Advanced Service Design

vRealize Automation 6.2

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Contents

Advanced Service Design

Advanced Service Design provides information about authoring advanced services in VMware vRealize Automation.

Advanced Service Design contains instructions about creating the major building blocks of an advanced service, such as resource types, resource mappings, service blueprints, and resource actions. Additionally, information about managing catalog items, organizing them into services and publishing the services to service catalogs is provided.

This documentation also contains information about VMware vRealize Orchestrator and the vRealize Orchestrator plug-ins.

Note   Not all features and capabilities of vRealize Automation are available in all editions. For a comparison of feature sets in each edition, see https://www.vmware.com/products/vrealize-automation/.

Intended Audience

This information is intended for advanced service architects, business group managers, tenant administrators, approval administrators, and system administrators who are familiar with virtual machine technology, data center management operations, and who also have strong experience with vRealize Automation and vRealize Orchestrator.

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to http://www.vmware.com/support/pubs.

Updated Information

This *Advanced Service Design* is updated with each release of the product or when necessary.

This table provides the update history of the *Advanced Service Design*.

Revision	Description
001646-02	Updated Constraints and Values in the Form Designer with additional information regarding constraint values.
001646-01	- Added the new configuration location for Import Content in Import Advanced Service Designer Components and Workflows. - Added the new configuration location for Export Content in Export Advanced Service Designer Components. - Added the new configuration location for Orchestration Server Configuration in Configure an External vRealize Orchestrator Server. - Added the new configuration location for Orchestration plug-in Endpoints in the following topics: - Configure the Active Directory Plug-In as an Endpoint - Configure the HTTP-REST Plug-In as an Endpoint - Configure the PowerShell Plug-In as an Endpoint - Configure the SOAP Plug-In as an Endpoint - Configure the vCenter Server Plug-In as an Endpoint - Delete an Endpoint - Updated user interface labels for Orchestration plug-in Endpoints in the following topics: - Configure the Active Directory Plug-In as an Endpoint - Configure the HTTP-REST Plug-In as an Endpoint - Configure the PowerShell Plug-In as an Endpoint - Configure the SOAP Plug-In as an Endpoint - Configure the vCenter Server Plug-In as an Endpoint
001646-00	Initial release.

Using the Goal Navigator

The goal navigator guides you through high-level goals that you might want to accomplish in vRealize Automation.

The goals you can achieve depend on your role. To complete each goal, you must complete a sequence of steps that are presented on separate pages in the vRealize Automation console.

The goal navigator can answer the following questions:

- Where do I start?

- What are all the steps I need to complete to achieve a goal?

- What are the prerequisites for completing a particular task?

- Why do I need to do this step and how does this step help me achieve my goal?

The goal navigator is hidden by default. You can expand the goal navigator by clicking the icon on the left side of the screen.

After you select a goal, you navigate between the pages needed to accomplish the goal by clicking each step. The goal navigator does not validate that you completed a step, or force you to complete steps in a particular order. The steps are listed in the recommended sequence. You can return to each goal as many times as needed.

For each step, the goal navigator provides a description of the task you need to perform on the corresponding page. The goal navigator does not provide detailed information such as how to complete the forms on a page. You can hide the page information or move it to a more convenient position on the page. If you hide the page information, you can display it again by clicking the information icon on the goal navigator panel.

Introduction to VMware vRealize Orchestrator

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VMware vRealize Orchestrator is an automation and management engine that helps you to automate your cloud and integrate the VMware vCloud Suite with the rest of your management systems.

vRealize Orchestrator allows administrators and architects to develop complex automation tasks by using the workflow designer, and then quickly access and run workflows directly from vSphere Web Client or by various triggering mechanisms.

vRealize Orchestrator can access and control external technologies and applications by using vRealize Orchestrator plug-ins.

This chapter includes the following topics:

- VMware vRealize Orchestrator Overview
- vRealize Orchestrator Plug-Ins Overview
- vRealize Orchestrator Integration in vRealize Automation
- Log in to the vRealize Orchestrator Configuration Interface
- Log in to the vRealize Orchestrator Client

VMware vRealize Orchestrator Overview

vRealize Orchestrator is a development- and process-automation platform that provides a library of workflows. You can use the vRealize Orchestrator workflows to create and run automated, configurable processes to manage the VMware® vSphere infrastructure as well as other VMware and third-party technologies.

By default, vRealize Orchestrator exposes every operation in the VMware vCenter Server API, and you can integrate all of these operations into your automated processes. By using vRealize Orchestrator, you can also integrate with other management and administration solutions through its open plug-in architecture.

For information about the latest vRealize Orchestrator releases, see the VMware vRealize Orchestrator Documentation landing page.

vRealize Orchestrator Plug-Ins Overview

With plug-ins you can use vRealize Orchestrator to access and control external technologies and applications. By exposing an external technology in a vRealize Orchestrator plug-in, you can incorporate objects and functions in workflows that access the objects and functions of the external technology.

The external technologies that you can access by using plug-ins can include virtualization management tools, email systems, databases, directory services, remote control interfaces, and so on.

You can use the standard set of vRealize Orchestrator plug-ins to incorporate external technologies such as the vCenter Server API and email capabilities into workflows. In addition, you can use the vRealize Orchestrator open plug-in architecture to develop plug-ins to access other applications.

Table 2-1. Plug-Ins Included by Default in vRealize Orchestrator

Plug-In	Purpose
vCenter Server	Provides access to the vCenter Server API so that you can incorporate all of the vCenter Server objects and functions into the management processes that you automate by using vRealize Orchestrator.
Configuration	Provides workflows for configuring the vRealize Orchestrator authentication, database connection, SSL certificates, and so on.
vCO Library	Provides workflows that act as basic building blocks for customization and automation of client processes. The workflow library includes templates for lifecycle management, provisioning, disaster recovery, hot backup, and other standard processes. You can copy and edit the templates to modify them according to your needs.
SQL	Provides the Java Database Connectivity (JDBC) API, which is the industry standard for database-independent connectivity between the Java programming language and a wide range of databases. The databases include SQL databases and other tabular data sources, such as spreadsheets or flat files. The JDBC API provides a call-level API for SQL-based database access from workflows.
SSH	Provides an implementation of the Secure Shell v2 (SSH-2) protocol. Allows remote command and file transfer sessions with password and public key-based authentication in workflows. Supports keyboard-interactive authentication. Optionally, the SSH plug-in can provide remote file system browsing directly in the vRealize Orchestrator client inventory.
XML	A complete Document Object Model (DOM) XML parser that you can implement in workflows. Alternatively, you can use the ECMAScript for XML (E4X) implementation in the vRealize Orchestrator JavaScript API.
Mail	Uses Simple Mail Transfer Protocol (SMTP) to send email from workflows.
Net	Wraps the Jakarta Apache Commons Net Library. Provides implementations of Telnet, FTP, POP3, and IMAP. The POP3 and IMAP part is used for reading email. In combination with the Mail plug-in, the Net plug-in provides complete email send and receive capabilities in workflows.
Workflow documentation	Provides workflows that let you generate information in PDF format about a workflow or a workflow category.
Enumeration	Provides common enumerated types that can be used in workflows by other plug-ins.

Table 2-1. Plug-Ins Included by Default in vRealize Orchestrator (Continued)

Plug-In	Purpose
HTTP-REST	Lets you manage REST Web services by providing interaction between vCenter Orchestrator and REST hosts.
SOAP	Lets you manage SOAP Web services by providing interaction between vCenter Orchestrator and SOAP hosts.
AMQP	Lets you interact with Advanced Message Queuing Protocol (AMQP) servers also known as brokers.
SNMP	Enables vCenter Orchestrator to connect and receive information from SNMP-enabled systems and devices.
Active Directory	Provides interaction between vCenter Orchestrator and Microsoft Active Directory.
vCO WebOperator	A Web view that lets you to access the workflows in the vRealize Orchestrator library and interact with them across a network by using a Web browser.
Dynamic Types	Lets you define dynamic types and create and use objects of these dynamic types.
Multi-Node	Contains workflows for hierarchical orchestration, management of Orchestrator instances, and scale-out of Orchestrator activities.
PowerShell	Lets you manage PowerShell hosts and run custom PowerShell operations.
vRealize Automation (only in the instance embedded in vRealize Automation)	Lets you create and run workflows for interaction between vRealize Orchestrator and vRealize Automation.

For more information about the vRealize Orchestrator plug-ins that VMware develops and distributes, see the VMware vRealize Orchestrator Documentation landing page.

vRealize Orchestrator Integration in vRealize Automation

vRealize Orchestrator is the workflow engine integrated in vRealize Automation.

The vRealize Orchestrator server distributed with vRealize Automation is preconfigured, and therefore when your system administrator deploys the vRealize Automation Appliance, the vRealize Orchestrator server is up and running.

Figure 2‑**1. Create and Request Catalog Items Included in an Advanced Service to Provision a Custom Resource**
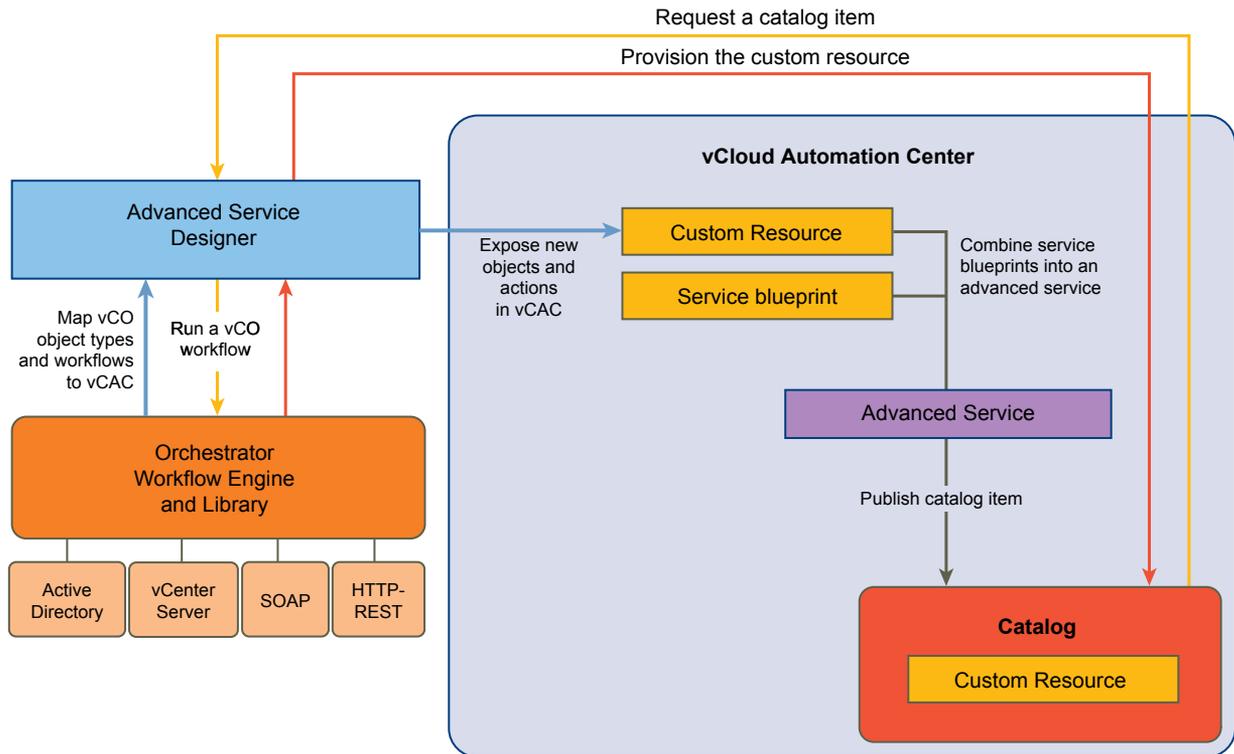
Service architects can map vRealize Orchestrator objects to custom resources and vRealize Orchestrator workflows to service blueprints in vRealize Automation. They can then publish the service blueprints as catalog items and combine the items into an advanced service. Tenant administrators or business group managers can display the service to the catalog of the consumers by creating an entitlement. When the consumers request a catalog item, vRealize Automation runs a vRealize Orchestrator workflow and provisions the custom resource.

Figure 2-2. Create and Request Custom Resource Actions to Modify a Custom Resource
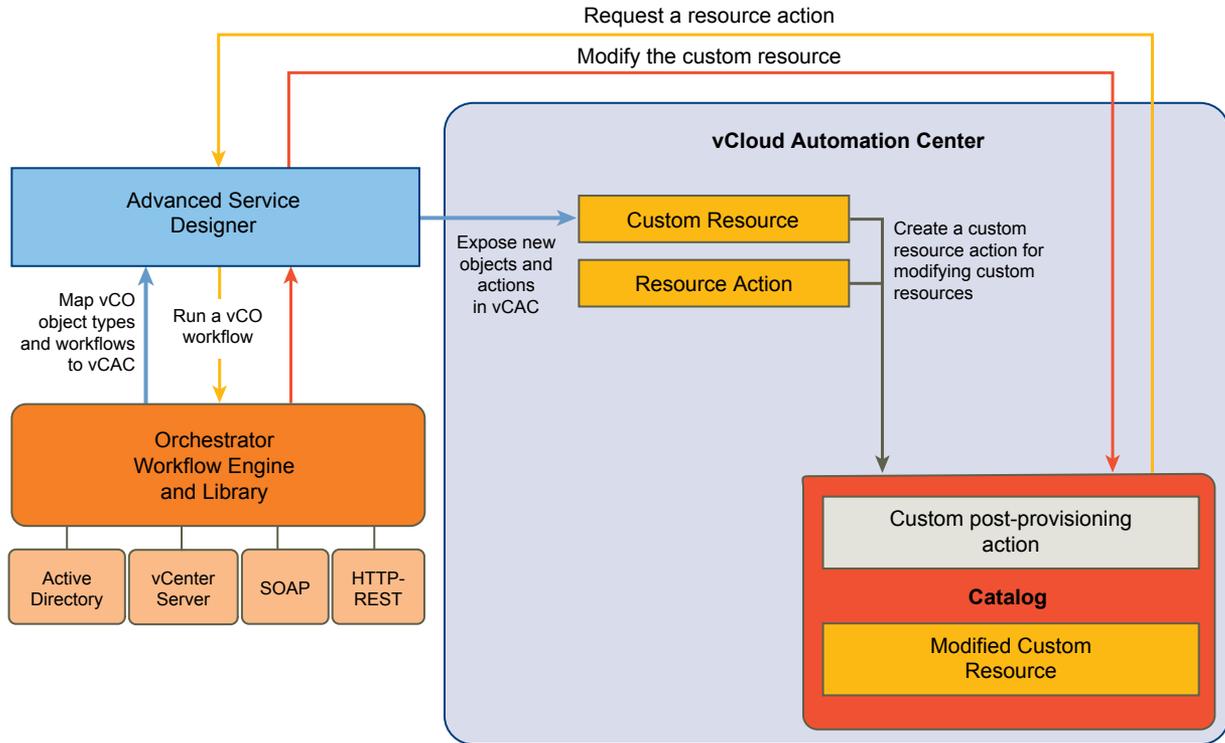
Service architects can also map vRealize Orchestrator workflows to resource actions to extend the management vRealize Automation capabilities. After the consumers provision a custom resource, they can request to run a post-provisioning action. This way, the consumers run a vRealize Orchestrator workflow and modify the provisioned custom resource.

When a consumer requests a catalog item or resource action, the Advanced Service Designer runs the corresponding vRealize Orchestrator workflow passing the following data as global parameters to the workflow:

Table 2-2. Advanced Services Global Parameters

Parameter	Description
__asd_tenantRef	The tenant of the user requesting the workflow.
__asd_subtenantRef	The business group of the user requesting the workflow.
__asd_catalogRequestId	The request id from the catalog for this workflow run.
__asd_requestedFor	The target user of the request. If the request is on behalf of a user, then this is the user on behalf of whom the workflow is requested, otherwise it is the user requesting the workflow.
__asd_requestedBy	The user requesting the workflow.

If an advanced service blueprint or resource action uses a vRealize Orchestrator workflow that contains a User Interaction schema element, when a consumer requests the service, the workflow suspends its run and waits for the user to provide the required data. To answer to a waiting user interaction, the user must navigate to **Inbox > Manual User Action**.

The default vRealize Orchestrator server inventory is shared across all tenants and cannot be used per tenant. For example, if a service architect creates a service blueprint for creating a cluster compute resource, the consumers from different tenants have to browse through the inventory items of all vCenter Server instances although they might belong to a different tenant.

System administrators can install vRealize Orchestrator or deploy the VMware vRealize Orchestrator Appliance separately to set up an external vRealize Orchestrator instance and configure vRealize Automation to work with that external vRealize Orchestrator instance.

System administrators can also configure vRealize Orchestrator workflow categories per tenant and define which workflows are available to each tenant.

In addition, tenant administrators can also configure an external vRealize Orchestrator instance but only for their own tenants.

For information about configuring an external vRealize Orchestrator instance and vRealize Orchestrator workflow categories, see *Configuring vCenter Orchestrator and Plug-Ins*.

Log in to the vRealize Orchestrator Configuration Interface

To edit the configuration of the default vRealize Orchestrator instance embedded in vRealize Automation, you must start the vRealize Orchestrator configuration service and log in to the vRealize Orchestrator configuration interface.

The vRealize Orchestrator configuration service is not started by default in the vRealize Automation appliance. You must start the vRealize Orchestrator configuration service to access the vRealize Orchestrator configuration interface.

Procedure

1 Start the vRealize Orchestrator Configuration service.

   a Log in to the vRealize Appliance Linux console as root.

   b Enter `service vco-configurator start` and press Enter.

2 Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*.

3 Click **vRealize Orchestrator Configurator**.

   You are redirected to https://*vra-va-hostname.domain.name*:8283/vco-config.

4 Log in to the vRealize Orchestrator Configurator.

   The user name is `vmware` and the default password is `vmware`.

5 (Optional) If this is the first time you are logging in, change the default password and click **Apply changes**.

   Your new password must be at least eight characters long, and must contain at least one digit, one special character, and one uppercase letter.

Log in to the vRealize Orchestrator Client

To perform general administration tasks or to edit and create workflows in the default vRealize Orchestrator instance, you must log in to the vRealize Orchestrator client.

The vRealize Orchestrator client interface is designed for developers with administrative rights who want to develop workflows, actions, and other custom elements.

Procedure

1   Navigate to the vRealize Appliance management console by using its fully qualified domain name, https://*vra-va-hostname.domain.name*.

2   Click **vRealize Orchestrator Client**.

    You are redirected to the **VMware vRealize Orchestrator Login** wizard.

3   Type the IP or the domain name of the vRealize Appliance in the **Host name** text box, and **8281** as a port number.

    For example, type *vra—va—hostname.domain.name***:8281** or *vrealize_automation_appliance_ip***:8281**.

4   Log in by using the vRealize Orchestrator Client user name and password.

    The credentials are the vCenter Single Sign-On default tenant administrator user name and password.

5   In the **Certificate Warning** window select an option to handle the certificate warning.

    The vRealize Orchestrator client communicates with the vRealize Orchestrator server by using an SSL certificate. A trusted CA does not sign the certificate during installation. You receive a certificate warning each time you connect to the vRealize Orchestrator server.

Option	Description
Ignore	Continue using the current SSL certificate.
	The warning message appears again when you reconnect to the same vRealize Orchestrator server, or when you try to synchronize a workflow with a remote Orchestrator server.
Cancel	Close the window and stop the login process.
Install this certificate and do not display any security warnings for it anymore.	Select this check box and click **Ignore** to install the certificate and stop receiving security warnings.

You can change the default SSL certificate with a certificate signed by a CA. For more information about changing SSL certificates, see *Installing and Configuring VMware vRealize Orchestrator*.

What to do next

You can import a package, develop workflows, or set root access rights on the system. See *Using the VMware vRealize Orchestrator Client* and *Developing with VMware vRealize Orchestrator*.

Configuring vRealize Orchestrator and Plug-Ins

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System and tenant administrators can configure vRealize Automation to use an external vRealize Orchestrator server.

In addition, system administrators can also determine the workflow folders that are available to each tenant.

Tenant administrators can configure the vRealize Orchestrator plug-ins as endpoints. They can also import workflow packages.

If you have custom vRealize Orchestrator workflow packages or previously developed Advanced Service Designer components, tenant administrators and service architects can import them into your vRealize Automation. See Import Advanced Service Designer Components and Workflows.

Role	vRealize Orchestrator-Related Configuration Privileges
System administrators	■ Configure the vRealize Orchestrator server for all tenants. ■ Define the default vRealize Orchestrator workflow folders per tenant.
Tenant administrators	■ Configure the vRealize Orchestrator server for their own tenant. ■ Add vRealize Orchestrator plug-ins as endpoints. ■ Import vRealize Orchestrator workflow packages or Advanced Service Designer components.

This chapter includes the following topics:

- Configure an External vRealize Orchestrator Server

- Configure the Default Workflow Folder for a Tenant

- Configuring Advanced Service Endpoints

- Installing Additional Plug-Ins on the Default vRealize Orchestrator Server

Configure an External vRealize Orchestrator Server

You can set up vRealize Automation to use an external vRealize Orchestrator server.

System administrators can configure the default vRealize Orchestrator server globally for all tenants. Tenant administrators can configure the vRealize Orchestrator server only for their tenants.

Prerequisites

- Install and configure an external vRealize Orchestrator server. You can also deploy the vRealize Orchestrator Appliance. See *Installing and Configuring VMware vCenter Orchestrator*.

- Log in to the vRealize Automation console as a **system administrator** or **tenant administrator**.

Procedure

1 To specify your Orchestrator server configurations, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Server Configuration**
vRealize Automation 6.2	Select **Administration > Advanced Services > Server Configuration**

2 Click **Use an external Orchestrator server**.

3 Enter a name and, optionally, a description.

4 Enter the IP or the DNS name of the machine on which the vRealize Orchestrator server runs in the **Host** text box.

5 Enter the port number to communicate with the external vRealize Orchestrator server in the **Port** text box.

8281 is the default port for vRealize Orchestrator.

6 Select the authentication type.

Option	Description
Single Sign-On	Connects to the vRealize Orchestrator server by using vCenter Single Sign-On.
	Note This option is applicable only if you configured the vRealize Orchestrator and vRealize Automation to use one common vCenter Single Sign-On instance.
Basic	Connects to the vRealize Orchestrator server with the user name and password that you enter in the **User name** and **Password** text boxes.

7 Click **Test Connection**.

8 Click **Update**.

You configured the connection to the external vRealize Orchestrator server, and the **vCAC** workflows folder and the related utility actions are automatically imported. The **vCAC > ASD** workflows folder contains workflows for configuring endpoints and creating resource mappings.

What to do next

Configure the vRealize Orchestrator plug-ins as endpoints. See Configuring Advanced Service Endpoints.

Configure the Default Workflow Folder for a Tenant

System administrators can group workflows in different folders and then define workflow categories per tenant. By doing this, a system administrator can grant users from different tenants access to different workflow folders from the same vRealize Orchestrator server.

Prerequisites

Log in to the vRealize Automation console as a **system administrator**.

Procedure

1 Select **Administration > Advanced Services > Default Orchestrator Folder**.

2 Click the name of the tenant you want to edit.

3 Browse the vRealize Orchestrator workflow library and select a folder.

4 Click **Add**.

You defined the default vRealize Orchestrator workflow folder for a tenant.

What to do next

Repeat the procedure for all of the tenants for which you want to define a default workflow folder.

Configuring Advanced Service Endpoints

By configuring advanced service endpoints you can connect the vRealize Automation to your environment. When you configure vRealize Orchestrator plug-ins as endpoints, you use the vRealize Automation user interface to configure the plug-ins instead of using the vRealize Orchestrator configuration interface.

To use vRealize Orchestrator capabilities and the vRealize Orchestrator plug-ins to expose VMware and third-party technologies to vRealize Automation, you can configure the vRealize Orchestrator plug-ins by adding the plug-ins as endpoints. This way, you create connections to different hosts and servers, such as vCenter Server instances, a Microsoft Active Directory host, and so on.

When you add a vRealize Orchestrator plug-in as an endpoint by using the vRealize Automation UI, you run a configuration workflow in the default vRealize Orchestrator server. The configuration workflows are located in the **Orchestrator > vCAC > ASD > Endpoint Configuration** workflows folder.

Important Configuring a single plug-in in vRealize Orchestrator and in the vRealize Automation console is not supported and results in errors.

Configure the Active Directory Plug-In as an Endpoint

You can add an endpoint and configure the Active Directory plug-in to connect to a running Active Directory instance and manage users and user groups, Active Directory computers, organizational units, and so on.

Important By using the Microsoft Active Directory plug-in, you can orchestrate only one connection to an Active Directory host. You cannot add multiple Microsoft Active Directory instances as endpoints. You cannot delete an Active Directory endpoint. After you add an Active Directory endpoint, you can update it at any time.

Prerequisites

- Verify that you have access to a Microsoft Active Directory instance. See the Microsoft Active Directory documentation.

- Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2 Click **Add** ( ).

3 Select **Active Directory** from the **Plug-in** drop-down menu.

4 Click **Next**.

5 Enter a name and, optionally, a description.

6 Click **Next**.

7 Configure the Active Directory server details.

   a Enter the IP address or the DNS name of the host on which Active Directory runs in the **Active Directory host IP/URL** text box.

   b Enter the lookup port of your Active Directory server in the **Port** text box.

   vRealize Orchestrator supports the Active Directory hierarchical domains structure. If your domain controller is configured to use Global Catalog, you must use port 3268. You cannot use the default port 389 to connect to the Global Catalog server.

   c Enter the root element of the Active Directory service in the **Root** text box.

   For example, if your domain name is *mycompany.com*, then your root Active Directory is `dc=mycompany,dc=com`.

   This node is used for browsing your service directory after entering the appropriate credentials. For large service directories, specifying a node in the tree narrows the search and improves performance. For example, rather than searching in the entire directory, you can specify `ou=employees,dc=mycompany,dc=com`. This root element displays all the users in the Employees group.

d   (Optional) To activate encrypted certification for the connection between vRealize Orchestrator and Active Directory, select **Yes** from the **Use SSL** drop-down menu.

> **Note**   The SSL certificate is automatically imported without prompting for confirmation even if the certificate is self-signed.

e   (Optional) Enter the default domain in the **Default Domain** text box.

For example, if your domain name is *mycompany.com*, type `@mycompany.com`.

8   Configure the shared session settings.

a   Enter the user name for the shared session in the **User name for the shared session** text box.

a   Enter the password for the shared session in the **Password for the shared session** text box.

9   Click **Add**.

You added an Active Directory instance as an endpoint. Service architects can use the Advanced Service Designer to publish Active Directory plug-in workflows as catalog items and resource actions.

Configure the HTTP-REST Plug-In as an Endpoint

You can add an endpoint and configure the HTTP-REST plug-in to connect to a REST host.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.
- Verify that you have access to a REST host.

Procedure

1   To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2   Click **Add** (➕).

3   Select **HTTP-REST** from the **Plug-in** drop-down menu.

4   Click **Next**.

5   Enter a name and, optionally, a description.

6   Click **Next**.

7 Provide information about the REST host.

    a   Enter the name of the host in the **Name** text box.

    b   Enter the address of the host in the **URL** text box.

> **Note** If you use Kerberos access authentication, you must provide the host address in FDQN format.

    c   (Optional) Enter the number of seconds before a connection times out in the **Connection timeout (seconds)** text box.

        The default value is 30 seconds.

    d   (Optional) Enter the number of seconds before an operation times out in the **Operation timeout (seconds)** text box.

        The default value is 60 seconds.

8 (Optional) Configure proxy settings.

    a   Select **Yes** to use a proxy from the **Use Proxy** drop-down menu.

    b   Enter the IP of the proxy server in the **Proxy address** text box.

    c   Enter the port number to communicate with the proxy server in the **Proxy port** text box.

9 Click **Next**.

10 Select the authentication type.

Option	Action
None	No authentication is required.
OAuth 1.0	Uses OAuth 1.0 protocol. You must provide the required authentication parameters under OAuth 1.0.
	a Enter the key used to identify the consumer as a service provider in the **Consumer key** text box.
	b Enter the secret to establish ownership of the consumer key in the **Consumer secret** text box.
	c (Optional) Enter the access token that the consumer uses to gain access to the protected resources in the **Access token** text box.
	d (Optional) Enter the secret that the consumer uses to establish ownership of a token in the **Access token secret** text box.
OAuth 2.0	Uses OAuth 2.0 protocol.
	Enter the authentication token in the **Token** text box.
Basic	Provides basic access authentication. The communication with the host is in shared session mode.
	a Enter the user name for the shared session in the **Authentication user name** text box.
	b Enter the password for the shared session in the **Authentication password** text box.

Option	Action
Digest	Provides digest access authentication that uses encryption. The communication with the host is in shared session mode.
	a Enter the user name for the shared session in the **Authentication user name** text box.
	b Enter the password for the shared session in the **Authentication password** text box.
NTLM	Provides NT LAN Manager (NTLM) access authentication within the Window Security Support Provider (SSP) framework. The communication with the host is in shared session mode.
	a Provide the user credentials for the shared session.
	▪ Enter the user name for the shared session in the **Authentication user name** text box.
	▪ Enter the password for the shared session in the **Authentication password** text box.
	b Configure the NTLM details
	▪ (Optional) Enter the workstation name in the **Workstation for NTLM authentication** text box.
	▪ Enter the domain name in the **Domain for NTLM authentication** text box.
Kerberos	Provides Kerberos access authentication. The communication with the host is in shared session mode.
	a Enter the user name for the shared session in the **Authentication user name** text box.
	b Enter the password for the shared session in the **Authentication password** text box.

11 Click **Add**.

You configured the endpoint and added a REST host. Service architects can use the Advanced Service Designer to publish HTTP-REST plug-in workflows as catalog items and resource actions.

Configure the PowerShell Plug-In as an Endpoint

You can add an endpoint and configure the PowerShell plug-in to connect to a running PowerShell host, so that you can call PowerShell scripts and cmdlets from vRealize Orchestrator actions and workflows, and work with the result.

Prerequisites

▪ Verify that you have access to a Windows PowerShell host. For more information about Microsoft Windows PowerShell, see the Windows PowerShell documentation.

▪ Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1   To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2   Click **Add** (✚).

3   Select **PowerShell** from the **Plug-in** drop-down menu.

4   Click **Next**.

5   Enter a name and, optionally, a description.

6   Click **Next**.

7   Specify the PowerShell host details.

    a   Enter the name of the host in the **Name** text box.

    b   Enter the IP address or the FDQN of the host in the **Host/IP** text box.

8   Select the PowerShell host type to which the plug-in connects.

Option	Action
WinRM	a Enter the port number to use for communication with the host in the **Port** text box under the PowerShell host details.
	b Select a transport protocol from the **Transport protocol** drop-down menu.
	Note If you use the HTTPS transport protocol, the certificate of the remote PowerShell host is imported to the vRealize Orchestrator keystore.
	c Select the authentication type from the **Authentication** drop-down menu.
	Note To use Kerberos authentication, enable it on the WinRM service. For information about configuring Kerberos authentication, see *Using the PowerShell Plug-In*.
SSH	None.

9   Enter the credentials for a shared session communication with the PowerShell host in the **User name** and **Password** text boxes.

10 Click **Add**.

You added an Windows PowerShell host as an endpoint. Service architects can use the Advanced Service Designer to publish PowerShell plug-in workflows as catalog items and resource actions.

Configure the SOAP Plug-In as an Endpoint

You can add an endpoint and configure the SOAP plug-in to define a SOAP service as an inventory object, and perform SOAP operations on the defined objects.

Prerequisites

- Verify that you have access to a SOAP host. The plug-in supports SOAP Version 1.1 and 1.2, and WSDL 1.1 and 2.0.

- Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2 Click **Add** ( ).

3 From the **Plug-in** drop-down menu, select **SOAP**.

4 Click **Next**.

5 Enter a name and, optionally, a description.

6 Click **Next**.

7 Provide the details about the SOAP host.

    a Enter the name of the host in the **Name** text box.

    b Select whether to provide the WSDL content as text from the **Provide WSDL content** drop-down menu.

Option	Action
Yes	Enter the WSDL text in the **WSDL content** text box.
No	Enter the correct path in the **WSDL URL** text box.

    c (Optional) Enter the number of seconds before a connection times out in the **Connection timeout (in seconds)** text box.

       The default value is 30 seconds.

    d (Optional) Enter the number of seconds before an operation times out in the **Request timeout (in seconds)** text box.

       The default value is 60 seconds.

8 (Optional) Specify the proxy settings.

    a To use a proxy, select **Yes** from the **Proxy** drop-down menu.

    b Enter the IP of the proxy server in the **Address** text box.

    c Enter the port number to communicate with the proxy server in the **Port** text box.

9 Click **Next**.

10 Select the authentication type.

Option	Action
None	No authentication is required.
Basic	Provides basic access authentication. The communication with the host is in shared session mode. a Enter the user name for the shared session in the **User name** text box. b Enter the password for the shared session in the **Password** text box.
Digest	Provides digest access authentication that uses encryption. The communication with the host is in shared session mode. a Enter the user name for the shared session in the **User name** text box. b Enter the password for the shared session in the **Password** text box.
NTLM	Provides NT LAN Manager (NTLM) access authentication in the Window Security Support Provider (SSP) framework. The communication with the host is in shared session mode. a Provide the user credentials. ▪ Enter the user name for the shared session in the **User name** text box. ▪ Enter the password for the shared session in the **Password** text box. b Provide the NTLM settings. ▪ Enter the domain name in the **NTLM domain** text box. ▪ (Optional) Enter the workstation name in the **NTLM workstation** text box.
Negotiate	Provides Kerberos access authentication. The communication with the host is in shared session mode. a Provide the user credentials. 1 Enter the user name for the shared session in the **User name** text box. 2 Enter the password for the shared session in the **Password** text box. b Enter the Kerberos service SPN in the **Kerberos service SPN** text box.

11 Click **Add**.

You added a SOAP service. Service architects can use the Advanced Service Designer to publish SOAP plug-in workflows as catalog items and resource actions.

Configure the vCenter Server Plug-In as an Endpoint

You can add an endpoint and configure the vCenter Server plug-in to connect to a running vCenter Server instance to create service blueprints to manage vSphere inventory objects.

Prerequisites

▪ Install and configure vCenter Server. See *vSphere Installation and Setup*.

▪ Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2 Click **Add** (✚).

3 Select **vCenter Server** from the **Plug-in** drop-down menu.

4 Click **Next**.

5 Enter a name and, optionally, a description.

6 Click **Next**.

7 Provide information about the vCenter Server instance.

   a Enter the IP address or the DNS name of the machine in the **IP or host name of the vCenter Server instance to add** text box.

   This is the IP address or DNS name of the machine on which the vCenter Server instance you want to add is installed.

   b Enter the port to communicate with the vCenter Server instance in the **Port of the vCenter Server instance** text box.

   The default port is 443.

   c Enter the location of the SDK to use for connecting to your vCenter Server instance in the **Location of the SDK that you use to connect to the vCenter Server instance** text box.

   For example, **/sdk**.

8 Click **Next**.

9 Define the connection parameters.

   a Enter the HTTP port of the vCenter Server instance in the **HTTP port of the vCenter Server instance - applicable for VC plugin version 5.5.2 or earlier** text box.

   b Enter the credentials for vRealize Orchestrator to use to establish the connection to the vCenter Server instance in the **User name of the user that Orchestrator will use to connect to the vCenter Server instance** and **Password of the user that Orchestrator will use to connect to the vCenter Server instance** text boxes.

   The user that you select must be a valid user with privileges to manage vCenter Server extensions and a set of custom defined privileges.

10 Click **Add**.

You added a vCenter Server instance as an endpoint. Service architects can use the Advanced Service Designer to publish vCenter Server plug-in workflows as catalog items and resource actions.

Update an Endpoint

After you create an endpoint, and configure a vRealize Orchestrator plug-in, you can edit the endpoint. For example, if the IP of the external system changes, you can update the IP so that vRealize Orchestrator does not lose connection to the host.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2 Select the row of the endpoint to update.

3 Click **Edit** (✏).

4 Follow the prompts and make your edits.

All of the required fields are the same as the ones when you create an endpoint.

5 Click **Update**.

Delete an Endpoint

You can delete an advanced service endpoint. The only kind of endpoint that you cannot delete is an Active Directory endpoint.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**.

Procedure

1 To configure the your Orchestrator plug-in endpoints, browse to the location based on your current version.

Version	Location
vRealize Automation 6.2.1	Select **Administration > Orchestration Configuration > Endpoints**
vRealize Automation 6.2	Select **Administration > Advanced Services > Endpoints**

2 Select the row of the endpoint to delete.

3   Click **Delete** (❌).

4   Click **OK**.

Installing Additional Plug-Ins on the Default vRealize Orchestrator Server

You can install additional plug-ins on the default vRealize Orchestrator server by using the vRealize Orchestrator configuration interface.

Additional plug-ins are not supported for configuration as vRealize Automation endpoints, but you can install additional plug-ins on the default vRealize Orchestrator server and use the workflows with the Advanced Service Designer.

Plug-in installation files are available as `.vmoapp` or `.dar` files from either the VMware Solution Exchange website or the vCenter Orchestrator Plug-Ins Documentation.

For more information about installing new plug-ins, see *Installing and Configuring VMware vCenter Orchestrator*

Authoring Services with Advanced Service Designer

<div style="text-align: right; font-size: 2em;">4</div>

Creating an advanced service involves a number of tasks.

This chapter includes the following topics:

- Advanced Service Designer Basics
- Creating an Advanced Service Overview
- Extending Operations on Resources Provisioned by Other Sources
- Importing and Exporting Advanced Service Designer Components

Advanced Service Designer Basics

By using Advanced Service Designer you can publish vRealize Orchestrator workflows as catalog items, include them in services, and publish the services in the catalog. You can also extend the vRealize Automation capabilities to manage provisioned items and resources by using custom resource actions.

For example, you can create custom resource actions to extend the post-provisioning actions on vSphere virtual machines provisioned with Infrastructure as a Service (IaaS).

Advanced Service Designer exposes the following objects in vRealize Automation:

- Custom resource
- Resource mapping
- Service blueprint
- Resource action

You can use the objects to create an advanced service in which to include your catalog items, and entitle the service, the catalog items and the resource actions to a user or a group of users within a business group.

Custom Resources

You must create a custom resource so that you can create an advanced service for provisioning with the option to access and manage the provisioned items. Custom resources define the items for provisioning, and you can use them to define post-provisioning operations that the consumers can perform.

You create a custom resource to define a new type of provisioned item and map it to an existing vRealize Orchestrator object type. vRealize Orchestrator object types are the objects exposed through the APIs of the vRealize Orchestrator plug-ins. The custom resource is the output type of a blueprint workflow for provisioning and can be the input type for a resource action workflow.

For example, if you have a running vCenter Server instance, and you also have the vCenter Server plug-in that is configured to work with vRealize Orchestrator, all of the object types from the vCenter Server API are exposed in vRealize Orchestrator. The vCenter Server plug-in exposes the vSphere inventory objects in the vRealize Orchestrator inventory. The vSphere inventory objects include data centers, folders, ESXi hosts, virtual machines and appliances, resource pools, and so on. You can perform operations on these objects. For example, you can create, clone, or destroy virtual machines.

For more information about the vRealize Orchestrator object types exposed through the vCenter Server API, see the *vCenter Server 5.5 Plug-In API Reference for vCenter Orchestrator*.

Service Blueprints

A blueprint is a complete specification of a service.

With service blueprints, you can publish predefined and custom vRealize Orchestrator workflows as catalog items for either requesting or provisioning. Blueprints for requesting run workflows with no provisioning and provide no options for managing a provisioned item. Before you create a blueprint for provisioning, you must map the workflow output parameter as a custom resource. Then you can assign resource actions that define post-provisioning operations.

Resource Actions

You can create custom resource actions to configure the post-provisioning operations that the consumers can perform.

To create post-provisioning operations, you must publish vRealize Orchestrator workflows as resource actions. To create a resource action for an item provisioned by using the Advanced Service Designer, you use a custom resource as an input parameter for the workflow. To create a resource action for an item that is provisioned by a source different from the Advanced Service Designer, you use a resource mapping as an input parameter for the workflow. When you entitle the resource actions, they appear in the **Actions** drop-down menu of the provisioned items on the **Items** tab.

Resource Mappings

You create resource mappings between the vRealize Automation catalog resource type and the vRealize Orchestrator inventory type to manage resources provisioned outside of Advanced Service Designer.

For example, you might want to create an action so that users can take a snapshot of their Amazon machines. For this action to work on an Amazon machine provisioned by using IaaS, the three components involved, Advanced Service Designer, vRealize Orchestrator, and IaaS, need a common language for the Amazon machine. You create that common language by adding a resource mapping in Advanced Service Designer that runs a vRealize Orchestrator scripting action or workflow to map the IaaS Cloud Machine resource type to the vRealize Orchestrator AWS:EC2Instance inventory type.

vRealize Automation provides resource mappings, and the underlying vRealize Orchestrator script actions and workflows, for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps.

Creating an Advanced Service Overview

Creating an advanced service and exposing the service to the catalog includes a number of tasks that are performed by different users.

The following is a high-level overview of the sequence of steps required to create and entitle a service for provisioning to a user or a group of users.

1 A service architect creates a custom resource to define the item for provisioning. See Create a Custom Resource.

2 A service architect creates a service blueprint to provision the custom resource and publishes the blueprint as a catalog item. See Create a Service Blueprint and Publish a Service Blueprint as a Catalog Item.

3 A service architect creates and publishes resource actions to define the post-provisioning operations that the consumers of the catalog items can perform on the provisioned items. See Create a Resource Action and Publish a Resource Action.

4 After creating the custom resource, the blueprint, and the resource actions, a service architect, tenant administrator, or a business group manager creates a service and includes the catalog item in the service. See Create a Service and Associate a Catalog Item with a Service.

5 A tenant administrator or an approval administrator creates an approval policy for advanced service blueprints and actions. See Create an Approval Policy for Advanced Service Blueprints and Actions.

6 A business group manager or a tenant administrator entitles the service, catalog items, and resource actions to a user or a group of users. The users specified are the consumers of the service who can request the catalog items. See Entitle a Service, Catalog Items, and Actions to a User or a Group of Users.

This is the most common and straightforward scenario for creating an advanced service. It suggests provisioning resource items on the **Items** tab, defining the post-provisioning operations, adding catalog items in the service, and entitling the service and the resource actions to a consumer.

You can also create and publish advanced services for requesting that do not result in provisioned items on the **Items** tab, for example, sending notifications. For creating such services, you skip steps 1 and 3.

Create a Custom Resource

To create an advanced service for provisioning, you must create a custom resource to define the item for provisioning.

By creating a custom resource, you map as a resource an object type exposed through the API of a vRealize Orchestrator plug-in. You create a custom resource to define the output parameter of a service blueprint for provisioning and to define an input parameter of a resource action. If you do not create a custom resource, the service blueprint does not provision items on the **Items** tab and you cannot define post-provisioning operations for the provisioned items.

During the process of creating a custom resource, on the Details Form page, you can specify the fields of the read-only form for the resource that displays information on the details view of a provisioned item. See Designing a Custom Resource Form.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Custom Resources**.

2   Click **Add** (✚).

3   Enter the vRealize Orchestrator object type In the **Orchestrator Type** text box and press Enter.

4   Enter a name and, optionally, a description.

5   Click **Next**.

6   Edit the form of the custom resource.

    You can edit the custom resource form by deleting, editing, and rearranging elements. You can also add a new form and form pages and drag elements to the new form and form page.

Option	Description
Add a form	Click the **New Form** icon (✚) next to the form name, provide the required information, and click **Submit**.
Add a form page	Click the **New Page** icon (✚) next to the form page name, provide the required information, and click **Submit**.
Add an element to the form page	Drag an element from the New Fields pane on the left to the pane on the right. You can then provide the required information and click **Submit**. The available elements are specific for the vRealize Orchestrator object type.
Edit an element	Click the **Edit** icon (✎) next to the element to edit, make the necessary changes, and click **Submit**.

Option	Description
Delete an element	Click the **Delete** icon (✖) next to the element to delete, and in the confirmation dialog box click **OK**.
Delete a form	Click the **Delete** icon (✖) next to the form name, and in the confirmation dialog box click **OK**.

7 Click **Add**.

You created a custom resource and you can see it on the Custom Resources page.

What to do next

Create a service blueprint. See Create a Service Blueprint.

Create a Service Blueprint

A blueprint is a complete specification for a service. A blueprint determines the components of a service, which are the input parameters, submission and read-only forms, sequence of actions, and provisioning.

You can create service blueprints to provision custom resources that you previously created. When consumers request these catalog items, the provisioned items are stored on the **Items** tab and you can define post-provisioning operations for this type of provisioned resources.

If you create a service blueprint for provisioning without specifying the output parameter, when the consumers request this catalog item, the blueprint does the provisioning but the provisioned items are not added on the **Items** tab. You cannot perform post-provisioning operations on this type of provisioned resource.

You can also create service blueprints for requesting that do not have output parameters and do not result in provisioning. For example, you can create a service blueprint for sending notifications.

By creating a service blueprint, you publish a vRealize Orchestrator workflow as a catalog item. During this process you can edit the default generated forms. See Designing a Service Blueprint Form.

Prerequisites

- Log in to the vRealize Automation console as a **service architect**.
- For items provisioning, create a custom resource corresponding to the output parameter of the service blueprint.

Procedure

1 Select **Advanced Services > Service Blueprints**.

2 Click **Add** (➕).

3 Navigate through the vRealize Orchestrator workflow library and select a workflow.

You can see the name and description of the selected workflow, and the input and output parameters as they are defined in vRealize Orchestrator.

4 Click **Next**.

5   Enter a name and, optionally, a description.

The **Name** and **Description** text boxes are prepopulated with the name and description of the workflow as they are defined in vRealize Orchestrator.

6   (Optional) If you do not want to prompt consumers to enter a description and reason for requesting this resource action, select the **Hide catalog request information page** check box.

7   Click **Next**.

8   (Optional) Edit the form of the service blueprint on the Blueprint Form page.

By default, the service blueprint form is mapped to the vRealize Orchestrator workflow presentation. You can edit the blueprint form by deleting, editing, and rearranging the elements in the form. You can also add a new form and form pages and drag elements to the new form and form page.

Option	Action
Add a form	Click the **New Form** icon ( ) next to the form name, provide the required information, and click **Submit**.
Edit a form	Click the **Edit** icon ( ) next to the form name, make the necessary changes, and click **Submit**.
Regenerate the workflow presentation	Click the **Rebuild** icon ( ) next to the form name and click **OK**.
Delete a form	Click the **Delete** icon ( ) next to the form name, and in the confirmation dialog box click **OK**.
Add a form page	Click the **New Page** icon ( ) next to the form page name, provide the required information, and click **Submit**.
Edit a form page	Click the **Edit** icon ( ) next to the form page name, make the necessary changes, and click **Submit**.
Delete a form page	Click the **Delete** icon ( ) next to the form name, and in the confirmation dialog box click **OK**.
Add an element to the form page	Drag an element from the New Fields pane on the left to the pane on the right. You can then provide the required information and click **Submit**.
Edit an element	Click the **Edit** icon ( ) next to the element to edit, make the necessary changes, and click **Submit**.
Delete an element	Click the **Delete** icon ( ) next to the element to delete, and in the confirmation dialog box click **OK**.

9   Click **Next**.

10   Select an output parameter from the drop-down menu.

Option	Description
A custom resource that you previously created	When users request this catalog item, the provisioned items are stored on the **Items** tab.
No provisioning	The service blueprint does not add new items on the **Items** tab.

11   Click **Add**.

You created a service blueprint and you can see it on the Service blueprints page.

What to do next

Publish the blueprint as a catalog item. See Publish a Service Blueprint as a Catalog Item.

Publish a Service Blueprint as a Catalog Item

After you create a service blueprint, it is in a draft state and you can publish it as a catalog item.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Service Blueprints**.

2   Select the row of the service blueprint to publish, and click **Publish**.

The status of the service blueprint changes to Published. If you select **Administration > Catalog Management > Catalog Items**, you can see that the blueprint is published as a catalog item.

What to do next

You can create a resource action to define the operations that the consumers can perform against the item they provision. See Create a Resource Action. If you do not want to create a resource action, you can create a service and include the catalog item in it. For more information about creating a service, see Create a Service.

Create a Resource Action

As a service architect, you can create resource actions to define the operations that consumers can perform on the provisioned items.

By creating a resource action, you associate a vRealize Orchestrator workflow as a post-provisioning operation. During this process, you can edit the default submission and read-only forms. See Designing a Resource Action Form.

Prerequisites

▪   Log in to the vRealize Automation console as a **service architect**.

▪   Create a custom resource corresponding to the input parameter of the resource action.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click **Add** (➕).

3 Navigate through the vRealize Orchestrator workflow library and select a workflow.

You can see the name and description of the selected workflow, and the input and output parameters as they are defined in vRealize Orchestrator.

4 Click **Next**.

5 Select the custom resource that you previously created from the **Resource type** drop-down menu.

6 Select the input parameter for the resource action from the **Input parameter** drop-down menu.

7 Click **Next**.

8 Enter a name and, optionally, a description.

The **Name** and **Description** text boxes are prepopulated with the name and description of the workflow as they are defined in vRealize Orchestrator.

9 (Optional) If you do not want to prompt consumers to enter a description and reason for requesting this resource action, select the **Hide catalog request information page** check box.

10 (Optional) Select the type of the action.

Option	Description
Disposing	The input parameter of the resource action workflow is disposed and the item is removed from the **Items** tab. For example, the resource action is for deleting a provisioned machine.
Provisioning	The resource action is for provisioning. For example, the resource action is for copying a catalog item.
	From the drop-down menu, select an output parameter. You can select a custom resource that you previously created so that when the consumers request this resource action, the provisioned items are added on the **Items** tab. If you have only the **No provisioning** option, either the resource action is not for provisioning, or you did not create a proper custom resource for the output parameter, and you cannot proceed.

Depending on the action workflow, you can select one, both, or none of the options.

11 Select the conditions under which the resource action is available to users, and click **Next**.

12 (Optional) Edit the form of the resource action on the **Form** tab.

The form of the resource action maps the vRealize Orchestrator workflow presentation. You can change the form by deleting, editing, and rearranging the elements. You can also add a new form and form pages and drag the necessary elements to the new form and form page.

Option	Action
Add a form	Click the **New Form** icon ( ) next to the form name, provide the required information, and click **Submit**.
Edit a form	Click the **Edit** icon ( ) next to the form name, make the necessary changes, and click **Submit**.
Regenerate the workflow presentation	Click the **Rebuild** icon ( ) next to the form name and click **OK**.

Option	Action
Delete a form	Click the **Delete** icon (❌) next to the form name, and in the confirmation dialog box click **OK**.
Add a form page	Click the **New Page** icon (➕) next to the form page name, provide the required information, and click **Submit**.
Edit a form page	Click the **Edit** icon (✏️) next to the form page name, make the necessary changes, and click **Submit**.
Delete a form page	Click the **Delete** icon (❌) next to the form name, and in the confirmation dialog box click **OK**.
Add an element to the form page	Drag an element from the New Fields pane on the left to the pane on the right. You can then provide the required information and click **Submit**.
Edit an element	Click the **Edit** icon (✏️) next to the element to edit, make the necessary changes, and click **Submit**.
Delete an element	Click the **Delete** icon (❌) next to the element to delete, and in the confirmation dialog box click **OK**.

13 Click **Add**.

You created a resource action and you can see it listed on the Resource Actions page.

What to do next

Publish the resource action. See Publish a Resource Action.

Publish a Resource Action

The newly created resource action is in draft state, and you must publish the resource action.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Select the row of the resource action to publish, and click **Publish**.

The status of the resource action changes to Published.

What to do next

Assign an icon to the resource action. See Assign an Icon to a Resource Action. Business group managers and tenant administrators can then use the action when they create an entitlement.

Assign an Icon to a Resource Action

After you create and publish a resource action, you can edit it and assign an icon to the action.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Administration > Catalog Management > Actions**.

2   Select the resource action that you created.

3   Click **Configure**.

4   Click **Browse** and select the icon to add.

5   Click **Open**.

6   Click **Update**.

You assigned an icon to the resource action. Business group managers and tenant administrators can use the resource action in an entitlement.

Create a Service

You can create a service to organize catalog items into related offerings.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

Procedure

1   Select **Administration > Catalog Management > Services**.

2   Click **Add** (➕).

3   Enter a name and, optionally, a description.

4   (Optional) Click **Browse** to select an icon for the service and click **Open**.

5   (Optional) Select a status for the service from the **Status** drop-down menu.

Option	Description
Inactive	Service is saved in a draft state and cannot be published to the catalog.
Active	Service can be published in the catalog.

6   (Optional) Configure information to display to users of the service when they browse the catalog.

  a   Select the availability of internal support services teams from the **Hours** drop-down menus.

  b   Enter the name of the service owner in the **Owner** text box and press Enter.

  a   Enter the name of the person or group of persons in charge of the service in the **Support Team** text box and press Enter.

  b   Select a time for scheduled maintenance from the **Change Window** drop-down menus.

7   Click **Add**.

What to do next

Associate your catalog item with a service.

Associate a Catalog Item with a Service

Include your catalog items in the service. You can include a catalog item in only one service, but a service can contain many catalog items.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator**, **business group manager**, or **service architect**.

Procedure

1   Select **Administration > Catalog Management > Catalog Items**.

2   Select the catalog item to associate with a service.

3   Click **Configure**.

4   (Optional) Click **Browse** to change the icon of the catalog item.

5   Select the status of the catalog item from the **Status** drop-down menu.

Option	Description
Active	Can be used in the service.
Inactive	Cannot be used in the service until you activate it.

6   Select a service with which to associate the catalog item from the **Service** drop-down menu.

7   Click **Update**.

You associated the catalog item with a service.

What to do next

Repeat the steps for all of the catalog items you want to include in the service. Create an entitlement to entitle the service and the catalog items included in it to users or groups in a business group. These users are the consumers of your service. See Entitle a Service, Catalog Items, and Actions to a User or a Group of Users.

Create an Approval Policy for Advanced Service Blueprints and Actions

Tenant administrators and approval administrators can define approval policies and use them in entitlements. You can set up the approval policies with multiple levels for pre- and post-approval events.

For detailed information about approvals and approval levels, see *Tenant Administration*.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **approval administrator**.

- Verify that a service architect created and published an advanced service blueprint. See Create a Service Blueprint and Publish a Service Blueprint as a Catalog Item.

- Verify that a service architect created and published a custom resource action. See Create a Resource Action and Publish a Resource Action.

Procedure

1 Specify Approval Policy Information

When you create an approval policy, first define the approval policy information, such as policy type, name, description, and status.

2 Create an Approval Level

When you create an approval policy, you can add levels for both pre- and post-provisioning phases within the provisioning workflow.

You created an approval policy. You can use it when you create an entitlement.

Specify Approval Policy Information

When you create an approval policy, first define the approval policy information, such as policy type, name, description, and status.

Procedure

1 Select **Administration > Approval Policies**.

2 Click **Add** (➕).

3 Select a policy type from the **Policy Type** drop-down menu.

Option	Description
Service Catalog - Catalog Item Request - Advanced Service Blueprint	Applies the policy to a catalog item that you created by publishing an advanced service blueprint.
Service Catalog - Resource Action Request - *your_custom_resource_action*	Applies the policy to a resource action that a service architect created by using Advanced Service Designer. The resource action can be any custom resource action, including resource actions for managing IaaS-provisioned vSphere virtual machines.

4 Click **OK**.

5 Enter a name and, optionally, a description.

6 Select the state of the policy from the **Status** drop-down menu.

Option	Description
Draft	Saves the approval policy in an editable state.
Active	Saves the approval policy in a read-only state that you can use in an entitlement.
Inactive	Saves the approval policy in a read-only state that you cannot use in an entitlement until you activate the policy.

What to do next

Create the pre- and post-approval levels.

Create an Approval Level

When you create an approval policy, you can add levels for both pre- and post-provisioning phases within the provisioning workflow.

Procedure

1 On the **Pre Approval** or **Post Approval** tab, click the **Add Levels** icon (+).

2 Enter a name and, optionally, a description.

3 Select a manual approval requirement.

Option	Description
Always Required	A manual approval is always required to complete the request.
Required based on conditions	A manual approval is required based on the conditions that you select from the **Clause** drop-down menu.

4 Select the approvers.

Option	Action
Specific Users and Groups	In the **Search** text box, enter the name of a user or group, and press Enter.
Determine approvers from the request	From the **Value** drop-down menu, select the approvers.

5 Indicate who must approve the request or action.

Option	Description
Anyone can approve	Any one of the approvers can approve the request.
All must approve	Each of the approvers must approve the request.

6 Click the **Approval Form** tab.

7 Double-click the fields you want to make editable.

An approver can modify the editable fields when completing an approval for this level and policy.

Editing fields is only in the pre-provisioning phase. In the post-provisioning phase, the fields are displayed as read-only and cannot be edited.

8 Click **Add**.

9 Click **Add**.

You can apply your approval policy to services, catalog items, and actions when you create an entitlement.

Entitle a Service, Catalog Items, and Actions to a User or a Group of Users

Business group managers and tenant administrators can entitle services, catalog items, and resource actions to groups of users, or to a specific user in a selected business group. They can also assign an approval policy for each service, catalog item, and resource action. The users to whom an object is entitled are the users who can access and request the entitled objects.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

1 Select **Administration > Catalog Management > Entitlements**.

2 Click **Add** (➕).

3 Enter a name and, optionally, a description.

4 (Optional) Select the date and the time when the entitlement expires in the **Expiration Date** text boxes.

If you do not specify expiry date and time, the entitlement remains active indefinitely.

5 Select the status of the entitlement from the **Status** drop-down menu.

Option	Description
Draft	Saves the entitlement in draft state.
Active	The entitlement is active and can be considered when determining access to entities in the service catalog.

If you select to activate the entitlement, you must select users or groups.

6 Select a business group from the **Business Group** drop-down menu.

7 Enter the name of a user or group in the **Users & Groups** text box, and press Enter.

You can add more than one user or group from the selected business group to the list. The groups and users must be part of the business group you selected previously.

8 Click **Next**.

9 Enter the name of a service in the **Entitled Services** text box, and press Enter.

You can select more than one service to add to an entitlement or you can add specific individual catalog items instead.

10 (Optional) Enter the name of a catalog item in the **Entitled Catalog Items** text box and press Enter.

By default, all of the catalog items included in the service are entitled to the users or user groups you selected on the **Details** tab.

If you entitle a service, by adding catalog items individually you can apply different approval policies to the catalog items.

11 (Optional) Enter the name of a resource action in the **Entitled Actions** text box, and press Enter.

12 (Optional) Modify the approval policies for a service, catalog item, or action.

    a   Point to the down arrow in the Approval Policy column and select **Modify Policy**.

    b   Select the policy to apply from the **Apply this Policy** drop-down menu.

    c   Click **OK**.

13 Click **Add**.

You created an entitlement and you can see it on the Entitlements page. If you set the entitlement in Active status, the users and user groups that you specified can access the catalog items in the service.

When consumers of the service log in to their vRealize Automation consoles, they see the service on the **Catalog** tab, and they can request the catalog items included in the service.

Extending Operations on Resources Provisioned by Other Sources

By using resource mappings, you can publish vRealize Orchestrator workflows as resource actions for managing items provisioned by sources other than Advanced Service Designer, for example, by IaaS or Application Services.

■   Extending Operations Checklist

    Resource actions for items provisioned outside of Advanced Service Designer require a resource mapping as the input parameter. Because some resource mappings are included with your vRealize Automation installation, the steps required to extend operations on resources provisioned outside of Advanced Service Designer depend on the type of resource you want to extend.

■   Resource Mapping Script Actions and Workflows

    You can use the provided resource mappings for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps, or you can create custom vRealize Orchestrator script actions or workflows to map additional vRealize Automation catalog resource types to vRealize Orchestrator inventory types.

■   Create a Resource Mapping

    vRealize Automation provides resource mappings for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps. You can create additional resource mappings for other types of catalog resources.

- Create a Resource Action for an Item Provisioned by Another Source

  You can create resource actions to extend the operations that the consumers of the catalog items can perform on items provisioned by sources other than the Advanced Service Designer.

- Publish a Resource Action

  The newly created resource action is in draft state, and you must publish the resource action.

- Assign an Icon to a Resource Action

  After you create and publish a resource action, you can edit it and assign an icon to the action.

Extending Operations Checklist

Resource actions for items provisioned outside of Advanced Service Designer require a resource mapping as the input parameter. Because some resource mappings are included with your vRealize Automation installation, the steps required to extend operations on resources provisioned outside of Advanced Service Designer depend on the type of resource you want to extend.

Extending Operations for vSphere and vCloud Director Machines

vRealize Automation provides the resource mappings for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps.

Table 4-1. Extending Operations for vSphere and vCloud Director Machines Checklist

Task	Details
❑ Create a resource action with a resource mapping as the input parameter. For the input parameter, select one of the provided resource mappings for vSphere virtual machines, vCloud Director virtual machines, or vCloud Director vApps.	Create a Resource Action for an Item Provisioned by Another Source.
❑ Publish your resource action.	Publish a Resource Action.
❑ Optionally, you can assign an icon to your resource action.	Assign an Icon to a Resource Action.

Tenant administrators and business group managers can entitle users to your resource action. Entitled users see the resource action in the Actions drop-down menu on the Items tab.

Extending Operations for Other Resource Types

You can extend operations on any vRealize Automation catalog resource by creating your own custom resource mappings.

Table 4-2. Extending Operations for Other Resource Types Checklist

Task	Details
❑ Develop or import a vRealize Orchestrator resource mapping script action or workflow.	For information about creating workflows and script actions to map resources, see Resource Mapping Script Actions and Workflows. For information about developing with vRealize Orchestrator, see *Developing with VMware vCenter Orchestrator* .
❑ Create an Advanced Service Designer resource mapping that runs your custom vRealize Orchestrator resource mapping script action or workflow.	Create a Resource Mapping.
❑ Create a resource action with a resource mapping as the input parameter. For the input parameter, select your custom resource mapping.	Create a Resource Action for an Item Provisioned by Another Source.
❑ Publish your resource action.	Publish a Resource Action.
❑ Optionally, you can assign an icon to your resource action.	Assign an Icon to a Resource Action.

Tenant administrators and business group managers can entitle users to your resource action. Entitled users see the resource action in the Actions drop-down menu on the Items tab.

Resource Mapping Script Actions and Workflows

You can use the provided resource mappings for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps, or you can create custom vRealize Orchestrator script actions or workflows to map additional vRealize Automation catalog resource types to vRealize Orchestrator inventory types.

Depending on your version of vRealize Orchestrator, you can create either a vRealize Orchestrator workflow or a script action to map resources between vRealize Orchestrator and vRealize Automation.

To develop the resource mapping, you use an input parameter of type `Properties`, which contains a key-value pair defining the provisioned resource, and an output parameter of a vRealize Orchestrator inventory type expected by the corresponding vRealize Orchestrator plug-in. The properties available for the mapping depend on the type of resource. For example, the `EXTERNAL_REFERENCE_ID` property is a common key parameter that defines individual machines, and you can use this property to query a catalog resource. If you are creating a mapping for a resource that does not use an `EXTERNAL_REFERENCE_ID`, you can use one of the other properties that are passed for the individual machines such as name, description, and so on.

vRealize Automation includes vRealize Orchestrator resource mapping script actions and resource mapping workflows for each of the provided Advanced Service Designer resource mappings. Script actions for the provided resource mappings are located in the `com.vmware.vcac.asd.mappings` package of the embedded vRealize Orchestrator server. Workflows for the provided resource mappings are located in the **Orchestrator > vCAC > ASD > Resource Mappings** workflows folder of the embedded vRealize Orchestrator server.

For more information about developing workflows and script actions, see *Developing with VMware vCenter Orchestrator* .

Create a Resource Mapping

vRealize Automation provides resource mappings for vSphere virtual machines, vCloud Director virtual machines, and vCloud Director vApps. You can create additional resource mappings for other types of catalog resources.

Prerequisites

- Log in to the vRealize Automation console as a **service architect**.

- Develop or import a vRealize Orchestrator resource mapping script action or workflow.

Procedure

1 Select **Advanced Services > Resource Mappings**.

2 Click **Add** (➕).

3 Enter a name and, optionally, a description.

4 Enter the type of the catalog resource in the **Catalog Resource Type** text box and press enter.

   The type of catalog resource appears on the details view of the provisioned item.

5 Enter the vRealize Orchestrator object type in the **Orchestrator Type** text box and press enter.

   This is the output parameter of the resource mapping workflow.

6 (Optional) Add target criteria to restrict the availability of resource actions created by using this resource mapping.

   Resource actions are also subject to restrictions based on approvals and entitlements.

   a Select **Available based on conditions**.

   b Select the type of condition.

Option	Description
All of the following	If all of the clauses you define are satisfied, resource actions created by using this resource mapping are available to the user.
Any of the following	If any one of the clauses you define are satisfied, resource actions created by using this resource mapping are available to the user.
Not the following	If the clause you define exists, resource actions created by using this resource mapping are not available.

   c Follow the prompts to build your clauses and complete the condition.

7 Select the type of resource mapping to use.

8 Select your resource mapping script action or workflow from the vRealize Orchestrator library.

9 Click **Add**.

Create a Resource Action for an Item Provisioned by Another Source

You can create resource actions to extend the operations that the consumers of the catalog items can perform on items provisioned by sources other than the Advanced Service Designer.

By creating a resource action, you publish a vRealize Orchestrator workflow as a post-provisioning operation. During this process, you can edit the default submission and read-only forms. See Designing a Resource Action Form.

Prerequisites

- Log in to the vRealize Automation console as a **service architect**.

- Create a resource mapping corresponding to the input parameter of the resource action. See Create a Resource Mapping

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click **Add** ( ).

3   Navigate through the vRealize Orchestrator workflow library and select a workflow.

    You can see the name and description of the selected workflow, and the input and output parameters as they are defined in vRealize Orchestrator.

4   Click **Next**.

5   Select the resource mapping that you previously created from the **Resource type** drop-down menu.

6   Select the input parameter for the resource action from the **Input parameter** drop-down menu.

7   Click **Next**.

8   Enter a name and, optionally, a description.

    The **Name** and **Description** text boxes are prepopulated with the name and description of the workflow as they are defined in vRealize Orchestrator.

9   (Optional) If you do not want to prompt consumers to enter a description and reason for requesting this resource action, select the **Hide catalog request information page** check box.

10 (Optional) Select the type of the action.

Depending on the action workflow, you can select one, both, or none of the options.

Option	Description
Disposing	The input parameter of the resource action workflow is disposed and the item is removed from the **Items** tab. For example, the resource action is for deleting a provisioned machine.
Provisioning	The resource action is for provisioning. For example, the resource action is for copying a catalog item.
	Select an output parameter from the drop-down menu. You can select a custom resource or resource mapping that you previously created so that when the consumers request this resource action, the provisioned items are added on the **Items** tab. If you have only the **No provisioning** option, either the resource action is not for provisioning, or you did not create a proper custom resource or resource mapping for the output parameter, and you cannot proceed.

11 Select the conditions under which the resource action is available to users, and click **Next**.

12 (Optional) Edit the form of the resource action on the **Form** tab.

The form of the resource action maps the vRealize Orchestrator workflow presentation. You can change the form by deleting, editing, and rearranging the elements. You can also add a new form and form pages and drag the necessary elements to the new form and form page.

Option	Action
Add a form	Click the **New Form** icon ( ) next to the form name, provide the required information, and click **Submit**.
Edit a form	Click the **Edit** icon ( ) next to the form name, make the necessary changes, and click **Submit**.
Regenerate the workflow presentation	Click the **Rebuild** icon ( ) next to the form name and click **OK**.
Delete a form	Click the **Delete** icon ( ) next to the form name, and in the confirmation dialog box click **OK**.
Add a form page	Click the **New Page** icon ( ) next to the form page name, provide the required information, and click **Submit**.
Edit a form page	Click the **Edit** icon ( ) next to the form page name, make the necessary changes, and click **Submit**.
Delete a form page	Click the **Delete** icon ( ) next to the form name, and in the confirmation dialog box click **OK**.
Add an element to the form page	Drag an element from the New Fields pane on the left to the pane on the right. You can then provide the required information and click **Submit**.
Edit an element	Click the **Edit** icon ( ) next to the element to edit, make the necessary changes, and click **Submit**.
Delete an element	Click the **Delete** icon ( ) next to the element to delete, and in the confirmation dialog box click **OK**.

13 Click **Add**.

You created a resource action and you can see it listed on the Resource Actions page.

What to do next

Publish the resource action.

Publish a Resource Action

The newly created resource action is in draft state, and you must publish the resource action.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Select the row of the resource action to publish, and click **Publish**.

The status of the resource action changes to Published.

What to do next

Assign an icon to the resource action. See Assign an Icon to a Resource Action. Business group managers and tenant administrators can then use the action when they create an entitlement.

Assign an Icon to a Resource Action

After you create and publish a resource action, you can edit it and assign an icon to the action.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Administration > Catalog Management > Actions**.

2   Select the resource action that you created.

3   Click **Configure**.

4   Click **Browse** and select the icon to add.

5   Click **Open**.

6   Click **Update**.

You assigned an icon to the resource action. Business group managers and tenant administrators can use the resource action in an entitlement.

Importing and Exporting Advanced Service Designer Components

Instead of recreating Advanced Service Designer components for every environment, you can export your custom resources, service blueprints, resource mappings, and resource actions from one environment and import them into another.

Export Advanced Service Designer Components

You can export a zip file of your custom resources, service blueprints, resource mappings, and resource actions so that you can reuse Advanced Service Designer components in separate tenants or different vRealize Automation environments.

vRealize Orchestrator workflows are not exported with Advanced Service Designer components. You can use vRealize Orchestrator to create a `.package` for import into the target vRealize Automation environment.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 To configure the your content export options, browse to the location based on your current version.

Option	Description
vRealize Automation 6.2.1	Select **Administration > Content Management > Export Content**
vRealize Automation 6.2	Select **Administration > Advanced Services > Export Content**

2 Select the components to export.

3 Click **Next**.

   You are directed to the next tab to complete your selections.

4 From the **Export Content** tab, click **Export Content** to begin downloading your selections.

All Advanced Service Designer components you selected are downloaded in a zip file.

What to do next

You can import your content into another vRealize Automation environment.

Import Advanced Service Designer Components and Workflows

You can import custom vRealize Orchestrator workflows, custom resources, service blueprints, resource mappings, and resource actions so that you can use previously created Advanced Service Designer components in another tenant or in different vRealize Automation environments.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a `.package` file to import vRealize Orchestrator workflows.

- Create a `.zip` bundle to import vRealize Automation components.

Procedure

1   To configure the your content import options, browse to the location based on your current version.

Option	Description
vRealize Automation 6.2.1	Select **Administration > Content Management > Import Content**
vRealize Automation 6.2	Select **Administration > Advanced Services > Import Content**

2   Configure a prefix to prevent conflicts in cases where an Advanced Service Designer component with the same name already exists.

   a   (Optional) Select **Prefix only conflicting** to add a prefix only in cases where a naming conflict exists.

   b   Enter a prefix to add to imported components.

3   Click **Browse** and select the files to import.

Option	Description
`.package`	Import workflows into your vRealize Orchestrator.
`.zip`	Import custom resources, service blueprints, resource mappings, and resource actions into your Advanced Service Designer.

4   Click **Open**.

5   (Optional) Click **Validate** to ensure you are not missing any vRealize Orchestrator workflows required by the Advanced Service Designer components.

   vRealize Orchestrator workflow packages are not validated and might return an error.

6   Click **Import Content**.

After you import Advanced Service Designer components, you can see or edit them in Advanced Service Designer. After you import vRealize Orchestrator workflows you can see or edit them in vRealize Orchestrator, and you can use them to create components in Advanced Service Designer.

Form Designer 5

The Advanced Service Designer includes a form designer that you can use to design submission and details forms for blueprints, resources, and actions. Based on the presentation of the workflows, the form designer dynamically generates default forms and fields you can use to modify the default forms.

You can create interactive forms that the users can complete for submission of catalog items and resource actions. You can also create read-only forms that define what information the users can see on the details view for a catalog item or a provisioned resource.

As you create objects in the Advanced Service Designer, forms are generated for common use cases.

Table 5-1. Advanced Service Designer Object Types and Associated Forms

Object Type	Default Form	Additional Forms
Service blueprint	Request submission form based on the presentation of the selected workflow.	■ Catalog item details (read-only) ■ Submitted request details (read-only)
Custom resource	Resource details form based on the attributes of the vRealize Orchestrator plug-in inventory type (read-only).	■ None
Resource action	Action submission form based on the presentation of the selected workflow.	■ Submitted action details (read-only)

You can modify the default forms and design new forms. You can drag fields to add and reorder them on the form. You can place constraints on the values of certain fields, specify default values, or provide instructional text for the end user who is completing the form.

Because of their different purposes, the operations you can perform to design read-only forms are limited compared to the operations for designing submission forms.

This chapter includes the following topics:

- Fields in the Form Designer
- Constraints and Values in the Form Designer
- External Value Definitions in the Form Designer
- Working With the Form Designer

Fields in the Form Designer

You can extend the workflow presentation and functionality by adding new predefined fields to the default generated forms of resource actions and service blueprints.

If an input parameter is defined in the vRealize Orchestrator workflow, in vRealize Automation it appears on the default generated form. If you do not want to use the default generated fields in the form, you can delete them and drag and drop new fields from the palette. You can replace default generated fields without breaking the workflow mappings if you use the same ID as the field you are replacing.

You can also add new fields, other than the ones that were generated based on the vRealize Orchestrator workflow inputs, so that you can extend the workflow presentation and functionality in the following cases:

- Add constraints to the existing fields

  For example, you can create a new drop-down menu and name it **dd**. You can also create predefined options of Gold, Silver, Bronze, and Custom. If there is a predefined field, such as CPU, you can add the following constraints to this field:

  - If dd equals Gold, then CPU is 2000 MHz

  - If dd equals Silver, then CPU is 1000 MHz

  - If dd equals Bronze then CPU is 500 MHz

  - If dd equals Custom, the CPU field is editable, and the consumer can specify a custom value

- Add external value definitions to fields

  You can add an external value definition to a field so that you can run vRealize Orchestrator script actions and supply additional information to consumers on the forms you design. For instance, you might want to create a workflow to change the firewall settings of a virtual machine. On the resource action request page, you want to provide the user with the ability to change the open port settings, but you also want to restrict the options to ports that are open. You can add an external value definition to a dual list field and select a custom vRealize Orchestrator script action that queries for open ports. When the request form loads, the script actions runs, and the open ports are presented as options to the user.

- Add new fields that are handled in the vRealize Orchestrator workflow as global parameters

  For instance, the workflow provides an integration with a third-party system and the workflow developer defined input parameters to be handled in the general case, but has also provided a way for passing custom fields. For example, in a scripting box, all global parameters that start with **my3rdparty** are handled. Then, if the service architect wants to pass specific values for consumers to provide, the service architect can add a new field named **my3rdparty_CPU**.

Table 5-2. New Fields in the Resource Action or Service Blueprint Form

Field	Description
Text field	Single-line text box
Text area	Multi-line text box

Table 5-2. New Fields in the Resource Action or Service Blueprint Form (Continued)

Field	Description
Link	Field in which consumers enter a URL
Email	Field in which consumers enter an email address
Password field	Field in which consumers enter a password
Integer field	Text box in which consumers entre an integer You can make this field a slider with a minimum and maximum value, as well as an increment.
Decimal field	Text box in which consumers enter a decimal You can make this field a slider with a minimum and maximum value, as well as an increment.
Date & time	Text boxes in which consumers specify a date (by selecting a date from a calendar menu) and can also select the time (by using up and down arrows)
Dual List	A list builder in which consumers move a predefined set of values between two lists, the first list contains all unselected options and the second list contains the user's choices.
Check box	Check box
Yes/No	Drop-down menu for selecting **Yes** or **No**
Drop-down	Drop-down menu
List	List
Check box list	Check box list
Radio button group	Group of radio buttons
Search	Search text box that auto completes the query and where consumers select an object
Tree	Tree that consumers use to browse and select available objects
Map	Map table that consumers use to define key-value pairs for properties

You can also use the **Section header** form field to split form pages in sections with separate headings and the **Text** form field to add read-only informational texts.

Constraints and Values in the Form Designer

When you edit an element of the blueprint or resource action form, you can apply various constraints and values to the element.

Constraints

The constraints that you can apply to an element vary depending on the type of element you are editing or adding to the form. Some constraint values might be configured in the vRealize Orchestrator workflow. Those values do not appear on the Constraints tab because they are often dependent on conditions that are evaluated when the workflow runs. Any constraint values that you configure for the blueprint form overrides any constraints specified in the vRealize Orchestrator workflow.

For each constraint you apply to an element, you can select one of the following options to define the constraint:

Not set	Gets the property from the vRealize Orchestrator workflow presentation.
Constant	Sets the element you are editing to required or optional.
Field	Binds the element to another element from the form. For example, you can set the element to be required only when another element, such as a check box, is selected.
Conditional	Applies a condition. By using conditions you can create various clauses and expressions and apply them to the state or constraints of the element.
External	Select a vRealize Orchestrator script action to define the value.

Table 5-3. Constraints in the forms designer

Constraint	Description
Required	Indicates whether the element is required.
Read only	Indicates whether the field is read-only.
Value	Allows you to set a value for the element.
Visible	Indicates whether the consumer can see the element.
Minimum length	Allows you to set a minimum number of characters of the string input element.
Maximum length	Allows you to set a maximum allowed number of characters of the string input element.
Minimum value	Allows you to set a minimum value of the number input element.
Maximum value	Allows you to set a maximum value of the number input element.
Increment	Allows you to set an increment for an element such as a **Decimal** or **Integer** field. For example, when you want an **Integer** field to be rendered as a **Slider**, you can use the value of the step.
Minimum count	Allows you to set a minimum count of items of the element that can be selected. For example, when you add or edit a **Check box list** you can set the minimum number of check boxes that the consumer must select to proceed.
Maximum count	Allows you to set a maximum count of items of the element that can be selected. For example, when you add or edit a **Check box list** you can set the maximum number of check boxes that the consumer must select to proceed.

Values

You can apply values to some of the elements and define what the consumers see for some of the fields. The options available depend on the type of element you are editing or adding to the form.

Table 5-4. Values in the Form Designer

Value	Description
Not set	Get the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Predefined values	Select values from a list of related objects from the vRealize Orchestrator inventory.
Value	Define a static custom values with labels.
External Values	Select a vRealize Orchestrator script action to define your value with information not directly exposed by the workflow.

External Value Definitions in the Form Designer

When you edit some elements in the forms designer, you can assign external value definitions that use custom vRealize Orchestrator script actions to supply information not directly exposed by the workflow.

For instance, you might want to publish a resource action to install software on a provisioned machine. Instead of providing the consumer with a static list of all software available for download, you can dynamically populate that list with software that is relevant for the machine's operating system, software that the user has not previously installed on the machine, or software that is out of date on the machine and requires an update.

To provide custom dynamic content for your consumer, you create a vRealize Orchestrator script action that retrieves the information you want to display to your consumers. You assign your script action to a field in the form designer as an external value definition. When the resource or service blueprint form is presented to your consumers, the script action retrieves your custom information and displays it to your consumer.

You can use external value definitions to supply default or read-only values, to build boolean expressions, to define constraints, or to provide options for consumers to select from lists, check boxes, and so on.

Working With the Form Designer

When you create advanced service blueprints, custom resource actions, and custom resources, you can edit the forms of the blueprints, actions, and resources by using the form designer. You can edit the representation and define what the consumers of the item or action see when they request the catalog item or run the post-provisioning operation.

By default, any service blueprint, resource action, or custom resource form is generated based on the workflow presentation in vRealize Orchestrator.

The steps in the vRealize Orchestrator presentation are represented as form pages and the vRealize Orchestrator presentation groups are represented as separate sections. The input types of the selected workflow are displayed as various fields in the form. For example, the vRealize Orchestrator type `string` is represented by a text box. A complex type such as `VC:VirtualMachine` is represented by a search box or a tree, so that the consumers can type an alphanumeric value to search for a virtual machine or browse to select a virtual machine.

You can edit how an object is represented in the form designer. For example, you can edit the default VC:VirtualMachine representation and make it a tree instead of a search box. You can also add new fields such as check boxes, drop-down menus, and so on, and apply various constraints. If the new fields you add are not valid or are not correctly mapped to the vRealize Orchestrator workflow inputs, when the consumer runs the workflow, vRealize Orchestrator skips the invalid or unmapped fields.

Designing a Custom Resource Form

All fields on the resource details form are displayed as read-only to the consumer on the item details page when they provision your custom resource. You can perform basic edit operations to the form, such as deleting, modifying, or rearranging fields, or you can add new externally defined fields that use vRealize Orchestrator script actions to supply additional read-only information to consumers.

- Edit a Custom Resource Element

  You can edit some of the characteristics of an element on the custom resource Details Form page. Each default field on the page represents a property of the custom resource. You cannot change the type of a property or the default values, but you can edit the name, size, description.

- Add a New Custom Resource Form Page

  You can add a new page to rearrange the form into multiple tabs.

- Insert a Section Header in a Custom Resource Form

  You can insert a section header to split the form into sections.

- Insert a Text Element in a Custom Resource Form

  You can insert a text box to add some descriptive text to the form.

- Insert an Externally Defined Field in a Custom Resource Form

  You can insert a new field and assign it an external value definition to dynamically provide read-only information that consumers can see on the item details page when they provision a custom resource.

Edit a Custom Resource Element

You can edit some of the characteristics of an element on the custom resource Details Form page. Each default field on the page represents a property of the custom resource. You cannot change the type of a property or the default values, but you can edit the name, size, description.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.
- Create a Custom Resource.

Procedure

1 Select **Advanced Services > Custom Resources**.

2 Click the custom resource to edit.

3 Click the **Details Form** tab.

4   Point to the element you want to edit and click the **Edit** icon.

5   Enter a new name for the field in the **Label** text box to change the label.

6   Edit the description in the **Description** text box.

7   Select an option from the **Size** drop-down menu to change the size of the element.

8   Select an option from the **Label size** drop-down menu to change the size of the label.

9   Click **Submit**.

10   Click **Update**.

Add a New Custom Resource Form Page

You can add a new page to rearrange the form into multiple tabs.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Custom Resource.

Procedure

1   Select **Advanced Services > Custom Resources**.

2   Click the custom resource to edit.

3   Click the **Details Form** tab.

4   Click the **New Page** icon ( ) next to the form page name.

5   Enter a name for the page in the **Heading** text box.

6   Click **Submit**.

7   Click **Update**.

You can delete some of the elements from the original form page and insert them in the new form page, or you can add new fields that use external value definitions to provide information to consumers that is not directly exposed by the vRealize Orchestrator workflow.

Insert a Section Header in a Custom Resource Form

You can insert a section header to split the form into sections.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Custom Resource.

Procedure

1   Select **Advanced Services > Custom Resources**.

2   Click the custom resource to edit.

3   Click the **Details Form** tab.

4   Drag the **Section header** element from the Form pane to the Form page pane.

5   Type a name for the section.

6   Click outside of the element to save the changes.

7   Click **Update**.

Insert a Text Element in a Custom Resource Form

You can insert a text box to add some descriptive text to the form.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Custom Resource.

Procedure

1   Select **Advanced Services > Custom Resources**.

2   Click the custom resource to edit.

3   Click the **Details Form** tab.

4   Drag the **Text** element from the Form pane to the Form page pane.

5   Enter the text you want to add.

6   Click outside of the element to save the changes.

7   Click **Update**.

Insert an Externally Defined Field in a Custom Resource Form

You can insert a new field and assign it an external value definition to dynamically provide read-only information that consumers can see on the item details page when they provision a custom resource.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Custom Resource.

▪ Develop or import a vRealize Orchestrator script action to retrieve the information you want to provide to consumers.

Procedure

1   Select **Advanced Services > Custom Resources**.

2   Click the custom resource to edit.

3   Click the **Details Form** tab.

4   Drag an element from the New Fields pane and drop it to the Form page pane.

5   Enter an ID for the element in the **ID** text box.

6   Enter a label in the **Label** text box.

Labels appear to consumers on the forms.

7   (Optional) Select a type for the field from the **Type** drop-down menu.

8   Enter the result type of your vRealize Orchestrator script action in the **Entity Type** search box and press Enter.

For example, if you want to use a script action to display the current user, and the script returns a vRealize Orchestrator result type of `LdapUser`, enter **LdapUser** in the **Entity Type** search box and press Enter.

9   Click **Add External Value**.

10   Select your custom vRealize Orchestrator script action.

11   Click **Submit**.

12   Click **Submit** again.

13   Click **Update**.

When the form is presented to your consumers, the script action retrieves your custom information and displays it to your consumer.

Designing a Service Blueprint Form

When you create a service blueprint, you can edit the form of the blueprint by adding new fields to the form, modifying the existing fields, deleting, or rearranging fields. You can also create new forms and form pages, and drag and drop new fields to them.

- Add a New Service Blueprint Form

   When you edit the default generated form of a workflow that you want to publish as a service blueprint, you can add a new service blueprint form.

- Edit a Service Blueprint Element

   You can edit some of the characteristics of an element on the Blueprint Form page of a service blueprint. You can change the type of an element, its default values, and apply various constraints and values.

- Add a New Element

   When you edit the default generated form of a service blueprint, you can add a predefined new element to the form. For example, if you do not want to use a default generated field, you can delete it and replace it with a new one.

- Insert a Section Header in a Service Blueprint Form

   You can insert a section header to split the form into sections.

- Add a Text Element to a Service Blueprint Form

  You can insert a text box to add some descriptive text to the form.

Add a New Service Blueprint Form

When you edit the default generated form of a workflow that you want to publish as a service blueprint, you can add a new service blueprint form.

By adding a new service blueprint form, you define the look and feel of the catalog item details and submitted request details pages. If you do not add a catalog item details and submitted request details forms, the consumer sees what is defined in the request form.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Service Blueprint.

Procedure

1 Select **Advanced Services > Service Blueprints**.

2 Click the service blueprint you want to edit.

3 Click the **Blueprint Form** tab.

4 Click the **New Form** icon (✚).

5 Enter a name and, optionally, a description.

6 Select the screen type from the **Screen type** menu.

Option	Description
Catalog item details	A catalog item details page that consumers see when they click a catalog item.
Request form	The default service blueprint form. The consumers see the request form when they request the catalog item.
Submitted request details	A request details page that consumers see after they request the item and want to view the request details on the **Request** tab.

7 Click **Submit**.

What to do next

Add the fields you want by dragging them from the New fields pane to the Form page pane.

Edit a Service Blueprint Element

You can edit some of the characteristics of an element on the Blueprint Form page of a service blueprint. You can change the type of an element, its default values, and apply various constraints and values.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

■   Create a Service Blueprint.

Procedure

1   Select **Advanced Services > Service Blueprints**.

2   Click the service blueprint you want to edit.

3   Click the **Blueprint Form** tab.

4   Locate the element you want to edit.

5   Click the **Edit** icon ( ).

6   Enter a new name for the field in the **Label** text box to change the label that consumers see.

7   Edit the description in the **Description** text box.

8   Select an option from the **Type** drop-down menu to change the display type of the element.

    The options vary depending on the type of element you edit.

9   Select an option from the **Size** drop-down menu to change the size of the element.

10 Select an option from the **Label size** drop-down menu to change the size of the label.

11 Edit the default value of the element.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Constant	Sets the default value of the element you are editing to a constant value that you specify.
Field	Binds the default value of the element to a parameter of another element from the representation.
Conditional	Applies a condition. By using conditions you can create various clauses and expressions and apply them to an element.
External	Select a vRealize Orchestrator script action to define the value.

12 Apply constraints to the element on the **Constraints** tab.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Constant	Sets the default value of the element you are editing to a constant value that you specify.
Field	Binds the default value of the element to a parameter of another element from the representation.
Conditional	Applies a condition. By using conditions you can create various clauses and expressions and apply them to an element.
External	Select a vRealize Orchestrator script action to define the value.

13 Add one or more values for the element on the **Values** tab.

The options available depend on the type of element you are editing.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Predefined values	Select values from a list of related objects from the vRealize Orchestrator inventory.
	a Enter a value in the **Predefined values** search box to search the vRealize Orchestrator inventory.
	b Select a value from the search results and press Enter.
Value	Define custom values with labels.
	a Enter a value in the **Value** text box.
	b Enter a label for the value in the **Label** text box.
	c Click the **Add** icon ( ).
External Values	Select a vRealize Orchestrator script action to define your value with information not directly exposed by the workflow.
	▪ Select **Add External Value**.
	▪ Select your vRealize Orchestrator script action.
	▪ Click **Submit**.

14 Click **Submit**.

15 Click **Update**.

Add a New Element

When you edit the default generated form of a service blueprint, you can add a predefined new element to the form. For example, if you do not want to use a default generated field, you can delete it and replace it with a new one.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Service Blueprint.

Procedure

1 Select **Advanced Services > Service Blueprints**.

2 Click the service blueprint you want to edit.

3 Click the **Blueprint Form** tab.

4 Drag an element from the New Fields pane and drop it to the Form page pane.

5 Enter the ID of a workflow input parameter in the **ID** text box.

6 Enter a label in the **Label** text box.

Labels appear to consumers on the forms.

7   (Optional) Select a type for the field from the **Type** drop-down menu.

8   Enter a vRealize Orchestrator object in the **Entity type** text box and press Enter.

    This step is not required for all field types.

Option	Description
Result Type	If you are using a script action to define an external value for the field, enter the result type of your vRealize Orchestrator script action.
Input Parameter	If you are using the field to accept consumer input and pass parameters back to vRealize Orchestrator, enter the type for the input parameter accepted by the vRealize Orchestrator workflow.
Output Parameter	If you are using the field to display information to consumers, enter the type for the output parameter of the vRealize Orchestrator workflow.

9   (Optional) Select the **Multiple values** check box to allow consumers to select more than one object.

    This option is not available for all field types.

10 Click **Submit**.

11 Click **Update**.

What to do next

You can edit the element to change the default settings and apply various constraints or values.

Insert a Section Header in a Service Blueprint Form

You can insert a section header to split the form into sections.

Prerequisites

■   Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

■   Create a Service Blueprint.

Procedure

1   Select **Advanced Services > Service Blueprints**.

2   Click the service blueprint you want to edit.

3   Click the **Blueprint Form** tab.

4   Drag the **Section header** element from the Form pane to the Form page pane.

5   Type a name for the section.

6   Click outside of the element to save the changes.

7   Click **Update**.

Add a Text Element to a Service Blueprint Form

You can insert a text box to add some descriptive text to the form.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Service Blueprint.

Procedure

1   Select **Advanced Services > Service Blueprints**.

2   Click the service blueprint you want to edit.

3   Click the **Blueprint Form** tab.

4   Drag the **Text** element from the New Fields pane to the Form page pane.

5   Enter the text you want to add.

6   Click outside of the element to save the changes.

7   Click **Update**.

Designing a Resource Action Form

When you create a resource action, you can edit the form of the action by adding new fields to the form, modifying the existing fields, deleting, or rearranging fields. You can also create new forms and form pages, and drag and drop new fields to them.

Add a New Resource Action Form

When you edit the default generated form of a workflow you want to publish as a resource action, you can add a new resource action form.

By adding a new resource action form, you define how the submitted action details page looks. If you do not add a submitted action details form, the consumer sees what is defined in the action form.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Resource Action.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click the resource action you want to edit.

3   Click the **Form** tab.

4   Click the **New Form** icon ( ).

5   Enter a name and, optionally, a description.

6   Select the screen type from the **Screen type** menu.

Option	Description
Action form	The default resource action form that consumers see when they decide to run the post-provisioning action.
Submitted action details	A request details page that consumers see when they request the action and decide to view the request details on the **Request** tab.

7   Click **Submit**.

What to do next

Add the fields you want by dragging them from the New fields pane to the Form page pane.

Add a New Element to a Resource Action Form

When you edit the default generated form of a resource action, you can add a predefined new element to the form. For example, if you do not want to use a default generated field, you can delete it and replace it with a new one.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Resource Action.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click the resource action you want to edit.

3   Click the **Form** tab.

4   Drag an element from the New Fields pane and drop it to the Form page pane.

5   Enter the ID of a workflow input parameter in the **ID** text box.

6   Enter a label in the **Label** text box.

Labels appear to consumers on the forms.

7   (Optional) Select a type for the field from the **Type** drop-down menu.

8   Enter a vRealize Orchestrator object in the **Entity type** text box and press Enter.

This step is not required for all field types.

Option	Description
Result Type	If you are using a script action to define an external value for the field, enter the result type of your vRealize Orchestrator script action.
Input Parameter	If you are using the field to accept consumer input and pass parameters back to vRealize Orchestrator, enter the type for the input parameter accepted by the vRealize Orchestrator workflow.
Output Parameter	If you are using the field to display information to consumers, enter the type for the output parameter of the vRealize Orchestrator workflow.

9   (Optional) Select the **Multiple values** check box to allow consumers to select more than one object.

This option is not available for all field types.

10   Click **Submit**.

11   Click **Update**.

What to do next

You can edit the element to change the default settings and apply various constraints or values.

Edit a Resource Action Element

You can edit some of the characteristics of an element on the resource action Form page. You can change the type of an element, its default values, and apply various constraints and values.

Prerequisites

- Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

- Create a Resource Action.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click the resource action you want to edit.

3   Click the **Form** tab.

4   Locate the element you want to edit.

5   Click the **Edit** icon ( ).

6   Enter a new name for the field in the **Label** text box to change the label that consumers see.

7   Edit the description in the **Description** text box.

8   Select an option from the **Type** drop-down menu to change the display type of the element.

The options vary depending on the type of element you edit.

9   Select an option from the **Size** drop-down menu to change the size of the element.

10 Select an option from the **Label size** drop-down menu to change the size of the label.

11 Edit the default value of the element.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Constant	Sets the default value of the element you are editing to a constant value that you specify.
Field	Binds the default value of the element to a parameter of another element from the representation.
Conditional	Applies a condition. By using conditions you can create various clauses and expressions and apply them to an element.
External	Select a vRealize Orchestrator script action to define the value.

12 Apply constraints to the element on the **Constraints** tab.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Constant	Sets the default value of the element you are editing to a constant value that you specify.
Field	Binds the default value of the element to a parameter of another element from the representation.
Conditional	Applies a condition. By using conditions you can create various clauses and expressions and apply them to an element.
External	Select a vRealize Orchestrator script action to define the value.

13 Add one or more values for the element on the **Values** tab.

The options available depend on the type of element you are editing.

Option	Description
Not set	Gets the value of the element you are editing from the vRealize Orchestrator workflow presentation.
Predefined values	Select values from a list of related objects from the vRealize Orchestrator inventory. a Enter a value in the **Predefined values** search box to search the vRealize Orchestrator inventory. b Select a value from the search results and press Enter.

Option	Description
Value	Define custom values with labels.
	a Enter a value in the **Value** text box.
	b Enter a label for the value in the **Label** text box.
	c Click the **Add** icon ( ).
External Values	Select a vRealize Orchestrator script action to define your value with information not directly exposed by the workflow.
	▪ Select **Add External Value**.
	▪ Select your vRealize Orchestrator script action.
	▪ Click **Submit**.

14 Click **Submit**.

15 Click **Update**.

Insert a Section Header in a Resource Action Form

You can insert a section header to split the form into sections.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Resource Action.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Click the resource action you want to edit.

3 Click the **Form** tab.

4 Drag the **Section header** element from the Form pane to the Form page pane.

5 Type a name for the section.

6 Click outside of the element to save the changes.

7 Click **Update**.

Add a Text Element to a Resource Action Form

You can insert a text box to add some descriptive text to the form.

Prerequisites

▪ Log in to the vRealize Automation console as a **tenant administrator** or **service architect**.

▪ Create a Resource Action.

Procedure

1 Select **Advanced Services > Resource Actions**.

2   Click the resource action you want to edit.

3   Click the **Form** tab.

4   Drag the **Text** element from the New Fields pane to the Form page pane.

5   Enter the text you want to add.

6   Click outside of the element to save the changes.

7   Click **Update**.

Advanced Service Designer Examples and Scenarios 6

The examples and scenarios identify common tasks in vRealize Automation and suggest ways to accomplish them.

This chapter includes the following topics:

Create a Service for Creating and Modifying a User

By using Advanced Service Designer, you can create and publish a catalog item for provisioning a user in a group. You can also associate a new post-provisioning operation to the provisioned user, for example, an operation allowing the consumers to change the user password.

In this scenario, as a service architect, you create a new custom resource, a service blueprint, and publish a catalog item for creating a user. You create service and include the catalog item in the service. You also create a resource action for changing the password of the user. In addition, you edit the workflow presentation of the catalog item by using the form designer and change the way the consumers see the request form.

As a business group manager or a tenant administrator, you entitle the newly created service, catalog item, and resource action to a consumer.

Prerequisites

Verify that the Active Directory plug-in is properly configured and you have the rights to create users in Active Directory.

Procedure

1   Create a Test User as a Custom Resource

You can create a custom resource and map it to the vRealize Orchestrator object type `AD:User`.

2 Create a Service Blueprint for Creating a User

After you created the custom resource, you can create the service blueprint to publish the Create a user in a group workflow as a catalog item.

3 Publish the Create a User Blueprint as a Catalog Item

After you create the Create a test user service blueprint, you can publish it as a catalog item.

4 Create a Resource Action to Change a User Password

You can create a resource action to allow the consumers of the service to change the password of the user after they provision the user.

5 Publish the Change a Password Resource Action

To use the Change the password of the Test User resource action as a post-provisioning operation, you must publish it.

6 Create a Service for Creating a Test User

You can create a service to display in the service catalog and allow consumers to easily locate the catalog items related to creating the test user.

7 Associate the Catalog Item with the Create a Test User Service

To include the Create a test user catalog item in the Create a Test User service, you must associate it with this service.

8 Entitle the Service and the Resource Action to a Consumer

Business group managers and tenant administrators can entitle the service and the resource action to a user or a group of users so that they can see the service in their catalog and request the Create a test user catalog item included in the service. After the consumers provision the item, they can request to change the user password.

When consumers of the service log in to their vRealize Automation consoles, they see the service you created, Create a test user, on the **Catalog** tab. They can request the catalog item you created and included in the service, Create a user in a group. After they create the user, they can change the user password.

Create a Test User as a Custom Resource

You can create a custom resource and map it to the vRealize Orchestrator object type `AD:User`.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Advanced Services > Custom Resources**.

2 Click **Add** ( ).

3 Type **AD:User** in the **Inventory Type** text box and press Enter.

4 Type a name for the resource.

For example, `Test User`.

5 Type a description for the resource.

For example,
`This is a test custom resource that I will use for my catalog item to create a user in a group.`

6 Click **Next**.

7 Leave the form as is.

8 Click **Add**.

You created a Test User custom resource and you can see it on the Custom Resources page.

What to do next

Create a service blueprint.

Create a Service Blueprint for Creating a User

After you created the custom resource, you can create the service blueprint to publish the Create a user in a group workflow as a catalog item.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Advanced Services > Service Blueprints**.

2 Click **Add** ( ).

3 Navigate to **Orchestrator > Library > Microsoft > Active Directory > User** in the vRealize Orchestrator workflow library, and select the **Create a user in a group** workflow.

4 Click **Next**.

5 Change the name of the blueprint to `Create a test user`, and leave the description as is.

6 Click **Next**.

7 Edit the blueprint form.

a Click the **Edit** icon ( ) next to the **groupContainer** text box, and change the name of the label to `Group container`.

b Click **Submit** to save the changes.

c Click the **Edit** icon ( ) next to the **accountName** text box, and change the label to `Account name`.

     d   Click **Submit** to save the changes.

     e   Click the **Edit** icon (✐) next to the **domainName** text box, and change the name of the label to
          `Domain name`.

     f   Click the **Constraints** tab.

     g   Select **Constant** from the **Value** drop-down menu and type **test.domain**.

          You set the domain name to a constant value.

     h   Click **Constant** in the **Visible** drop-down menu and select **No**.

          You made the domain name invisible to the consumer of the catalog item.

     i   Click **Submit** to save the changes.

     j   Click the **Edit** icon (✐) next to the **displayName** text box, and change the label to
          `Display name`.

     k   Click **Submit** to save the changes.

8   Click **Next**.

9   Select **newUser [Test User]** as an output parameter to be provisioned.

10 Click **Add**.

You created a blueprint for creating a test user and you can see it on the Service blueprints page.

What to do next

Publish the Create a test user blueprint to make it an active catalog item.

Publish the Create a User Blueprint as a Catalog Item

After you create the Create a test user service blueprint, you can publish it as a catalog item.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Service Blueprints**.

2   Select the row of the Create a test user blueprint, and click the **Publish** button.

The status of the Create a test user blueprint changes to Published. You can navigate to **Administration > Catalog Management > Catalog Items** and see that the Create a test user blueprint is published as a catalog item.

Create a Resource Action to Change a User Password

You can create a resource action to allow the consumers of the service to change the password of the user after they provision the user.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click **Add** (➕).

3   Navigate to **Orchestrator > Library > Microsoft > Active Directory > User** in the vRealize Orchestrator workflow library, and select the **Change a user password** workflow.

4   Click **Next**.

5   Select **Test User** from the **Resource type** drop-down menu.

    This is the custom resource you created previously.

6   Select **user** from the **Input parameter** drop-down menu.

7   Click **Next**.

8   Change the name of the resource action to `Change the password of the Test User`, and leave the description as it appears on the **Details** tab.

9   Click **Next**.

10 (Optional) Leave the form as is.

11 Click **Add**.

You created a resource action for changing the password of a user and you can see it listed on the Resource Actions page.

What to do next

Publish the Change the password of the Test User resource action.

Publish the Change a Password Resource Action

To use the Change the password of the Test User resource action as a post-provisioning operation, you must publish it.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Select the row of the Change the password of the Test User action, and click the **Publish** button.

The status of the Change the password of the Test User resource action changes to Published.

What to do next

Assign an icon to the resource action. You can then use the action when you create an entitlement. For more information about assigning an icon to a resource action, see Assign an Icon to a Resource Action.

Create a Service for Creating a Test User

You can create a service to display in the service catalog and allow consumers to easily locate the catalog items related to creating the test user.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Administration > Catalog Management > Services**.

2 Click the **Add** icon (✚).

3 Enter `Create a Test User` as the name of the service.

4 Select **Active** from the **Status** drop-down menu.

5 Leave the other text boxes blank.

6 Click **Add**.

You created the service called Create a Test User, and you can see it on the Services page.

What to do next

Edit the Create a test user catalog item to include it in the service.

Associate the Catalog Item with the Create a Test User Service

To include the Create a test user catalog item in the Create a Test User service, you must associate it with this service.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Administration > Catalog Management > Catalog Items**.

2 Locate the Create a test user catalog item, and click the catalog item name.

3 (Optional) Click **Choose File** to change the icon of the catalog item.

4 Select the **Create a Test User** service from the **Service** drop-down menu.

5 Click **Update**.

You associated the Create a test user catalog item with the Create a Test User service.

What to do next

Business group managers and tenant administrators can entitle the service and the resource action to a user or a group of users.

Entitle the Service and the Resource Action to a Consumer

Business group managers and tenant administrators can entitle the service and the resource action to a user or a group of users so that they can see the service in their catalog and request the Create a test user catalog item included in the service. After the consumers provision the item, they can request to change the user password.

Prerequisites

Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Procedure

1 Select **Administration > Catalog Management > Entitlements**.

2 Click the **Add** icon (➕).

3 Enter `Create a user` in the **Name** text box.

4 Leave the **Description** and **Expiration Date** text boxes empty.

5 Select **Active** from the **Status** drop-down menu.

6 Select your business group from the **Business Group** drop-down menu.

7 Enter a user name in the **Users & Groups** text box and press Enter.

The person you select can see the service and the catalog items included in the service in the catalog.

8 Click **Next**.

9 Enter **Create a Test User** in the **Entitled Services** text box and press Enter.

10 Enter **Change the password of the Test User** in the **Entitled Resource Actions** text box and press Enter.

11 Click **Add**.

You created an active entitlement and exposed the service to the catalog of the consumers.

When consumers of the service log in to their vRealize Automation consoles, they see the service you created, Create a test user, on the **Catalog** tab. They can request the catalog item you created and included in the service, Create a user in a group. After they create the user, they can change the user password.

Create and Publish an Action to Migrate a Virtual Machine

By using Advanced Service Designer, you can create and publish a resource action to extend the operations that consumers can perform on IaaS-provisioned vSphere virtual machines.

In this scenario, you create a resource action for quick migration of a vSphere virtual machine.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Create a Resource Action to Migrate a vSphere Virtual Machine

   You can create a custom resource action to allow the consumers to migrate vSphere virtual machines after they provision the vSphere virtual machines with IaaS.

2 Publish the Action for Migrating a vSphere Virtual Machine

   To use the Quick migration of virtual machine resource action as a post-provisioning operation, you must publish it.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Quick migration of virtual machine resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

What to do next

Business group managers and tenant administrators can include the Quick migration of virtual machine resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create a Resource Action to Migrate a vSphere Virtual Machine

You can create a custom resource action to allow the consumers to migrate vSphere virtual machines after they provision the vSphere virtual machines with IaaS.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Click **Add** (✚).

3 Navigate to **Orchestrator > Library > vCenter > Virtual Machine management > Move and migrate** in the vRealize Orchestrator workflow library and select the **Quick migration of virtual machine** workflow.

4 Click **Next**.

5 Select **IaaS VC VirtualMachine** from the **Resource type** drop-down menu.

6 Select **vm** from the **Input parameter** drop-down menu.

7 Click **Next**.

8 Leave the name of the resource action and the description as they appear on the **Details** tab.

9 Click **Next**.

10 Leave the form as is.

11 Click **Add**.

You created a resource action for migrating a virtual machine and you can see it listed on the Resource Actions page.

What to do next

Publish the resource action.

Publish the Action for Migrating a vSphere Virtual Machine

To use the Quick migration of virtual machine resource action as a post-provisioning operation, you must publish it.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Select the row of the Quick migration of virtual machine resource action, and click the **Publish** button.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Quick migration of virtual machine resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

What to do next

Business group managers and tenant administrators can include the Quick migration of virtual machine resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create an Action to Migrate a Virtual Machine With vMotion

By using Advanced Service Designer, you can create and publish a resource action to migrate an IaaS-provisioned virtual machine with vMotion.

In this scenario, you create a resource action to migrate a vSphere virtual machine with vMotion. In addition, you edit the workflow presentation by using the form designer and change the way the consumers see the action when they request it.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Create an Action to Migrate a vSphere Virtual Machine With vMotion

   You can create a custom resource action to allow the consumers of the service to migrate a vSphere virtual machine with vMotion after they provision the machine with IaaS.

2 Edit the Resource Action Form

   The form of the resource action maps the vRealize Orchestrator workflow presentation. You can edit the form and define what the consumers of the resource action see when they decide to run the post-provisioning operation.

3 Add a Submitted Action Details Form and Save the Action

   You can add a new form to the Migrate a virtual machine with vMotion resource action to define what the consumers see after they request to run the post-provisioning operation.

4 Publish the Action for Migrating a Virtual Machine with vMotion

   To use the Migrate a virtual machine with vMotion resource action as a post-provisioning operation, you must publish it.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Migrate virtual machine with vMotion resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

You also edited the presentation of the workflow and defined the look and feel of the action.

What to do next

Business group managers and tenant administrators can include the Migrate a virtual machine with vMotion resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create an Action to Migrate a vSphere Virtual Machine With vMotion

You can create a custom resource action to allow the consumers of the service to migrate a vSphere virtual machine with vMotion after they provision the machine with IaaS.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Click **Add** (➕).

3 Navigate to **Orchestrator > Library > vCenter > Virtual Machine management > Move and migrate** in the vRealize Orchestrator workflow library and select the **Migrate virtual machine with vMotion** workflow.

4 Click **Next**.

5 Select **IaaS VC VirtualMachine** from the **Resource type** drop-down menu.

6 Select **vm** from the **Input parameter** drop-down menu.

7 Click **Next**.

8 Leave the name of the resource action and the description as they appear on the **Details** tab.

9 Click **Next**.

What to do next

Edit the resource action form.

Edit the Resource Action Form

The form of the resource action maps the vRealize Orchestrator workflow presentation. You can edit the form and define what the consumers of the resource action see when they decide to run the post-provisioning operation.

Procedure

1 Click the **Delete** icon (✖) to delete the **pool** element.

2 Edit the **host** element.

   a   Click the **Edit** icon (✏️) next to the **host** field.

   b   Type `Target host` in the **Label** text box.

   c   Select **Search** from the **Type** drop-down menu.

   d   Click the **Constraints** tab.

   e   Select **Constant** from the **Required** drop-down menu and select **Yes**.

       You made the host field always required.

   f   Click **Submit**.

3 Edit the **priority** element.

   a   Click the **Edit** icon (✏️) next to the **priority** field.

   b   Type `Priority of the task` in the **Label** text box.

   c   Select **Radio button group** from the **Type** drop-down menu.

   d   Click the **Values** tab, and deselect the **Not set** check box.

    e   Enter `lowPriority` in the **Predefined values** search text box, and press Enter.

    f   Enter `defaultPriority` in the **Predefined values** search text box, and press Enter.

    g   Enter `highPriority` in the **Predefined values** search text box, and press Enter.

    h   Click **Submit**.

When the consumers request the resource action, they see a radio button group with three radio buttons: **lowPriority**, **defaultPriority**, and **highPriority**.

4   Edit the **state** element.

    a   Click the **Edit** icon (🖊) next to the **state** field.

    b   Type `Virtual machine state` in the **Label** text box.

    c   Select **Drop-down** from the **Type** drop-down menu.

    d   Click the **Values** tab, and deselect the **Not set** check box.

    e   Enter `poweredOff` in the **Predefined values** search text box, and press Enter.

    f   Enter `poweredOn` in the **Predefined values** search text box, and press Enter.

    g   Enter `suspended` in the **Predefined values** search text box, and press Enter.

    h   Click **Submit**.

When the consumers request the resource action, they see a drop-down menu with three options: **poweredOff**, **poweredOn**, and **suspended**.

You edited workflow presentation of the Migrate a virtual machine with vMotion workflow.

What to do next

Add a new form and save the resource action.

Add a Submitted Action Details Form and Save the Action

You can add a new form to the Migrate a virtual machine with vMotion resource action to define what the consumers see after they request to run the post-provisioning operation.

Procedure

1   Click the **New Form** icon (➕) next to the **Form** drop-down menu.

2   Type `Submitted action` in the **Name** text box.

3   Leave the **Description** field blank.

4   Select **Submitted action details** from the **Screen type** menu.

5   Click **Submit**.

6   Click the **Edit** icon (🖊) next to the **Form page** drop-down menu.

7   Type `Details` in the **Heading** text box.

8 Click **Submit**.

9 Drag the **Text** element from the Form pane and drop it to the **Form** page.

10 Type

You submitted a request to migrate your machine with vMotion. Wait until the process completes successfully.

11 Click outside of the text box to save the changes.

12 Click **Submit**.

13 Click **Add**.

You created a resource action to migrate a virtual machine with vMotion and you can see it listed on the Resource Actions page.

What to do next

Publish the resource action to make it active.

Publish the Action for Migrating a Virtual Machine with vMotion

To use the Migrate a virtual machine with vMotion resource action as a post-provisioning operation, you must publish it.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Select the row of the Migrate a virtual machine with vMotion action, and lick the **Publish** button.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Migrate virtual machine with vMotion resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

You also edited the presentation of the workflow and defined the look and feel of the action.

What to do next

Business group managers and tenant administrators can include the Migrate a virtual machine with vMotion resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create and Publish an Action to Take a Snapshot

By using Advanced Service Designer, you can create and publish a resource action to take a snapshot of a vSphere virtual machine provisioned with IaaS.

In this scenario, you create a resource action to take a snapshot of a vSphere virtual machine provisioned with IaaS. In addition, you edit the workflow presentation by using the form designer and change the way the consumers see the action when they request it.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1   Create the Action to Take a Snapshot of a vSphere Virtual Machine

    You can create a custom resource action to allow the consumers to take a snapshot of a vSphere virtual machine after they provision the machine with IaaS.

2   Publish the Action for Taking a Snapshot

    To use the Create a snapshot resource action as a post-provisioning operation, you must publish it.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Create a snapshot resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

What to do next

Business group managers and tenant administrators can include the Create a snapshot resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create the Action to Take a Snapshot of a vSphere Virtual Machine

You can create a custom resource action to allow the consumers to take a snapshot of a vSphere virtual machine after they provision the machine with IaaS.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Click **Add** (✚).

3   Navigate to **Orchestrator > Library > vCenter > Virtual Machine management > Snapshot** in the vRealize Orchestrator workflow library and select the **Create a snapshot** workflow.

4   Click **Next**.

5   Select **IaaS VC VirtualMachine** from the **Resource type** drop-down menu.

6   Select **vm** from the **Input parameter** drop-down menu.

7   Click **Next**.

8   Leave the name of the resource action and the description as they appear on the **Details** tab.

9   Click **Next**.

10 Leave the form as is.

11 Click **Add**.

You created a resource action for taking a snapshot of a virtual machine and you can see it listed on the Resource Actions page.

What to do next

Publish the resource action.

Publish the Action for Taking a Snapshot

To use the Create a snapshot resource action as a post-provisioning operation, you must publish it.

Procedure

1   Select **Advanced Services > Resource Actions**.

2   Select the row of the Create a snapshot action, and click the **Publish** button.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Create a snapshot resource action in the list of actions. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

What to do next

Business group managers and tenant administrators can include the Create a snapshot resource action in an entitlement. For more information about how to create and publish IaaS blueprints for virtual platforms, see *IaaS Configuration for Virtual Platforms*.

Create and Publish an Action to Start an Amazon Virtual Machine

By using the Advanced Service Designer, you can create and publish actions to extend the operations that the consumers can perform on third-party provisioned resources.

In this scenario, you create and publish a resource action for quick starting of Amazon virtual machines.

Prerequisites

■   Install the vRealize Orchestrator plug-in for Amazon Web Services on your default vRealize Orchestrator server.

■   Create or import a vRealize Orchestrator workflow for resource mapping of Amazon instances.

Procedure

1   Create a Resource Mapping for Amazon Instances

   You can create a resource mapping to associate Amazon instances provisioned by using IaaS with the vRealize Orchestrator type `AWS:EC2Instance` exposed by the Amazon Web Services plug-in.

2   Create a Resource Action to Start an Amazon Virtual Machine

   You can create a resource action so that the consumers can start provisioned Amazon virtual machines.

3   Publish the Action for Starting Amazon Instances

To use the newly created Start Instances resource action for post-provisioning operations on Amazon virtual machines, you must publish it.

You created and published a vRealize Orchestrator workflow as a resource action. You can navigate to **Administration > Catalog Management > Actions** and see the Start Instances resource action for EC2 Instance resource types. You can assign an icon to the resource action. See Assign an Icon to a Resource Action.

What to do next

Business group managers and tenant administrators can assign the Start Instances resource action to an entitlement.

Create a Resource Mapping for Amazon Instances

You can create a resource mapping to associate Amazon instances provisioned by using IaaS with the vRealize Orchestrator type `AWS:EC2Instance` exposed by the Amazon Web Services plug-in.

Prerequisites

- Log in to the vRealize Automation console as a **service architect**.

- Create or import a vRealize Orchestrator resource mapping workflow or script action.

Procedure

1   Select **Advanced Services > Resource Mappings**.

2   Click **Add** (➕).

3   Enter `EC2 Instance` in the **Name** text box.

4   Enter `Cloud Machine` in the **Catalog Resource Type** text box.

5   Enter `AWS:EC2Instance` in the **Orchestrator Type** text box.

6   Select **Always available**.

7   Select the type of resource mapping to use.

8   Select your custom resource mapping script action or workflow from the vRealize Orchestrator library.

9   Click **Add**.

You can use your Amazon resource mapping to create resource actions for Amazon machines provisioned by using IaaS.

What to do next

Create a resource action for Amazon instances.

Create a Resource Action to Start an Amazon Virtual Machine

You can create a resource action so that the consumers can start provisioned Amazon virtual machines.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Click **Add** (✚).

3 Select **Orchestrator > Library > Amazon Web Services > Elastic Cloud > Instances** and select the **Start Instances** workflow in the workflows folder.

4 Click **Next**.

5 Select **EC2 Instance** from the **Resource type** drop-down menu.

   This is the name of the resource mapping you previously created.

6 Select **instance** from the **Input parameter** drop-down menu.

   This is the input parameter of the resource action workflow to match the resource mapping.

7 Click **Next**.

8 Leave the name and the description as they are.

   The default name of the resource action is Start Instances.

9 Click **Next**.

10 Leave the fields as they are on the **Form** tab.

11 Click **Add**.

You created a resource action for starting Amazon virtual machines and you can see it on the Resource Actions page.

What to do next

Publish the Start Instances resource action.

Publish the Action for Starting Amazon Instances

To use the newly created Start Instances resource action for post-provisioning operations on Amazon virtual machines, you must publish it.

Prerequisites

Log in to the vRealize Automation console as a **service architect**.

Procedure

1 Select **Advanced Services > Resource Actions**.

2 Select the row of the Start Instances resource action, and click **Publish**.

The status of the Start Instances resource action changes to Published.

What to do next

Assign an icon to the Start Instances resource action.

Creating a Data Refresh Service Offering

By using vRealize Orchestrator, Application Services, Advanced Service Designer, and IaaS, you can create an advanced service offering to refresh external database backups in a golden database node, mask the data, and clone the database nodes without increasing storage costs.

Data Refresh is a database-oriented feature that uses components to provide a complete feature in vRealize Automation. Data Refresh helps you refresh the external database backup. The components include vRealize Orchestrator, Application Services, IaaS, Advanced Service Designer and Service Catalog. Data Refresh duplicates the copies of databases from one environment to another. For example, a developer or a test engineer can refresh the database from production to development or testing.

Data Refresh helps you refresh the external database backups in a golden database node, mask the data in the golden database, and clone any number of database nodes from the golden database node without increasing storage costs. A golden database is a database instance that contains preset data obtained through import and mask operations. The golden database is in a template node. You can duplicate multiple copies of a golden database and clone from the template node.

The Data Refresh process consists of the following phases.

▪ Provisioning a golden database node

▪ Requesting a golden database clone

You must prepare an environment before users can provision and request to clone a database.

▪ Complete the vRealize Automation environment preparation. For more information, see Preparing a Data Refresh Environment Checklist.

▪ The database administrator (DBA) configures Application Services, including application and deployment profile.

▪ DBA configures the data refresh service catalog through Advanced Service Designer and vRealize Automation.

▪ DBA requests the golden database node with the prepared mask data SQL script.

▪ Trigger cloning by DBA or by the vRealize Automation user.

The DBA uses data refresh repeatedly. vRealize Automation allows DBAs to define their own data refresh workflow to generate a golden database and clone the golden database.

Oracle Database 12c R1 and SQL Server 2012 Enterprise Edition for single node are supported in vRealize Automation 6.1. DBAs follow the sample to create the Data Refresh vRealize Orchestrator workflow and are not limited to Oracle 12c and SQL Server 2012. You can change either the database type or refresh backup source type through the customized Data Refresh vRealize Orchestrator workflow.

Preparing a Data Refresh Environment Checklist

Data Refresh helps you refresh the external database backups in a golden database node, mask the data in the golden database, and clone any number of database nodes from the golden database node. You must prepare an environment to provision and clone the database nodes.

The preparing a data refresh environment checklist provides a high-level overview of the sequence of steps required to prepare an environment to generate a golden database.

Table 6-1. Preparing a Data Refresh Environment Checklist

Task	Comments
❑ Complete all required IaaS configurations, and set up reservation policies and network profiles.	For information about required IaaS configurations, reservation policies, and network profiles, see *IaaS Configuration for Virtual Platforms*.
❑ Register vRealize Automation server from the Application Services client in Application Services.	See *Using Application Services*.
❑ Create the cloud provider and deployment environment in Application Services.	See *Using Application Services*.
❑ Log in to Application Services as a **system administrator**.	Verify that the server or directory that contains the backups and control file is secured.
❑ Download the database installation files from the database website to any location on the server.	Ensure that the server access channel is secured. See Oracle or Microsoft website to download the installation files.
❑ Prepare a set of backups (plus control file backup) in a server or directory appropriately.	
❑ Prepare a virtual machine on vCenter Server with vRealize Automation and the Application Services agent installed.	
❑ Create a vRealize Automation machine blueprint of type vSphere vCenter based on the virtual machine in vCenter Server.	See *IaaS Configuration for Virtual Platforms*.
❑ Add the vSphere vCenter machine blueprint in the cloud provider and logical template in Application Services.	See *Using Application Services*.

Table 6-1. Preparing a Data Refresh Environment Checklist (Continued)

Task	Comments
❑ In Application Services, create an application and application version.	1 Create a blueprint. 2 Add a database node. 3 Add an appropriate database service in the database node. 4 Add additional disks with appropriate disk tags in the database node. 5 Set the properties in the appropriate database service. 6 Bind the disk_layout_info to self:disk_layout_info. See *Using Application Services*.
❑ Create a deployment profile for the application version.	See *Using Application Services*.

Provisioning a Golden Database Node Checklist

A golden database is a database instance with preset data. It is contained in a template node and can be duplicated to any number of copies along with cloning from the template node.

Ensure that you prepared the environment for data refresh for which you want to generate the golden database. See Preparing a Data Refresh Environment Checklist.

Log in to the vRealize Automation console as a **service architect**.

Table 6-2. Provisioning a Golden Database Node Checklist

Task	Comments
❑ In vRealize Orchestrator, create a data refresh workflow to publish as a catalog item.	You can use the sample data refresh workflows provided or create your own.
❑ Create a data refresh service blueprint the data refresh workflow you created in vRealize Orchestrator.	For information about creating service blueprints, see Create a Service Blueprint.
❑ Publish your data refresh service blueprint.	See Publish a Service Blueprint as a Catalog Item.
❑ Create a Data Management service for catalog items such as data refresh.	See Create a Service.
❑ Associate your data refresh catalog item with the data management service you created.	See Associate a Catalog Item with a Service.
❑ Entitle users to your data management service and data refresh catalog item.	Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**. See Entitle a Service, Catalog Items, and Actions to a User or a Group of Users.
❑ Select **Request** for the appropriate catalog item on the Service Catalog page.	

Table 6-2. Provisioning a Golden Database Node Checklist (Continued)

Task	Comments
❑ Provision a golden database node for the appropriate database on the New Request page.	1 On the **Request Information** tab, enter the `Description.` 2 On the **Register App Services Instance** tab, enter the values for the Application Services address, tenant, username, and password. 3 On the **Create Database** tab, enter the values for the Application Services name, owning group, version, qualifier, and deployment profile name. 4 On the **Find Import Data Task** tab, retain the default values for the Application Services task name, task version, and owning group. Set the parameters on the Import tab to import the data. 5 On the **Find Run SQL Script Task** tab, retain the default values for the Application Services task name, task version, and owning group. 6 On the **Mask Data** tab, enter the mask data SQL script and the required database access parameters. 7 On the **Execution Settings** tab, set the timeout in minutes for each task. Click **Submit** to complete the request.
❑ On the Requests page, select the completed request and check the request details for Application Services Deployment ID, name, node name, node hostname, and node IP address.	

Requesting a Golden Database Clone Checklist

You can use several methods to clone a virtual machine in vRealize Automation. You can use an IaaS machine blueprint to link clone a database node from the generated database node to save the storage cost.

Ensure that you complete the following tasks before you request a database clone.

- Shut down the database instance by using an appropriate database tool.

- Ensure that you configured the database node before you clone the database.

- Log in to the vRealize Automation console as a **tenant administrator** or **business group manager**.

Table 6-3. Requesting a Golden Database Clone Checklist

Task	Comments
❑ Edit the existing Data Management entitlement.	Add the Power Off (Machine) and Power On (Machine) to Entitled Actions.
❑ Select the machine, click **Item Details**, and click **Power Off** under **Actions**.	Wait for the machine status to turn off.
❑ Create a new snapshot.	For more information, see Managing Virtual Machines in *Tenant Administration*.
❑ Create and publish a new machine blueprint.	For more information, see *IaaS Configuration for Virtual Platforms*.

Table 6-3. Requesting a Golden Database Clone Checklist (Continued)

Task	Comments
❑ Create a new service, golden database in Catalog Management.	For more information, see Managing the Service Catalog in *Tenant Administration*.
❑ Update the published machine blueprint in the Catalog Items list and set the service to golden database.	
❑ Add a new Entitlement and set the name to golden database.	This action adds the following items. ■ Golden database in Entitled Services ■ Published machine blueprint in Entitled Catalog Items ■ The granted users or groups to Users and Groups
❑ Request a clone from the published machine blueprint in the golden database and grant the appropriate user and groups to access the published machine blueprint.	On the New Request page, set the CPU and memory details. Click **Submit.**
❑ In Request Details, find the clone machine name from Service Catalog.	
❑ Use an appropriate database tool to start the clone database instance.	