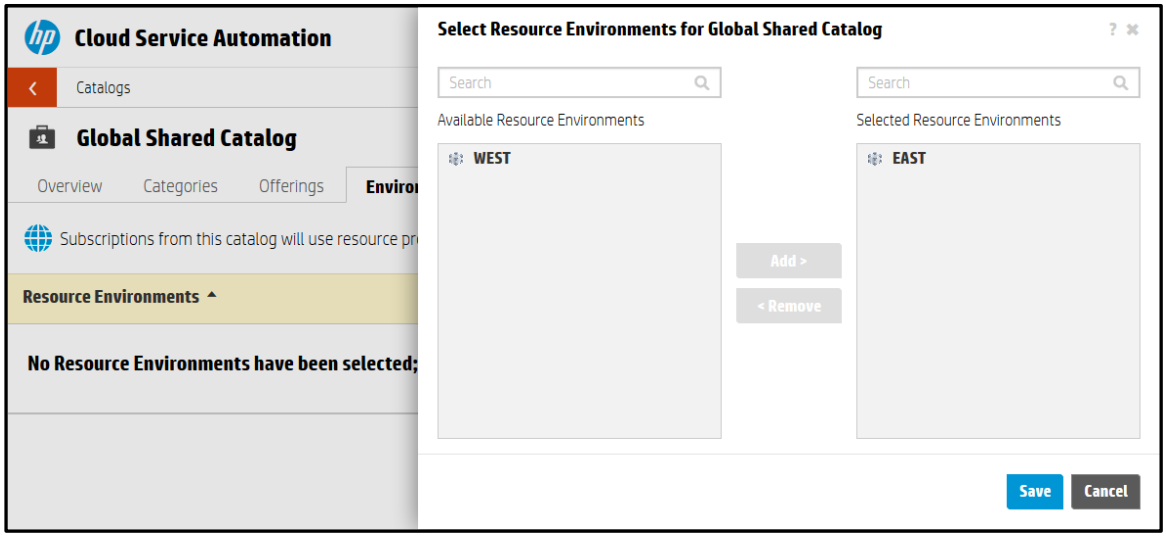
B. Associate the necessary providers into each resource environment.

Figure 6. vCenter Provider Associated with the East Region



C. Add the resource environments onto the desired catalogs in the Catalog area of the CSA interface. In this example, we will add the "East" resource environment into the "Global" catalog, so subscriptions requested from the "Global" catalog will always choose providers from the "East" resource environment during the provider selection stage of subscription fulfillment.

Figure 7. Adding a Resource Environment to a Catalog

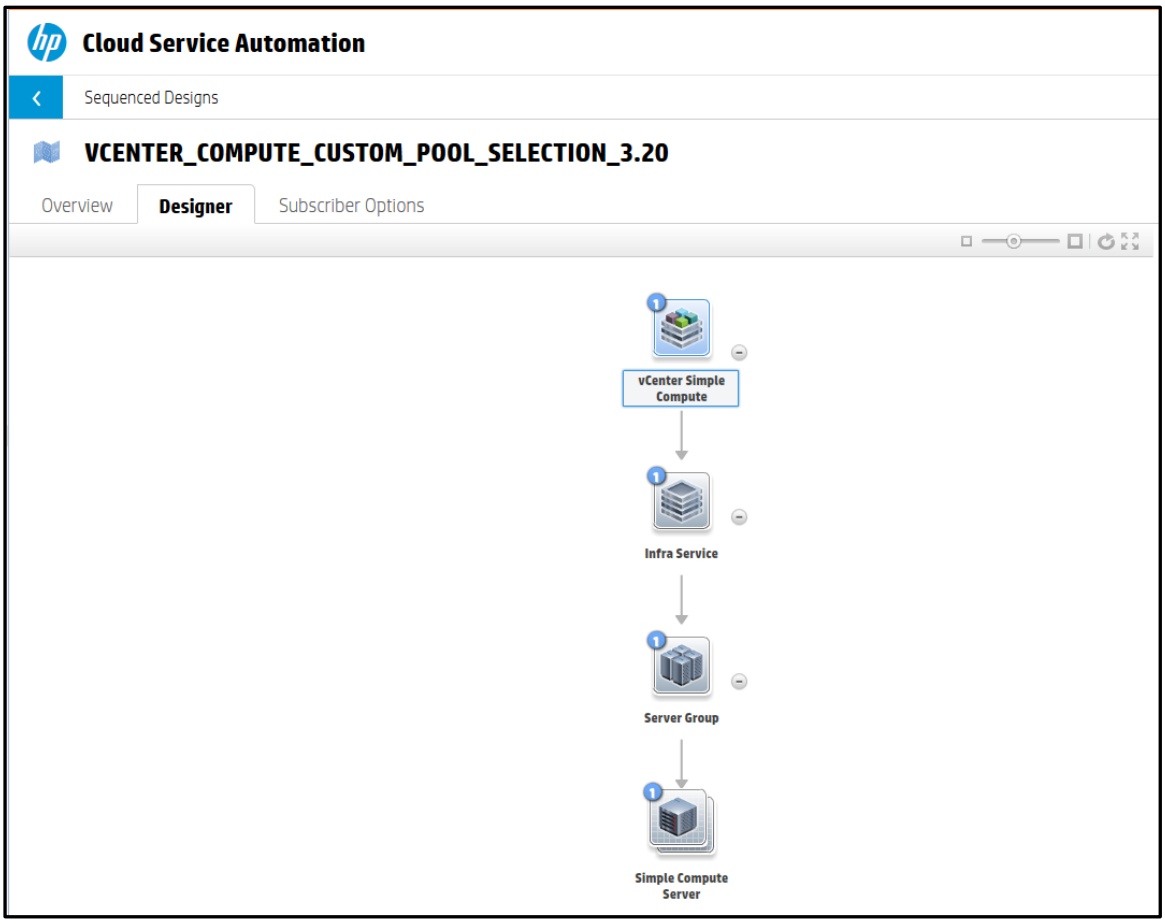


6. Create a sequenced service design.

   For this example, create a sequenced service design having the following components, with the hierarchy as indicated in the following list and shown in Figure 8:

   - Service Composite
   - Infrastructure Service
   - Server Group
   - Server

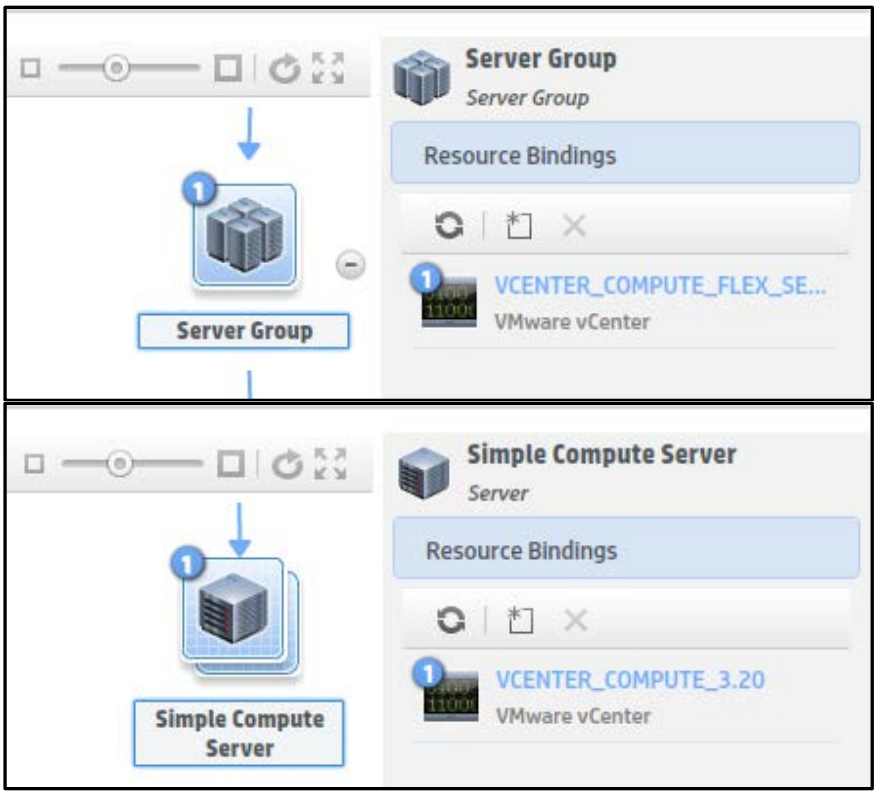
Figure 8. Service Design



7. Add the resource offerings to the components.

   Resource offerings are associated with components using resource bindings. In this example, add the VCENTER_FLEX_SERVER_RESOURCES binding to the Server Group component, and the VCENTER_COMPUTE binding to the Server component.

Figure 9. Resource Offering on Components

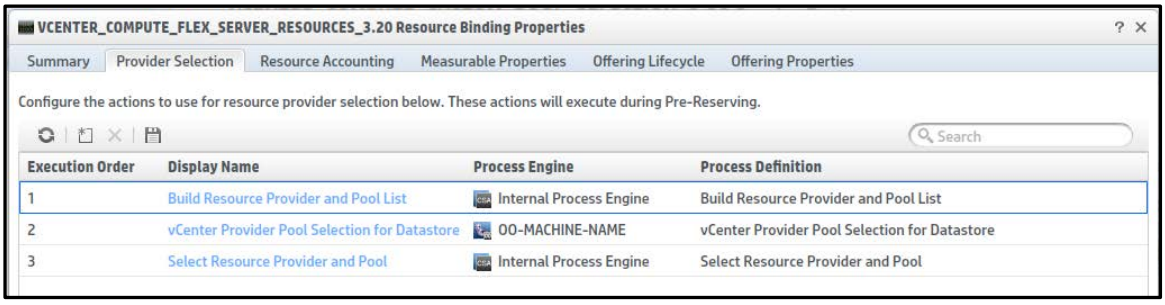


8. Create Provider Selection actions for the resource bindings on the Server Group component.

   Add the following actions to the Server Group component's binding (VCENTER_FLEX_SERVER_RESOURCES) in the following order:

   - Build Resource Provider and Pool List (Internal Process Engine)
   - vCenter Provider Pool Selection for Datastore (HP OO Flow)
   - Select Resource Provider and Pool (Internal Process Engine)

Figure 10. Provider and Pool Actions on the Resource Binding for the Server Group

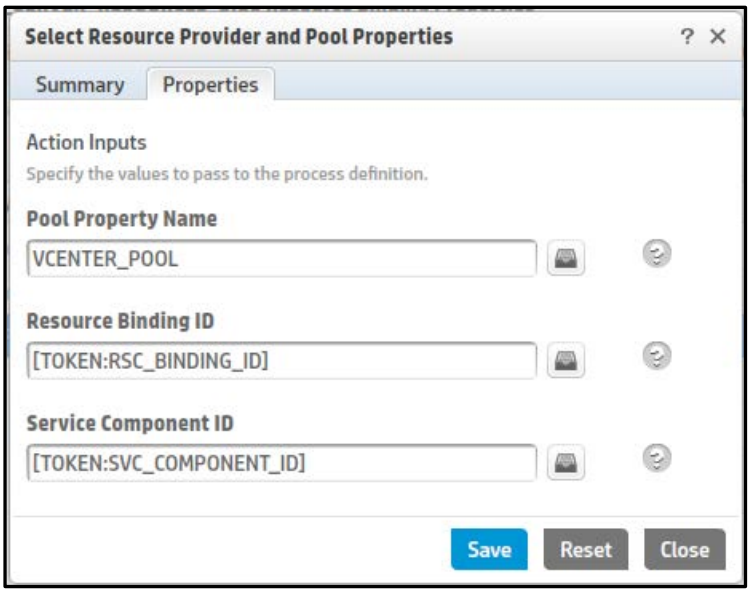


9. Specify the property of the Select Resource Provider and Pool internal action.

   The Select Resource Provider and Pool action has a property called Pool Property Name. With this property the user can specify the name of the property in which the selected resource provider ID will be set as a property of the service component. For example, if the user specifies VCENTER_POOL as the value for this property, then the selected provider pool Id will be set as a property on the service component as follows:

   Provider=ID of Selected Provider Pool.

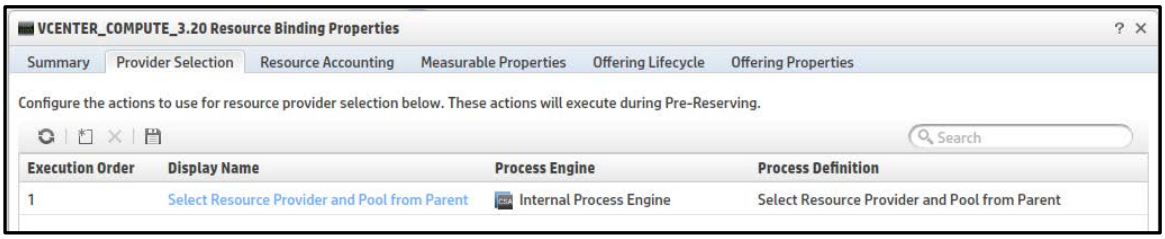
Figure 11. Provider Property Name



10. Create Provider Selection actions for the resource bindings on the Server component.

    Add the Select Resource Provider and Pool from Parent internal action on the Server component's binding (VCENTER_COMPUTE).

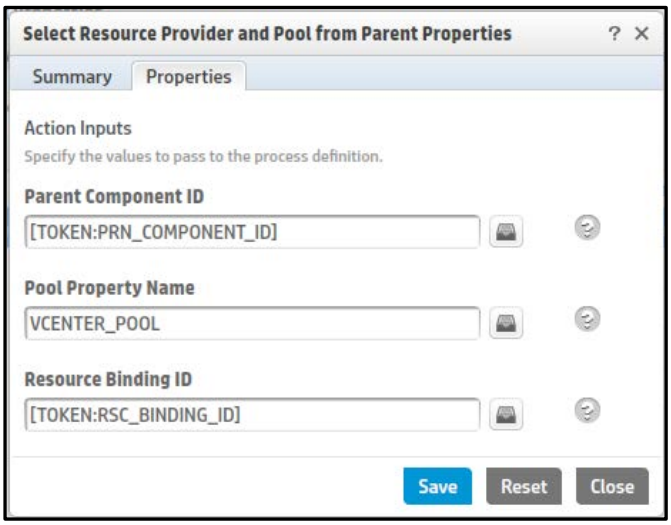
Figure 12. Provider Selection Action on Resource Binding



11. Specify the property of the internal action.

    The Select Resource Provider and Pool from Parent action has a property called Pool Property Name. Set the value of this property as VCENTER_POOL. The action will retrieve the Provider Pool Id populated on the property VCENTER_POOL from the parent Server Group component and store it on the Server component.

Figure 13. Provider Property Name



12. Create the following component properties on the Server Group component:
    - An Integer property named “diskSize”
    - A String property named “templateReference”

13. Source bind the Server component properties to the Server Group component, as follows:
    - Source bind the disk property on the Server component to the diskSize property on the Server Group component (Figure 14).
    - Source bind the templateReference property on the Server component to templateReference property on the Server Group component (Figure 15)

Figure 14. Source Binding the “disk” Property

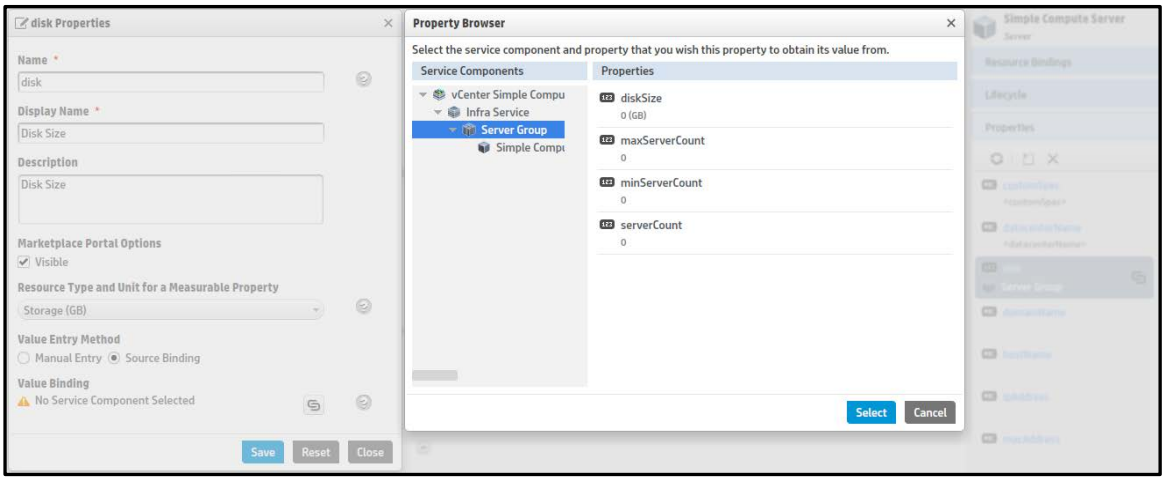
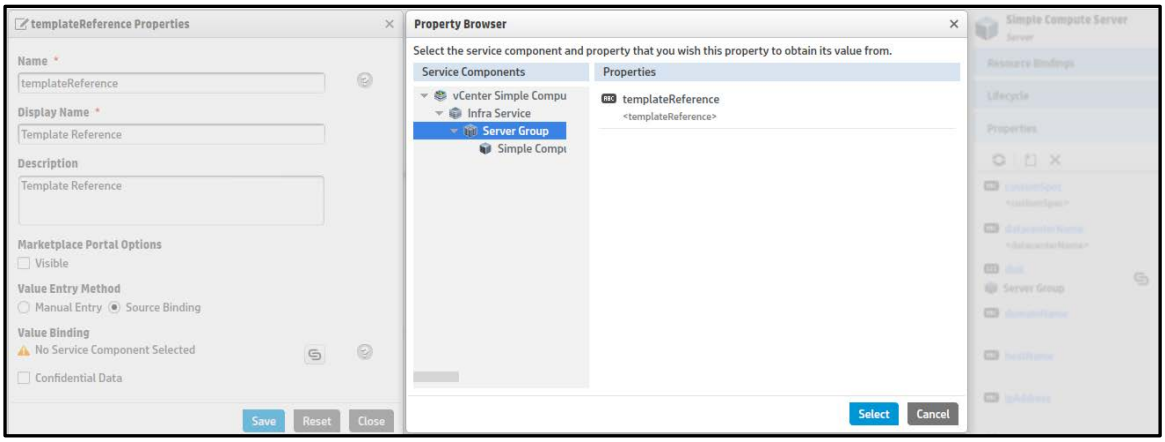
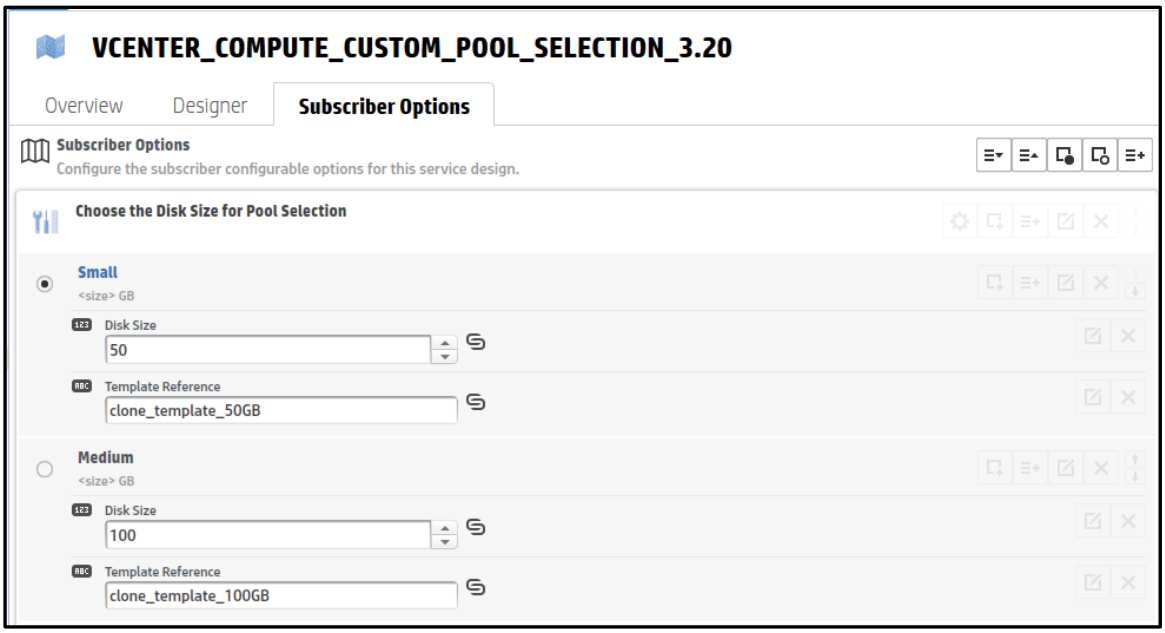


Figure 15. Source Binding the “templateReference” Property



14. Ceate the necessary subscriber options, as follows:
    A. Create an option set having options for various disk sizes (Small and Medium, for example, in Figure 16).
    B. Create a DiskSize property of Integer type on each option having values corresponding to the storage sizes.
    C. Create a templateReference property of String type on each option, the value being a clone template name residing on the VCenter provider. The clone template should provision the instance for the requested disk size.

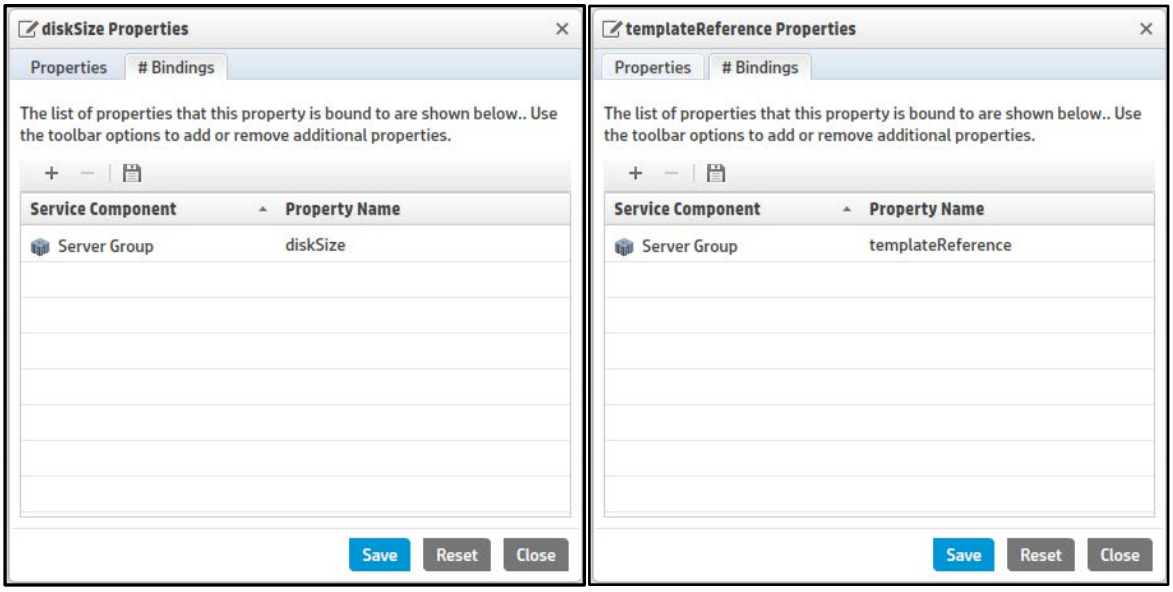
Figure 16. Subscriber Options



D. Create a target binding between the DiskSize property on each Option to the diskSize property on the Server Group.

E. Create target binding between the templateReference property on each Option to the templateReference property on the Server Group.

Figure 17. Target Binding the Option Properties to Server Group Properties



15. Publish the Design.

    After you have completed the above steps in this procedure, the service is ready to be associated with a service offering and published to a catalog. After a user subscribes to the published service, HP CSA creates a service instance that moves through the HP CSA lifecycle phases. When the provider selection actions are executed during the Reserving – Pre-Transition lifecycle phase, the following sequence of operations occurs:

    - "Build Resource Provider and Pool List," an internal action, gets the list of resource providers associated with the resource offering corresponding to the resource binding, and HP CSA stores the VCenter Provider and the list of pools associated with the provider. The list stored in HP CSA for the binding is called the Candidate Provider and Pool list.

- "vCenter Provider Pool Selection for Datastore," an HP OO flow, performs the following steps:
  - Retrieves the storage requested by the consumer using the HP CSA Rest API. Refer to the REST APIs section. The value is stored in the "diskSize" property on the Server Group component.
  - Retrieves the list of data store names and corresponding storage space from the VMWARE VCenter provider.
  - Retrieves the Candidate Provider and Pool list stored in the previous action using the HP CSA Rest API. Refer to the REST APIs section.
  - Retrieves the disk size property value defined on the Server Group component.
  - Verifies the pool names for each of the above lists against the candidate pool list.
  - Filters the candidate pool list which satisfies the storage space against the disk size.
  - Updates the filtered candidate list as a valid pool list onto HP CSA using the HP CSA Rest API. Refer to the REST APIs section.
- "Select Resource Provider and Pool," an internal action, performs following steps:
  - Retrieves the list of valid provider and pools built by the previous action.
  - Selects a random pool Id and saves it on the VCENTER_POOL property on the Server Group component.

Note
The discussion of how to create HP OO flows is beyond the scope of this document.

REST APIs

Get the list of candidate providers and pools

To get the list of candidate providers and pools use the GET artifact API.

URI:
```
https://localhost:8444/csa/rest/artifact/<RESOURCE_BINDING_ID>?userIdentifier=<USER_ID>&scope=view&view=candidatepools
```

Method: GET

Response:
```
<ResourceBinding>
	<id>90e72d893cd0fb1d013cd108d496004f</id>
	<objectId>90e72d893cd0fb1d013cd108d496004f</objectId>
	<isCriticalSystemObject>false</isCriticalSystemObject>
	<description>binding_February 12, 2013 6:14:59 PM UTC</description>
	<name>binding_February 12, 2013 6:14:59 PM UTC</name>
	<displayName>binding_February 12, 2013 6:14:59 PM UTC</displayName>
	<artifactType>
	... ... ...
	</artifactType>
	<disabled>false</disabled>
	<candidateProvider>
		<id>90e72d893ccf9a39013ccf9cf167001a</id>
		<resourceProvider>
			<id>90e72d893ccf9a39013ccf9cf167001a</id>
			<objectId>90e72d893ccf9a39013ccf9cf167001a</objectId>
			<isCriticalSystemObject>false</isCriticalSystemObject>
			<name>Provider2_February 12, 2013 6:13:54 PM UTC</name>
			<displayName>Provider2</displayName>
			<disabled>false</disabled>
		</resourceProvider>
		<candidatePool>
			<id>90e72d893ccf9a39013ccf9d5d630022</id>
			<objectId>90e72d893ccf9a39013ccf9d5d630022</objectId>
			<isCriticalSystemObject>false</isCriticalSystemObject>
			<name>P2-Pool1_February 12, 2013 6:14:22 PM UTC</name>
			<displayName>P2-Pool1</displayName>
			<disabled>false</disabled>
			<useProviderEnv>false</useProviderEnv>
		</candidatePool>
		<candidatePool>
		... ... ...
		</candidatePool>
	</candidateProvider>
</ResourceBinding>
```

Update the list of valid providers

To update the list of valid providers use the PUT artifact API.

URI:
```
https://localhost:8444/csa/rest/artifact/<RESOURCE_BINDING_ID>?userIdentifier=<USER_ID>&scope=view&view=validproviderspools
```

Method: PUT

Body: Include the refined list of valid providers. In this example, we have refined the list to remove Provider3.

```
<ResourceBinding>
	<id>90e72d893ccf9a39013ccfa0076a0099</id>
	<validProvider>
```

```
                <resourceBinding>
                        <id>90e72d893ccf9a39013ccfa0076a0099</id>
                </resourceBinding>
                <resourceProvider>
                        <id>90e72d893ccf9a39013ccf9cf167001a</id>
                </resourceProvider>
                <validPool>
                        <id>90e72d893ccf9a39013ccf9c6be60014</id>
                </validPool>
                <validPool>
                        <id>90e72d893ccf9a39013ccf9c6be60016</id>
                </validPool>
        </validProvider>
        <validProvider>
        ......
        </validProvider>
</ResourceBinding>
```

Appendix A – HP OO Flow

This appendix provides a brief overview of how custom pool selection is implemented in the vCenter Provider Pool Selection for Datastore HP OO flow. This flow is provided as out-of-the-box content with HP CSA. Refer to the *HP CSA Configuration Guide* to configure HP OO to obtain the flows from HP CSA.

Figure 18. Provider Pool Selection HP OO Flow for vCenter

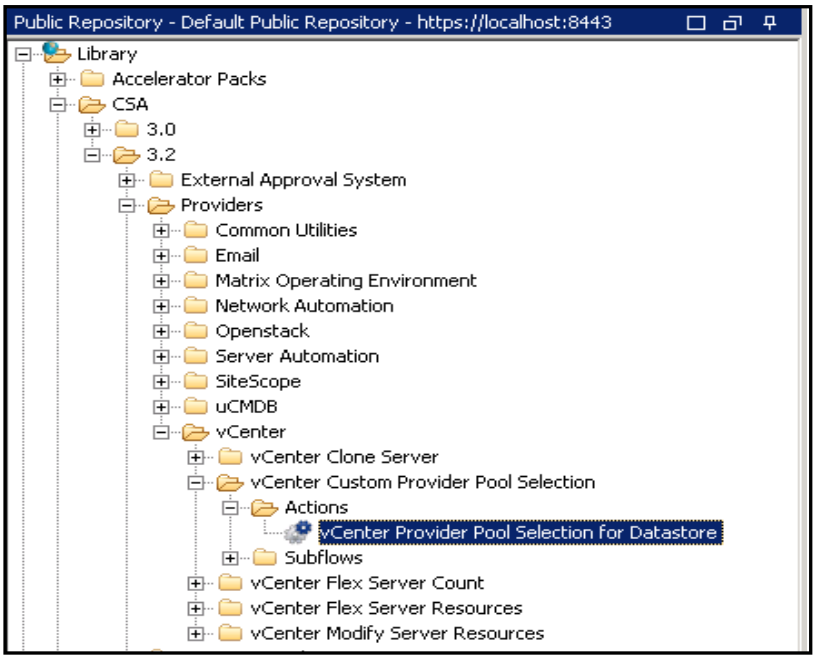


Figure 18 shows the HP CSA action used in the vCenter design for performing custom provider and pool selection. The Process Definition field (see Figure 19) shows the details of the corresponding HP OO flow.

Figure 19. HP CSA Action for Custom Provider and Pool Selection

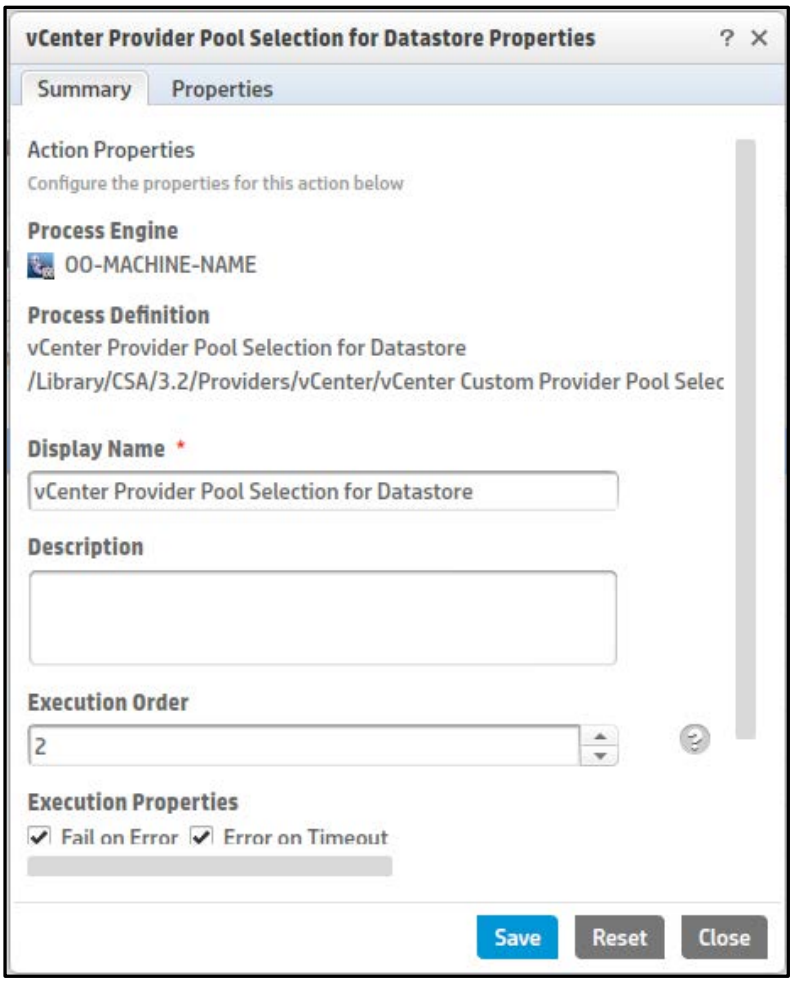
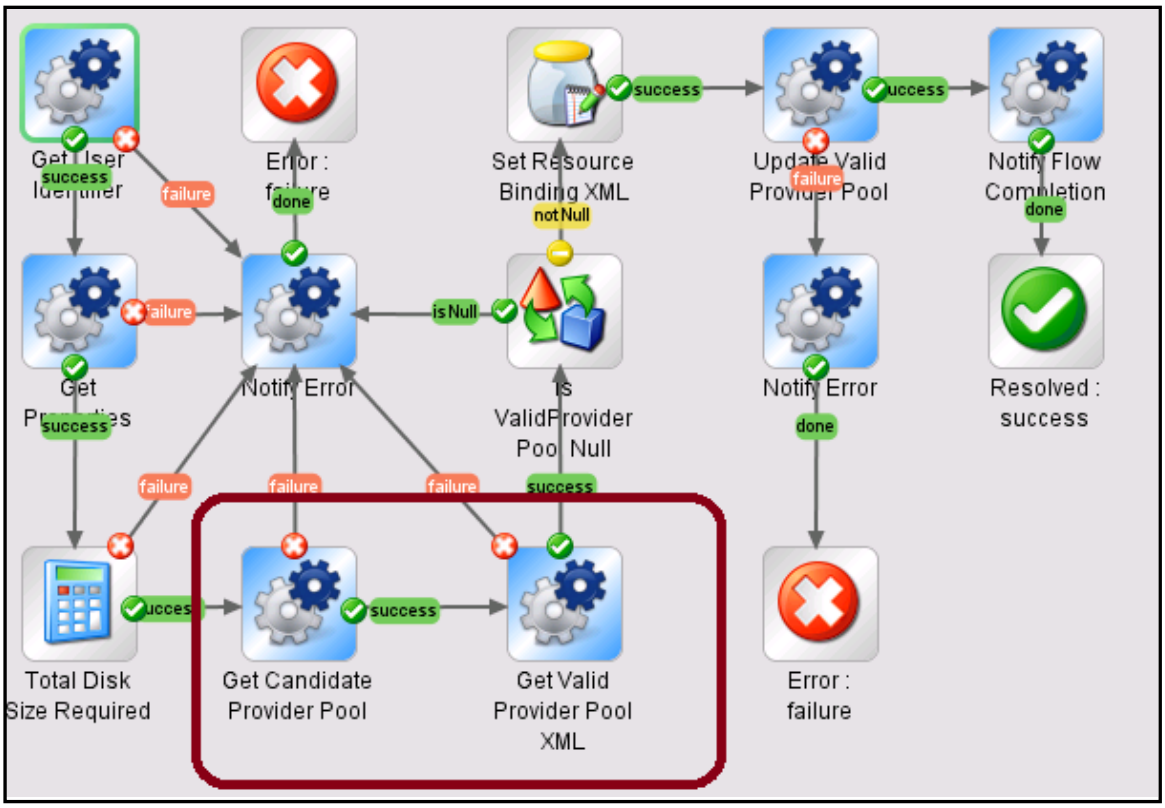


Figure 20 shows the HP OO flow invoked from HP CSA corresponding to the action shown in Figure 20. The steps which implement the refinement logic are shown in the red box below. For this flow, the refinement condition is based on the requesting disk size. A pool will be included in the list of valid pools only if required disk size criteria are satisfied.

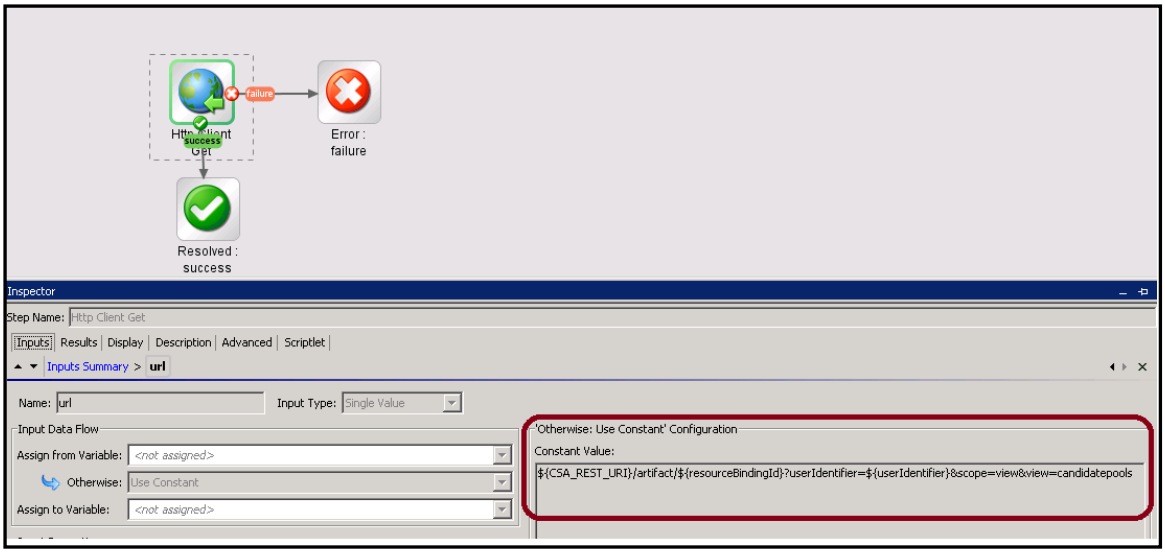
Figure 20. vCenter Provider Pool Selection for Datastore



Get Candidate Provider Pool

This step will retrieve all the candidate provider and pools from the HP CSA using the REST API call shown in the red box in Figure 21.

Figure 21. Candidate Pool REST Call



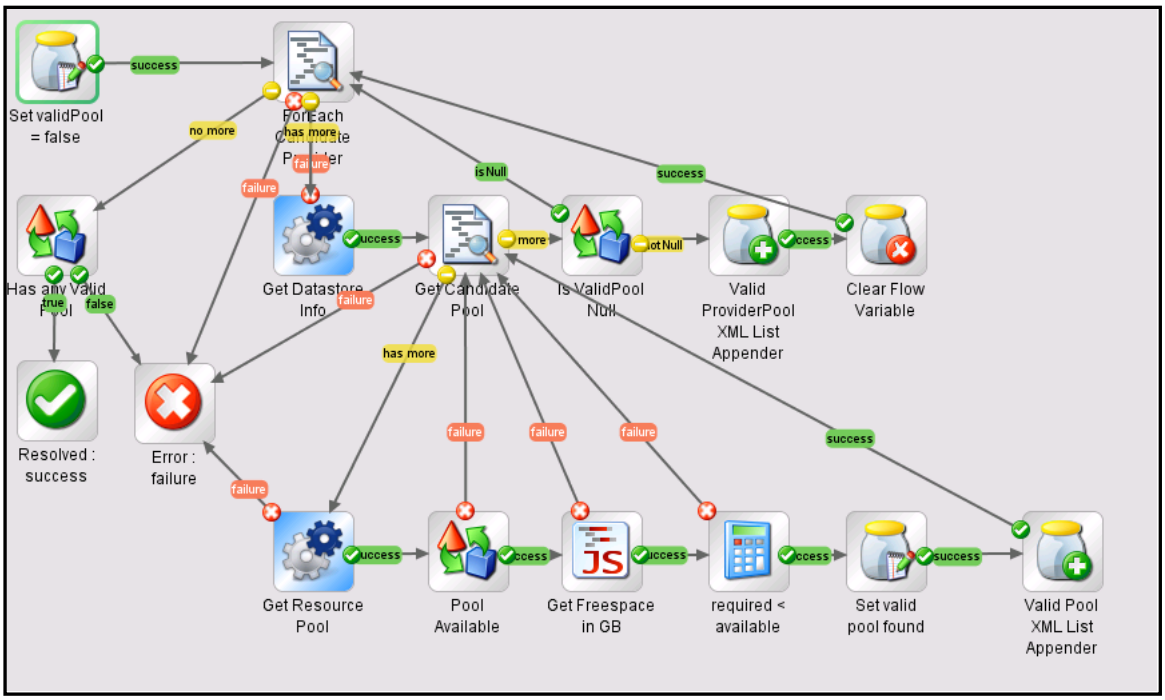
Get Valid Provider Pool XML

This step will browse through the candidate providers and pools retrieved in last step and filter the pool IDs based on storage. The subflow corresponding to this step is as show in Figure 22 and has following major steps:

- *Get Datastore Info* – Retrieves the list of data store names and free space available from VCENTER Provider.

- *Get Resource Pool* – Retrieves the Pool details like pool Name, available etc.
- *Valid Pool List Appender* - Appends/Creates the valid pool ids if the disk size requested in less than the free space available for a data store.
- *Valid Provider Pool List Appender* - Appends the Provider Id to the valid pool id list created in the previous step, *Valid Pool List Appender.*

Figure 22. Create Valid Provider and Pool list



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**
June 2013	Initial release of document.
February 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.

Learn more at
hp.com/go/csa

Sign up for updates
hp.com/go/getupdated

July 2014