Dell EMC vRealize Data Protection Extension

Version 4.0.x

Installation and Administration Guide

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REV 05

DELL EMC

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PREFACE

As part of an effort to improve its product lines, revisions of software and hardware are periodically released. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Note

This document was accurate at publication time. To find the latest version of this document, go to Online Support (https://support.EMC.com).

Purpose

This document describes how to install, configure, and use the vRealize Data Protection Extension.

Audience

This document is intended for system administrators who will be installing, configuring, and using the vRealize Data Protection Extension. A high degree of knowledge regarding Avamar, NetWorker, and VMware vRealize Automation administration is required.

Revision history

The following table prevents the revision history of this document.

Table 1 Revision history

Revision	Date	Description
05	October 16, 2018	Updated for version 4.0.5 of the vRealize Data Protection Extension. Updates include workflow changes for added option to remove NIC.
04	September 21, 2018	Updated for version 4.0.4 of the vRealize Data Protection Extension.
03	March 15, 2018	Updated for version 4.0.3 of the vRealize Data Protection Extension. Updates include: • Added new procedure to uninstall the vRealize Data Protection Extension from vRealize Orchestrator for vRO versions 7.3 and later. • Added section for "Install and Configure a 3-node cluster (vRA 7.3.1)." • Added recommendations for timeout values to Troubleshooting chapter.
02	March 31, 2017	Added note to "Installing data protection admin services into a specific tenant" to indicate that fields in the **Data Protection** screen are optional, but if not entered during the install, you must run the **Add a tenant data protection system** Catalog Item from vRA after the install.

Table 1 Revision history (continued)

Revision	Date	Description
01	December 22, 2016	First release of this document for version 4.0 of the vRealize Data Protection Extension.

Related documentation

The following publications available at https://support.emc.com provide additional information:

- *vRealize 4.0 Data Protection Extension Release Notes*
- *Avamar Administration Guide*
- *NetWorker Administration Guide*
- *NetWorker VMware Integration Guide*
- *NetWorker REST API Getting Started Guide*
- *NetWorker REST API Reference Guide*
- -

The following VMware publications available at https://www.vmware.com/support/pubs/ provide additional information:

- vRealize Automation documentation:
  - *Foundations and Concepts*
  - *Installation and Configuration*
  - *System Administration*
  - *IaaS Configuration*
  - *Tenant Administration*
- vRealize Orchestrator documentation:
  - *Using the vRealize Orchestrator plugin for vRealize Automation*

CHAPTER 1

Introduction

This chapter includes the following topics:

vRealize Data Protection Extension

VMware vRealize Automation™ allows authorized administrators, developers, and business users to request new IT services and manage specific cloud and IT resources based on their roles and privileges. The vRealize Data Protection Extension adds data protection to the services available during self-provisioning.

Data protection can be performed to an Avamar or NetWorker system, and consists of the following types:

- For Avamar and NetWorker, image level data protection (backup and recovery), which protects virtual machines at the disk level.
- For Avamar and NetWorker, file level restore using the EMC Data Protection Restore Client.
- For Avamar only, application consistent data protection, which uses Avamar's Agent-based Application Data Protection feature to protect virtual machines at an application level such that application data is consistent.

With the vRealize Data Protection Extension, the management of data protection is integrated into the standard vRealize Automation workflow. Service Level Agreements (SLAs) seamlessly enable data protection in the cloud. The applications are protected automatically when you enable EMC data protection.

Key concepts and components

The following sections define the key components of the vRealize Data Protection Extension.

Users

The EMC vRealize Data Protection Extension has two primary intended users. The first user is the data protection administrator. This user most likely has the tenant administrator role in vRealize Automation and should be added to the Administrator Entitlement that is created when running the **Install default setup for tenant** workflow. This user is responsible for the administration of the EMC vRealize Data Protection Extension. The responsibilities of the user include tenant administration, setting up blueprints with data protection, adding or removing data protection systems, deleting build profiles, and performing any advanced restore requests. For further information regarding these administrative responsibilities, see Administration on page 53.

The second user is the end user. This user most likely has the Business Group User role in vRealize Automation and should be added to the User Entitlement that is created when running the **Install default setup for tenant** workflow. This end user will provision virtual machines with data protection by using the blueprints that the data protection administrator creates. End users can also perform additional data protection actions on their provisioned virtual machines.

Blueprints

vRealize Automation enforces business rules around the self-provisioning of virtual machines using blueprints. A blueprint is the complete specification used to determine one or more virtual machine's attributes, the manner in which they are provisioned, and their policy and management settings.

Individual machines or all the machines in the blueprint can be protected using the EMC vRealize Data Protection Extension.

Catalog services

Self-provisioners select services from a catalog of services to which they are entitled.

Catalog services are backed by one of two types of blueprints:

- Blueprints define the rules about provisioning a virtual machine.
- Service blueprints define rules about self-provisioning custom services created with the Advanced Services mechanism, which is backed by the vRealize Orchestrator component.

Advanced services

Advanced Services, also known as XaaS (Anything as a Service), is vRealize Automation's extensible service construct.

The EMC vRealize Data Protection Extension delivers its data protection services as Advanced Services.

- If a service level agreement is assigned to the blueprint, the virtual machine will be added to a data protection policy at provisioning time.
- Blueprints can be configured with or without data protection policies assigned to them.

Property groups

A property group is a set of properties to be applied to a machine when it is provisioned.

These properties may determine the specification of the machine, the manner in which it is provisioned, operations to be performed after it is provisioned, or management information about the machine maintained within vRealize Automation. The EMC vRealize Data Protection Extension uses these property groups to add the data protection policy to blueprints.

Data protection policies

Data protection policies allow data protection administrators to control backup schedules and retention periods.

Policies map to the underlying data protection provider from which the policy originated, and adhere to the service level agreement (SLA) that the data protection provider supports. For example, Avamar data protection systems use groups, and NetWorker uses policies and protection groups.

Data protection policy definitions and descriptions

Backup policies are created and stored within the data protection system. The vRealize Data Protection Extension does not hold copies of policy definitions but keeps references to the original policy. This allows the backup administrator to modify the policy definition as needed without affecting the vRealize Data Protection Extension's loosely coupled reference.

Note

The policy name references the policy objects. It is recommended that you do not change the policy name after creating it. If you do change the policy name in the data protection system, then associated property groups that reference the policy must either be updated manually or the **Setup data protection property group** service must be requested again to update the property group with the new policy.

Since policies are referenced by name, It is recommended to use a unique name for each policy across all the data protection providers. For example, if two Avamar systems contain a policy that is named Gold, two Gold policies appear in some of the workflows in vRA, making it difficult to determine which Gold policy applies to which specific Avamar system.

Note

The vRealize Data Protection Extension uses the term "policy" to refer to Avamar policies or NetWorker policies/groups.

For blueprints with multiple components, you can either apply a configured Property Group to the root blueprint properties, which each component will then inherit, or apply to individual components as desired.

vRealize Automation and vRealize Orchestrator integration

vRealize Orchestrator is the workflow engine integrated with vRealize Automation. The vRealize Orchestrator server that is distributed with vRealize Automation is pre-configured, and therefore, when the Virtualization Administrator deploys the vRealize Automation Appliance, the vRealize Orchestrator server is up and running.

The vRealize Orchestrator product already offers hundreds of reusable workflows that vRealize Automation workflows can leverage. vRealize Automation workflows can run vRealize Orchestrator workflows, immediately extending the vSphere-oriented use cases for vRealize Automation. With the EMC vRealize Data Protection Extension installed, data protection features are accessible from the vRealize Automation and the vRealize Orchestrator user interfaces.

The vRealize Data Protection Extension includes both vRealize Automation services and public vRealize Orchestrator workflows and actions. General vRealize Orchestrator conventions for versioning and logging of workflows are followed.

Note

vRealize Orchestrator workflows and vRealize Automation services are not used during scheduled protection operations.

vRealize Automation endpoints

In vRealize Automation, an endpoint represents an external resource that is assigned to vRealize Automation to manage and allocate on behalf of tenants. In essence, this endpoint is the infrastructure fabric that vRealize Automation manages and makes available via reservations to one or more tenants.

Typically, IaaS administrators are responsible for creating endpoints while setting up the vRealize Automation infrastructure.

The EMC vRealize Data Protection Extension supports vCenter Server endpoints. For information on configuring the vCenter Server as the endpoint, refer to vRealize Automation documentation, which is available on the VMware website.

vRealize Automation tasks

The tasks in the following table encompass a typical end-to-end workflow using all required systems: vRealize Automation, vRealize Orchestrator, and the Data Protection System. The components must be configured and running with the EMC vRealize Data Protection Extension.

Table 2 vRealize Automation tasks

Task	Typical User	For more information
Install the EMC vRealize Data Protection Extension	System administrator	Installing the EMC Plug-in for vRealize Automation
Install the data protection service blueprints and resource actions into a tenant	Tenant administrator or XaaS architect	Installing data protection admin services into a specific tenant or the following link
Configure and entitle access to data protection functionality	Tenant administrator	Installing data protection admin services into a specific tenant
Create a virtual vSphere blueprint	Tenant administrator	Refer to vRealize Automation documentation for instructions on creating blueprints
To enforce data protection rules during provisioning, add data protection to a blueprint	Tenant administrator	Setting up data protection on a blueprint
Use advanced options to restore a virtual machine to a new location	Tenant administrator	Advanced restore to new for administrators
Restore a deleted virtual machine (Avamar only)	Tenant administrator	Restoring a deleted virtual machine
Provision virtual machines from a protected blueprint	Business group user	Provisioning a protected virtual machine
Use actions to manage protection on provisioned virtual machines: • Add data protection to a virtual machine • Run data protection on a virtual machine • View protection status and backup inventory • Remove data protection from a virtual machine • Restore a virtual machine to its original location	Business group user	Data protection actions Restore actions

Table 2 vRealize Automation tasks (continued)

Task	Typical User	For more information
• Restore a virtual machine to a new location • File-level restore (restore individual files or a directory of files to the same or different location on the virtual machine)		
View error logs	Any user	Event and error message codes

vCloud Automation vs. vRealize Automation

vRealize Automation is the new brand name to replace VMware vCloud Automation Center (vCAC). Throughout this document, the product is referred to as vRealize Automation. However, sometimes, the vCAC name still exists within the product. The same is true for vRealize Orchestrator, previously referred to as vCenter Orchestrator.

Recommended timeout values

It is recommended to set the following timeout values before using the vRealize Automation Data Protection Extension.

Log in to each vRealize Automation server node in the cluster and change each of the following default timeout values in the file `/usr/lib/vcac/server/webapps/o11n-gateway-service/WEB-INF/classes/META-INF/spring/root/o11ngateway-service-context.xml` to the following values:

- For a system with up to 300 virtual machines, set the *connectionTimeout* to 120000 ms.
- For a system with 300 to 1000 virtual machines, set the *connectionTimeout* to 240000 milliseconds.

Run the **vRO** > **Update a data protection system** workflow and configure the following values.

- For systems that have 300 to 1000 virtual machines, consider changing the default timeout values to the following:
  `edp.timeout=240s;mcjava.response.timeout=120s;networker.response.timeout=120s.`

Note

The *connectionTimeout* values must be greater than or equal to the value for *edp.timeout*, and the *edp.timeout* value must be greater than the Avamar (mcjava) and NetWorker timeout values.

Avamar limitations

The following limitation exists in the Avamar Data Protection system:

- Domain names within Avamar Data Protection systems can be a maximum of 63 characters in length. The vRealize Automation hostname forms the tenant domain name in Avamar Data Protection systems. If the hostname is very long, the tenant URL name might need to be shorter so that it does not exceed the limit.
  For example: `MyTenant_MyDomainIsLong.VeryLong.com`

  In this example, `_MyDomainIsLong.VeryLong.com` contains 28 characters, which means that the tenant URL name (`MyTenant`) cannot be longer than 35 characters.
- Avamar does not allow the use of tildes (~) in domain names. If the vRealize Automation tenant name has a tilde (~) then the tilde (~) is replaced with an underscore (_) in the domain name in Avamar.

NetWorker limitations

The following limitations apply to NetWorker data protection support:

- Restore from a deleted virtual machine is not supported.
- NetWorker does not support multi-tenancy for VMware data protection. Multi-tenancy can be supported with vRA by assigning/dedicating one NetWorker instance per tenant.

CHAPTER 2

Installation and Upgrade

This chapter includes the following topics:

Compatibility

This section describes the components that are required for using the EMC vRealize Data Protection Extension, and the versions of the products that the vRealize Data Protection Extension supports.

Required components

Operation of the EMC vRealize Data Protection Extension requires the following products:

- VMware vRealize Automation, including the latest IaaS server
- VMware vRealize Orchestrator
- VMware vSphere
- VMware ESXi Host
- Avamar Server with Avamar Image Proxy client(s)
- NetWorker Server with the vProxy appliance

Supported product versions

The following table lists the software versions that the 4.0.x vRealize Data Protection Extension supports.

Table 3 Supported product versions for vRealize Data Protection Extension

vRealize Automation and vRealize Orchestrator	Avamar	NetWorker
7.2.x, 7.3.x, 7.4.x **Note** 7.3.x and later supports 3 node vRealize Orchestrator Cluster	7.4.x, 7.5.x, 18.x	9.1.x, 9.2.x, 18.x

Pre-installation

Before you install the EMC vRealize Data Protection Extension, perform the following tasks.

Verify the configuration of the vRealize Automation installation

Before installing the EMC vRealize Data Protection Extension, verify the following in the base vRealize Automation installation configuration:

- The vRealize Automation Appliance has been deployed and configured
- IaaS components have been installed
- Tenants have been configured

- Agents, endpoints, and groups have been configured
- Blueprints have been created and published
- XaaS services have been set up
- A vRealize Automation (vCAC CAFE) endpoint exists for the default tenant (`vsphere.local`). Note that you can also create this endpoint by running the **Add a vRA host** workflow.
- A vRealize Automation Infrastructure Administration endpoint exists for the IaaS component. There is only one endpoint. Note that you can also create this endpoint by running the **Add the IAAS host of a vRA host** workflow.

Install the VMware vCenter Orchestrator Plug-in for vCloud Automation Center

The VMware vCenter Orchestrator Plug-in for vCloud Automation Center allows interaction between vRealize Orchestrator and vRealize Automation. The plug-in is a .vmoapp file name extension, which is a VMware vCenter Orchestrator application file that you must install in the vRealize Orchestrator Client.

Note

This step is not required when using the vRealize Automation Appliance with the internal vRealize Orchestrator server.

The VMware vCenter Orchestrator Plug-in for vRealize Automation contains the following two plug-ins:

- vCloud Automation Center plug-in for vCenter Orchestrator
- vCloud Automation Center Infrastructure Administration plug-in for vCenter Orchestrator

Refer to the *VMware vCenter Orchestrator Plug-in for vCloud Automation Center Release Notes*, and download the vCloud Automation Center Plug-in that is specific to the version of vRealize Automation.

Configuring XaaS to recognize vRealize Orchestrator

vRealize Automation's XaaS (Advanced Services) depend on an underlying vRealize Orchestrator. If you are using an external vRealize Orchestrator, configure that instance as an endpoint.

Note

If you are using the vRealize Orchestrator instance that is bundled with the vRealize Automation Appliance, and you have turned on the vRealize Orchestrator service during the general vRealize Automation installation, verify that vRealize Automation automatically points at the internal vRealize Orchestrator instance.

The following procedure configures the external vRealize Orchestrator instance that backs the XaaS/ASD mechanisms.

Procedure

1. Open a browser window, and access vRealize Automation.
2. Log in using the system administrator or tenant administrator credentials.

3. For the system administrator, select **Administration** > **Advanced Services** > **Server Configuration**. For the tenant administrator, select **Administration** > **vRO Configuration** > **Server Configuration**.
4. Point the server to the vRealize Orchestrator. By default, vRealize Automation points to the internal vRealize Orchestrator.

Install and configure a 3-node cluster

If using vRA version 7.3.1, perform the following steps to install and configure a 3-node cluster.

Procedure

1. Complete the steps to configure the vRO cluster by using the instructions at the following link:

   https://docs.vmware.com/en/vRealize-Orchestrator/7.3/com.vmware.vrealize.orchestrator-install-config.doc/GUID-0D106F6E-A9C3-4259-AB25-6ADB5640177E.html

2. Complete the steps to configure the load balancer by using the instructions at the following link:

   https://docs.vmware.com/en/vRealize-Automation/7.3/vrealize-automation-load-balancing.pdf

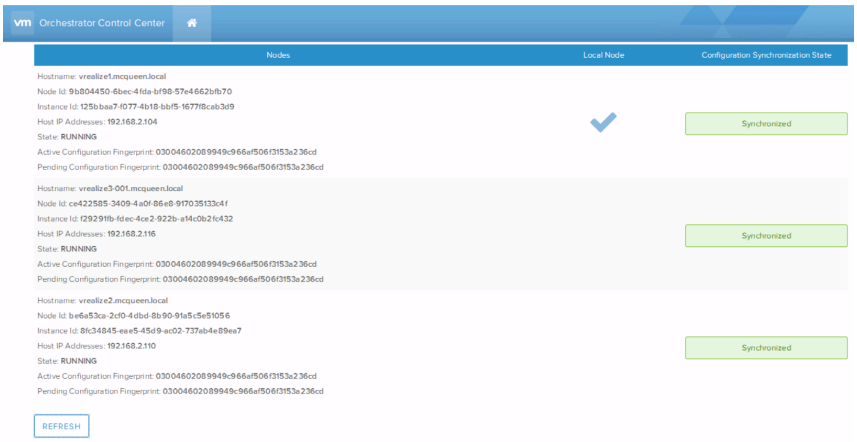
3. Log in to the two additional vRO nodes and confirm that vRO and vRO Orchestrator are running.

   For example, when you type the commands `service vco-server status` and `service vco-configurator status` and the services are not running, type `service vco-server start` and `service vco-configurator start`.

4. On the **vRealize Orchestrator Control Center** main window, click **Refresh**.

   When the configuration is successful, each node displays a status of "Synchronized" in green, as shown in the following.

   Figure 1 Synchronized cluster configuration in vRO



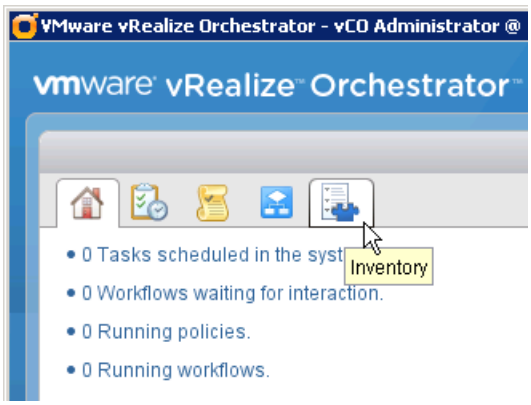
Check for the default tenant

This section describes how to determine whether you have configured a default tenant and the other required tenants for the EMC vRealize Data Protection Extension system. If not, add a vRealize Automation host for each tenant.

Procedure

1. In vRealize Orchestrator Client, select the **Inventory** tab.

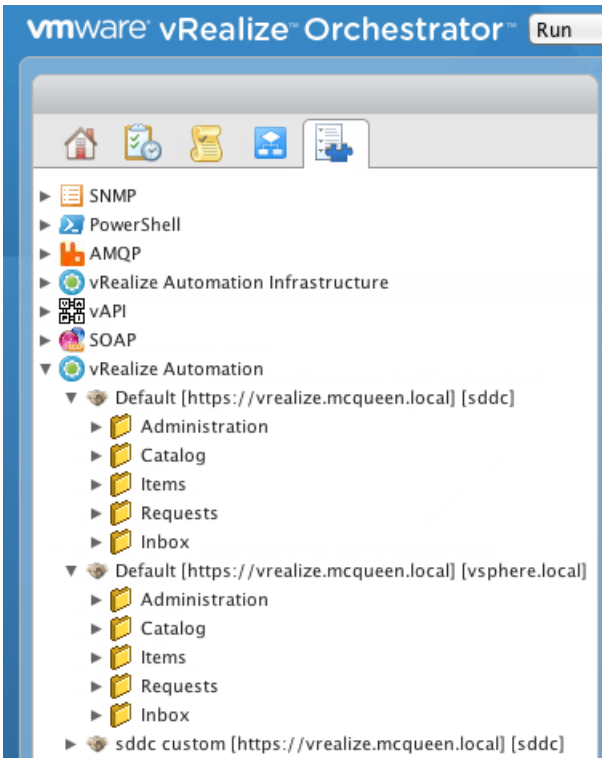
   Figure 2 Inventory tab in vRealize Orchestrator



2. Expand **vRealize Automation**, as shown in the following figure.

   Existing tenants are listed.

   Figure 3 Existing tenants in vRealize Orchestrator



   If one or more of the tenants are missing, add a vRealize Automation host for each of those tenants as described in the following section.

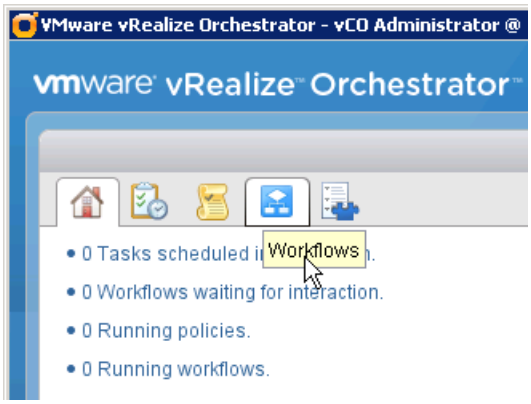
Add a vRealize Automation host

This section describes how to run the **Add a vRA host** workflow, which adds and configures a vRealize Automation host. If you have already done this task, you can skip this section.

Procedure

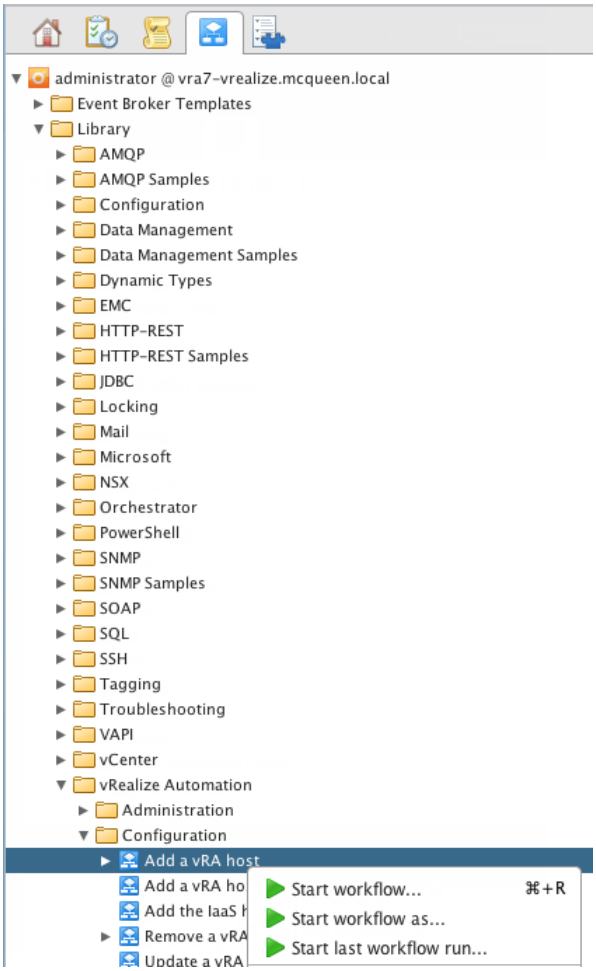
1. In the vRealize Orchestrator Client, select the **Workflows** tab.

   Figure 4 Workflows tab in vRealize Orchestrator

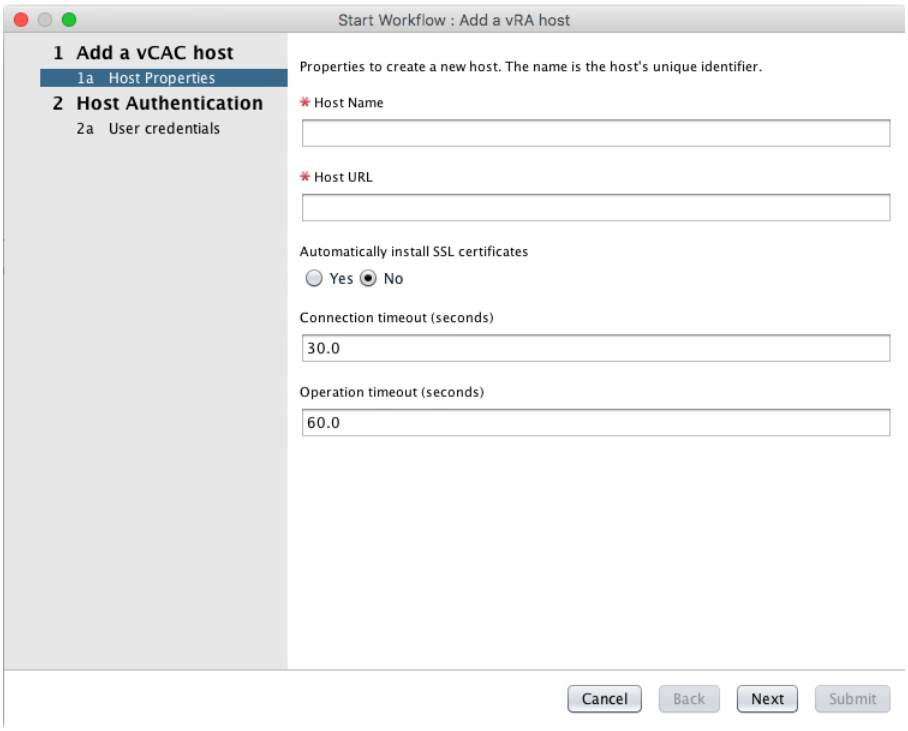
2. Browse to `/Library/vRealize Automation/Configuration`.
3. Right-click **Add a vRA host**, and select **Start Workflow**.

Figure 5 Start Workflow in vRealize Orchestrator



The workflow wizard opens on the **Add a vRA host** screen.

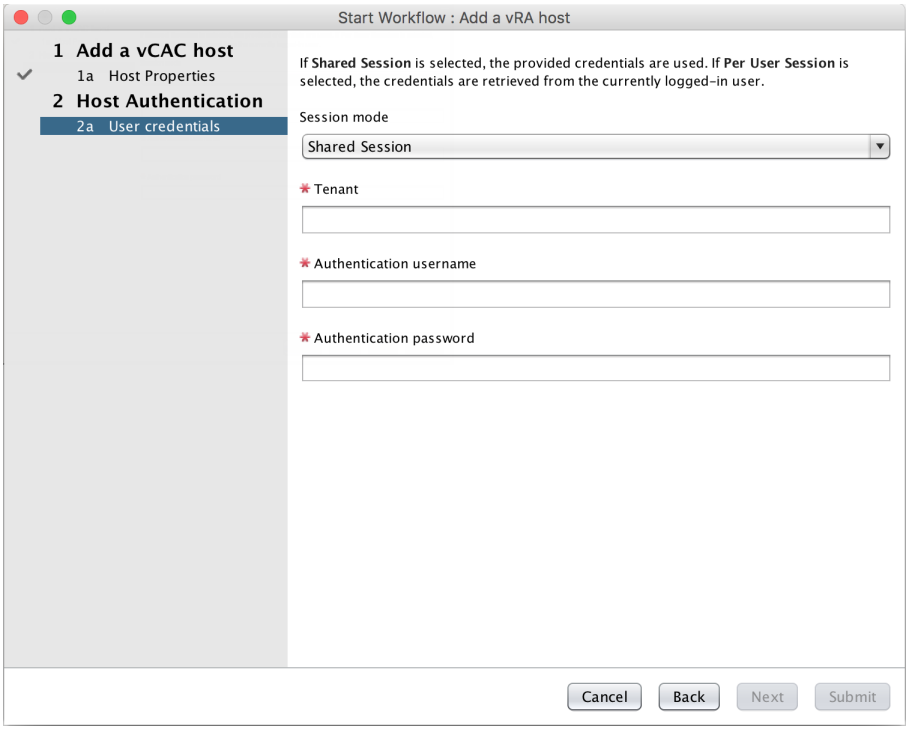
Figure 6 Start Workflow: Add a vRA host



4. In the **Add a vRA host** screen, supply the following information:
   - **Host Name:** Type the tenant, "default tenant" or the actual tenant name.
   - **Host URL:** Type the vCloud Automation Center/vRealize Automation Appliance URL.
   - **Automatically install SSL certificates:** Select **Yes**.
5. Click **Next**.

   The **Host Authentication** screen displays.

Figure 7 Host Authentication in Start Workflow wizard



6. In the **Host Authentication** screen, type the tenant name and the tenant administrator credentials.
7. Click **Submit**.
8. Repeat this procedure for each tenant that you are configuring.

Adding an IaaS host

This section describes how to add an IaaS (Infrastructure-as-a-Service) host.

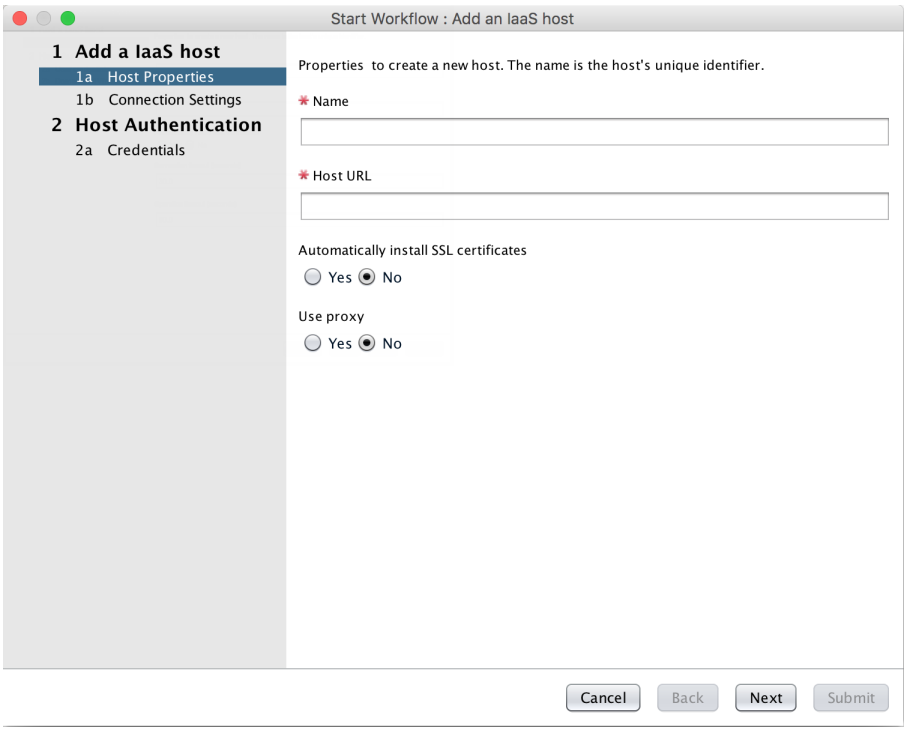
Procedure

1. In the vRealize Orchestrator Client, select the **Workflows** tab.
2. Browse to `/Library/vRealize Automation/Infrastructure Administration/Configuration`.
3. Right-click **Add an IaaS host**, and select **Start workflow**.

Figure 8 Start workflow in vRealize Orchestrator

The workflow wizard opens to the **Add an IaaS host** screen.

Figure 9 Add an IaaS host in Start workflow wizard



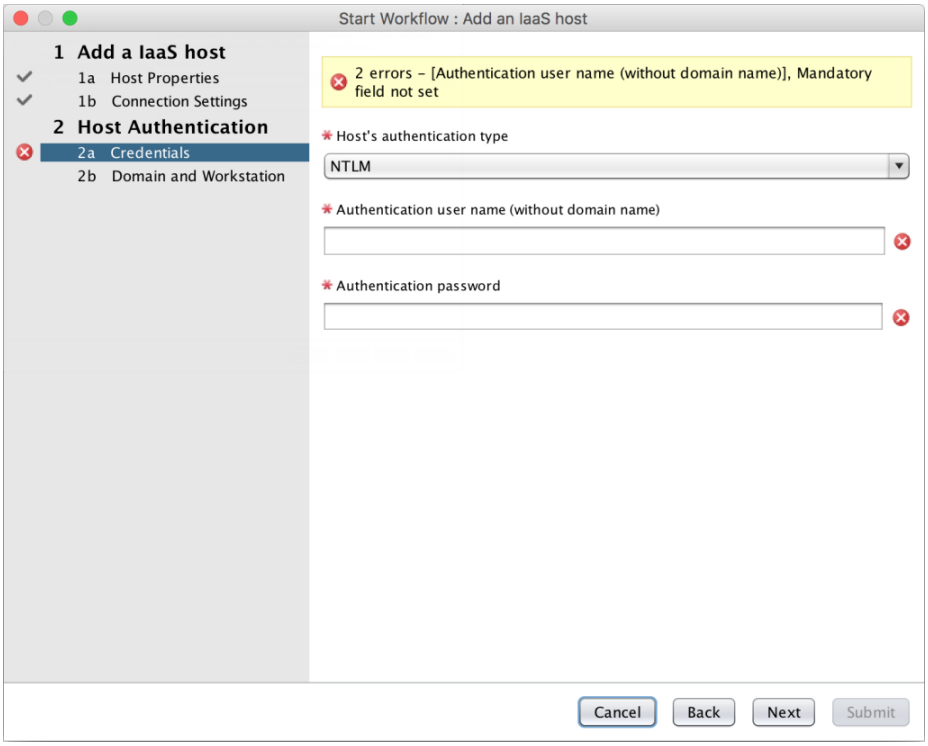
4. In the **Add an IaaS host Host Properties** screen:

- Type the IaaS hostname in both the **Name** and the **Host** fields.
- Select **Yes** for **Automatically install SSL certificates**.

5. In the **Add an IaaS host Connection Settings** screen, select **Yes** for default connection settings.
6. Click **Next**.

   The **Host Authentication - User credentials** screen displays.

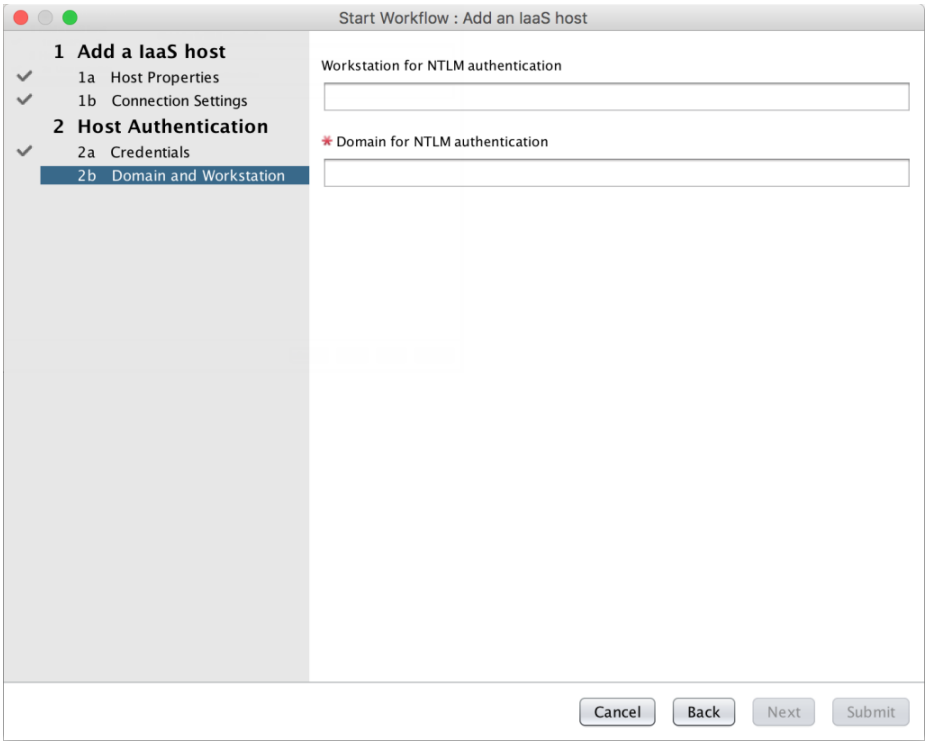
Figure 10 Host Authentication in Start workflow wizard



7. In the **Host Authentication - User credentials** screen, type the vRealize Automation service account name (without the domain) and password, and click **Next**.

   The **Host Authentication - Domain and Workstation** screen displays.

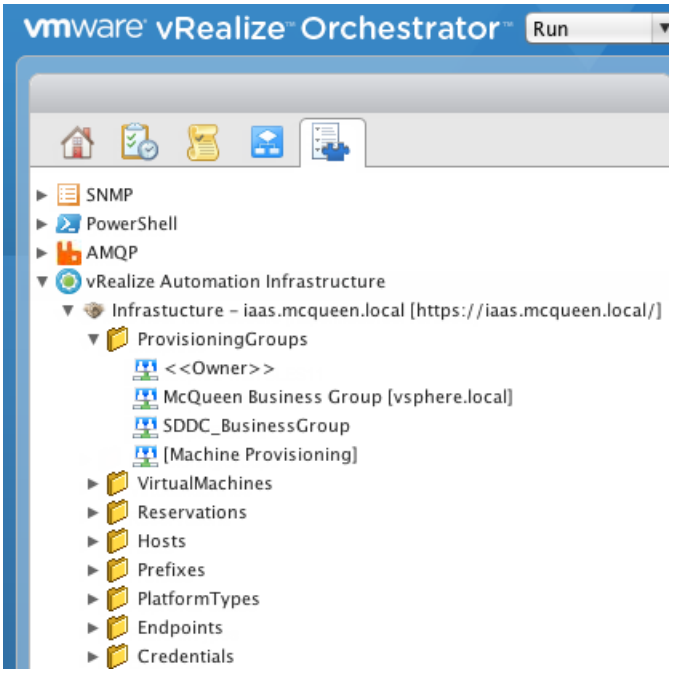
Figure 11 Host Authentication in Start workflow wizard



8. In the **Host Authentication - Domain and Workstation** screen, type the domain name in the **Domain for NTLM authentication** field, and click **Submit**.
9. To verify that the new IaaS host has been created, select the **Inventory** tab.
10. Expand **vRealize Automation Infrastructure** > ***host*** > **Provisioning Groups**.

    If valid provisioning groups are listed as shown in the following figure, the connection was successful.

Figure 12 Valid provisioning groups under vRealize Automation Infrastructure



Verify vCenter endpoints

vRealize Orchestrator is bundled with a vCenter plug-in. If you configured an external vRealize Orchestrator in the previous section, you must re-add the vCenter endpoint. A vCenter endpoint must exist, since this endpoint enables the provisioning of virtual machines in vRealize Automation.

You can create the endpoint by running the vRealize Orchestrator **Add a vCenter Server instance** workflow (located in `/Library/vCenter/Configuration`) or from the **Administration** > **vRO Configuration** > **Endpoints** tab in vRealize Automation.

Note

In order for Avamar to create tenant domains for a new vCenter, the user must either perform a reload operation in vRealize Orchestrator, or restart the vco-server service after creating the vCenter endpoint.

Install the Dell EMC Data Protection Restore Client (Avamar systems only)

The **Dell EMC Data Protection Restore Client** is an application for Avamar and NetWorker systems that allows business group users to restore individual files, or a directory of files, from a virtual machine backup. For NetWorker systems, the **Dell EMC Data Protection Restore Client** is included with the NetWorker 9.1 install, so no further installation is required. For Avamar systems, you must install the `EDP-FLR.rpm` to set up the **Dell EMC Data Protection Restore Client** on any servers being used for data protection by the vRealize Data Protection Extension.

Before you begin

- All vCenters used by vRealize Automation must be added to the Avamar servers being used by the vRealize Data Protection Extension.
- Image proxies must be deployed in each vCenter and registered with the Avamar servers.

Procedure

1. Log in via SSH as the root or admin user on the Avamar server you plan to install the `EDP-FLR.rpm`.
2. To stop Apache Tomcat, type the following command:

   `emwebapp.sh --stop`
3. To install the `EDP-FLR.rpm`, type the following command:

   `rpm -ivh <flr-rpm>`
4. To restart Apache Tomcat, type the following command:

   `emwebapp.sh --start`

In case the EBR server is running

If the EBR server is running on the Avamar server, use the following procedure to install the `EDP-FLR.rpm`.

Procedure

1. If the `EDP-FLR.rpm` is installed, uninstall it.
2. Type the following command to install the `EDP-FLR.rpm`:

   `rpm -ivh <flr-rpm>`
3. Type the following command to stop and restart Apache Tomcat:

   `emwebapp.sh --stop && emwebapp.sh --start`

In case an Avamar upgrade is required

If the Avamar server must be upgraded to a different version, use the following procedure to re-install EDP-FLR after the upgrade has been done.

Procedure

1. If the `EDP-FLR` rpm is installed, uninstall the rpm:

   `rpm -e <edp-flr>`
2. To install the EDP-FLR rpm, type the following command:

   `rpm -ivh <flr-rpm>`
3. To stop and restart Apache Tomcat, type the following command:

   `emwebapp.sh --stop && emwebapp.sh --start`

Installing the vRealize Data Protection Extension

The vRealize Data Protection Extension is packaged as a vRealize Orchestrator `vmoapp`. The `vmoapp` contains a vRealize Orchestrator plug-in and a package of workflows and actions.

The vRealize Data Protection Extension is designed so that it can be consumed as Advanced Services and Resource Actions within vRealize Automation. Organizations that are accustomed to using workflows from the vRealize Orchestrator level can leverage the workflows in that context as well.

You can install the `vmoapp` either from the **vRealize Orchestrator Control Center**, or from the command line, as described in the following two sections.

Install the vmoapp using vRealize Orchestrator

If you are using multiple vRealize Orchestrator (vRO) nodes in a cluster, install the **vmoapp** by connecting to a load balancer vRO hostname/IP.

Procedure

1. Open the browser to the **vRealize Orchestrator Control Center**.

   If using the local vRO server, this system is the vRealize Automation server. Otherwise, the system is the external vRO server. Note that using a Cluster vRO requires you to use the load balancer IP/FQDN to connect to the **vRealize Orchestrator Control Center** and install the plug-in.

2. Click **Manage Plug-ins** on the main window.
3. Click **Browse...**, select the `.vmoapp` file that you want to install, and click **Install**.
4. Read and accept the license agreement, and then click **Install**.

   The installation should complete quickly.

5. In the main window, select **Startup Options**, and restart the vRO server.
6. For vRO clusters running vRO versions 7.3.x and earlier, restart the vRO server and configurator services on each node by using the `ssh` command and running the following:

   ```
   service vco-server restart
   service vco-configurator  restart
   ```

   After running the commands, wait for a few minutes to ensure all of the nodes become synchronized. Note that in vRO versions 7.4 and later these services are restarted automatically after a few minutes.

7. Check the vRealize Automation configuration by running the **Check EMC data protection configuration** workflow. Instructions are provided in Checking the Plug-in for vRealize Automation configuration.

Install the vmoapp from the command line

If you prefer, you can install the **vmoapp** from the command line rather than using vRealize Orchestrator Configuration web application. For a vRO cluster, it is recommended to perform the installation from the **vRO load balancer Control Center**.

Procedure

1. Use an http client, such as curl, to upload the `.vmoapp` file to the vRealize Orchestrator server. For example:

   ```
   $ curl --insecure --user 'user:password' --form file=@/path/
   to/.vmoapp --form format=vmoapp https://vro.server:8281/vco/api/
   plugins
   ```

   Note

   The port on vRealize Orchestrator bundled with vRealize Automation is now port 443. However, you should continue to use port 8281 if using a standalone vRealize Orchestrator appliance.

2. Restart the vco-server service on the vRealize Orchestrator server. The following example illustrates how to do this using the `ssh` command:

   ```
   $ ssh user@vro.server

   service vco-server restart
   ```

3. Check the vRealize Automation configuration by running the **Check EMC data protection configuration** workflow. Instructions are provided in Checking the EMC Plug-in for vRealize Automation configuration.

Install data protection admin services into a specific tenant

This section describes how to use the vRealize Orchestrator **Install default setup for tenant** workflow to automate some of the Advanced Services configuration steps.

Before you begin

- For the tenant you are setting up, there must be a user configured with credentials having Infrastructure Architect, Tenant Administrator and XaaS Architect roles. When adding the vRealize Automation host, a user with these roles is required.

  Note

  For a secondary tenant, you must have both the `vsphere.local` default tenant and the secondary tenant added as vRealize Automation (vCAC CAFE) hosts.

- A business group must exist, to which the data protection admin services are entitled.
- Data protection systems such as NetWorker, Avamar or Avamar Virtual Edition (AVE) must be installed, and the versions must be supported as described in the compatibility and interoperability matrix documents for the respective systems.
- If using Avamar or NetWorker, vRealize Automation vCenter endpoints must be registered with the data protection systems using the fully qualified domain name (FQDN).
- If using Avamar or NetWorker for image-level backups, proxies compliant with the server version must be deployed within the vCenter endpoints and registered with their respective data protection systems.

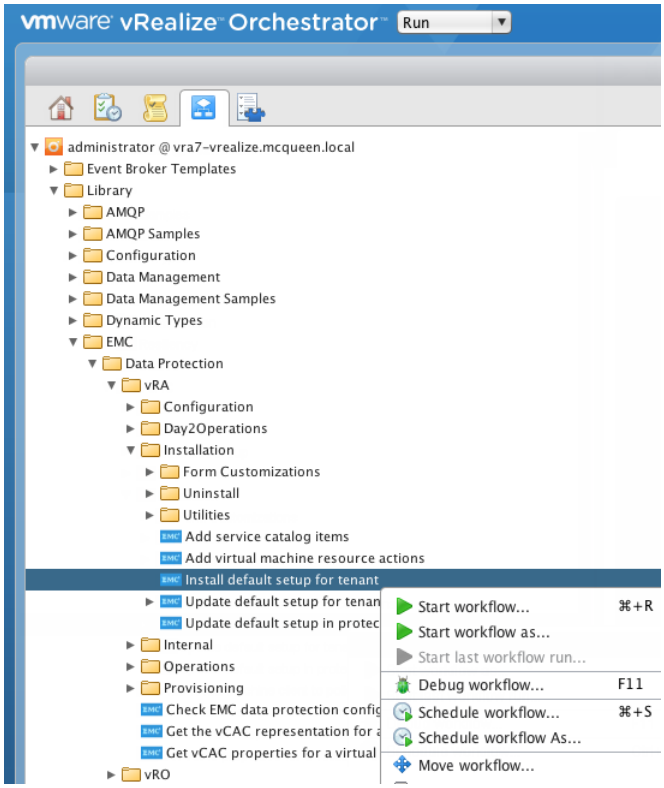
Note

The data protection admin services should not be exposed to any user who does not qualify as an administrator of the data protection services.

Procedure

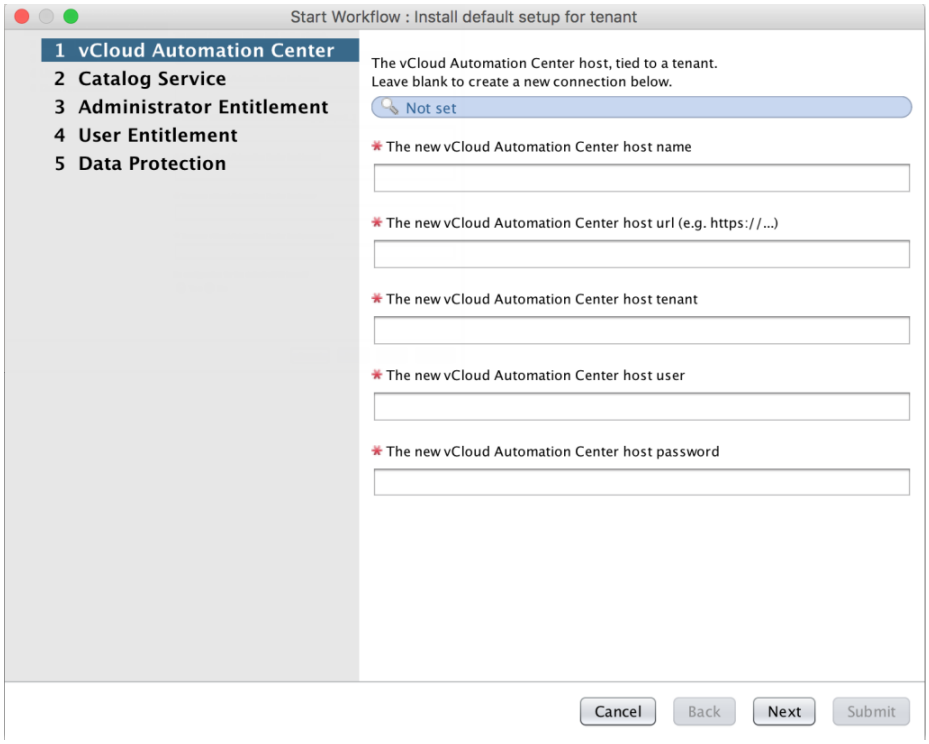
1. Log in to the vRealize Orchestrator client, or if using a vRO cluster, log in to the vRO load balancer.
2. Select the **Workflows** tab.
3. Browse to `/Library/EMC/Data Protection/vRA/Installation`.
4. Right-click the **Install default setup for tenant** workflow and select **Start Workflow** as shown in the following figure.

Figure 13 Start Workflow in vRealize Orchestrator



The workflow wizard opens on the **vCloud Automation Center** screen.

Figure 14 Start Workflow wizard

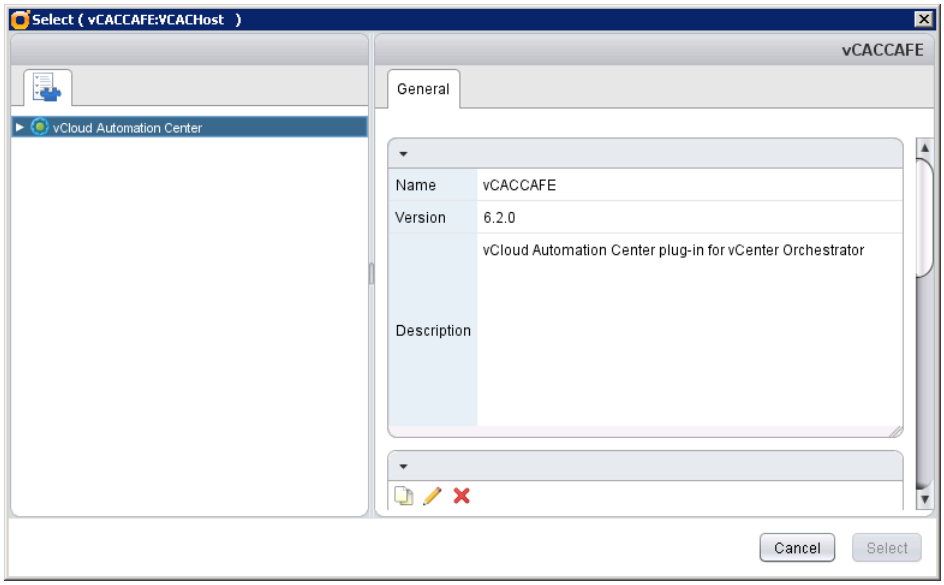


5. If you have already created the tenant-specific vCloud Automation Center host (as described in Adding a vCloud Automation Center host, perform the following three steps. If you have not created the host, continue to step 6.

   a. Click the **Not set** link in the top-most field.

      The **vCACCAFE Host** dialog box opens.

      Figure 15 Select vCACCAFE Host dialog



   b. In the left pane, expand the **vCloud Automation Center** list.

   c. Select the tenant-specific vCAC host, and then click **Select**.

      You are returned to the workflow wizard. Continue to step 7.

6. If you have not created a tenant-specific vCloud Automation Center host (as described in Adding a vCloud Automation Center host, supply the following information in the **vCloud Automation Center** screen to create the host.

Note

When you enter this information manually, the workflow creates the vCenter Automation Center host for you. However, you cannot use the **Chooser** dialog boxes to select existing vRealize Automation Catalogs and Entitlements in the following screens. You must specify them manually.

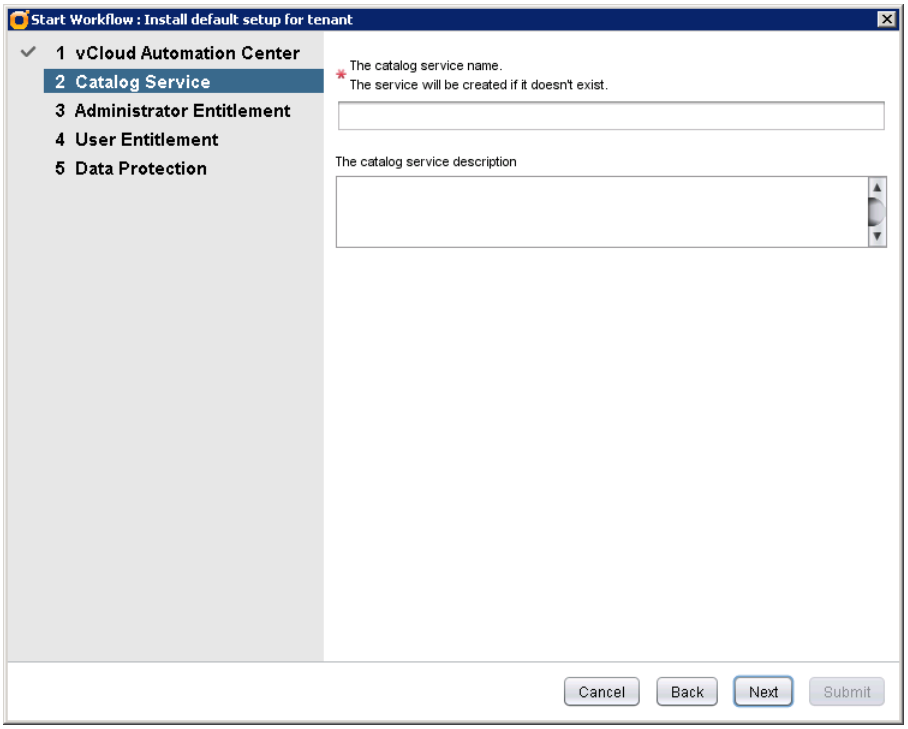
- **The new vCloud Automation Center host name**: Type a hostname for the vRealize Automation host. You can choose any name, but best practice is to provide the name of the tenant.
- **The new vCloud Automation Center host url**: Type the base URL for the vRealize Automation host (for example, `https:// ...`).
- **The new vCloud Automation Center host tenant**: Type the tenant URL name (for example, `vsphere.local`).
- **The new vCloud Automation Center host user**: Type the username for a user who has both the tenant administrator and the service architect roles for the tenant.

- **The new vCloud Automation Center host password**: Type the password for the user specified in the previous field.

7. Click **Next**.

   The **Catalog Service** screen displays. Data protection admin services are published in the catalog service.

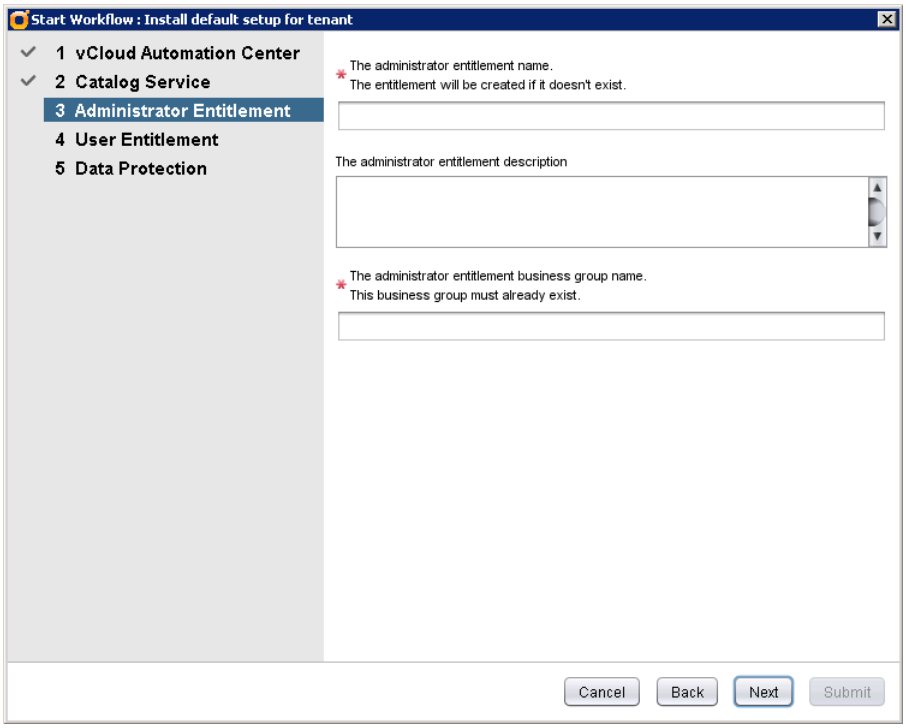
Figure 16 Catalog Service in Start Workflow wizard



8. On the **Catalog Service** screen, click **Not set** to select an existing catalog service, or type a name to create one.
9. Click **Next**.

   The **Administrator Entitlement** screen displays. On this screen, you can entitle the data protection admin services to data protection admin users.

Figure 17 Administrator Entitlement in Start Workflow wizard



10. On the **Administrator Entitlement** screen, do the following:

    - **The administrator entitlement name**: To select an existing administrator entitlement name, or type a new entitlement name, Click **Not set**.

      Note

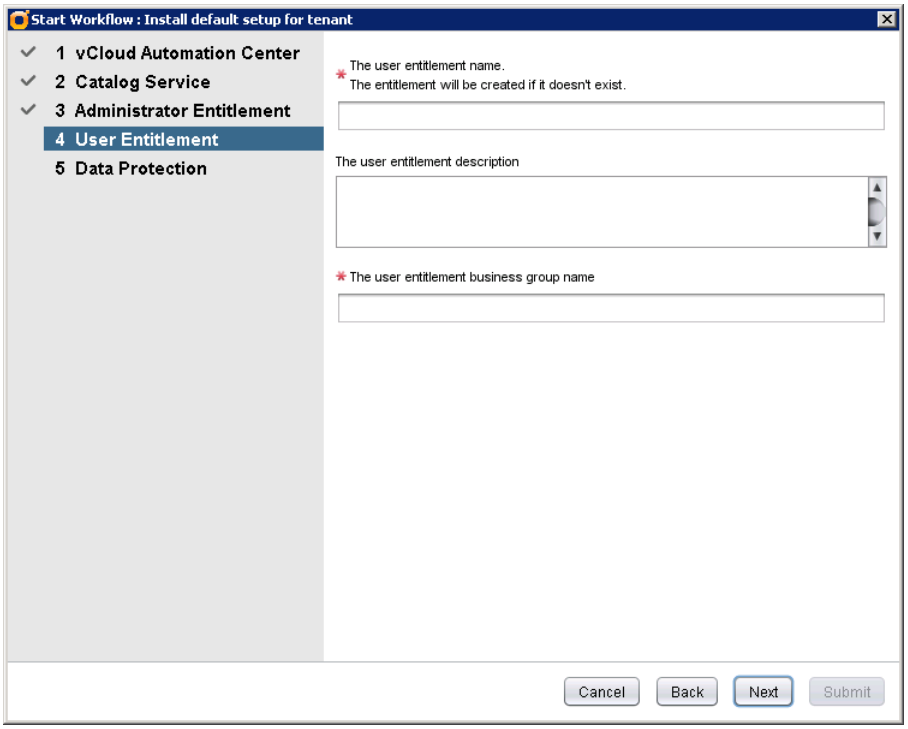
      If you type the entitlement name, the system automatically creates the entitlement. However, a newly created entitlement does not have any users. Users must be added manually to the entitlement in vRealize Automation after the installation completes.

    - **The administrator entitlement description**: Optionally, type a description for the entitlement.
    - **The administrator entitlement business group name**: To select an existing business group name, or type the name of an existing business group, click **Not set**.

11. Click **Next**.

    The **User Entitlement** screen displays.

Figure 18 user Entitlement in Start Workflow wizard



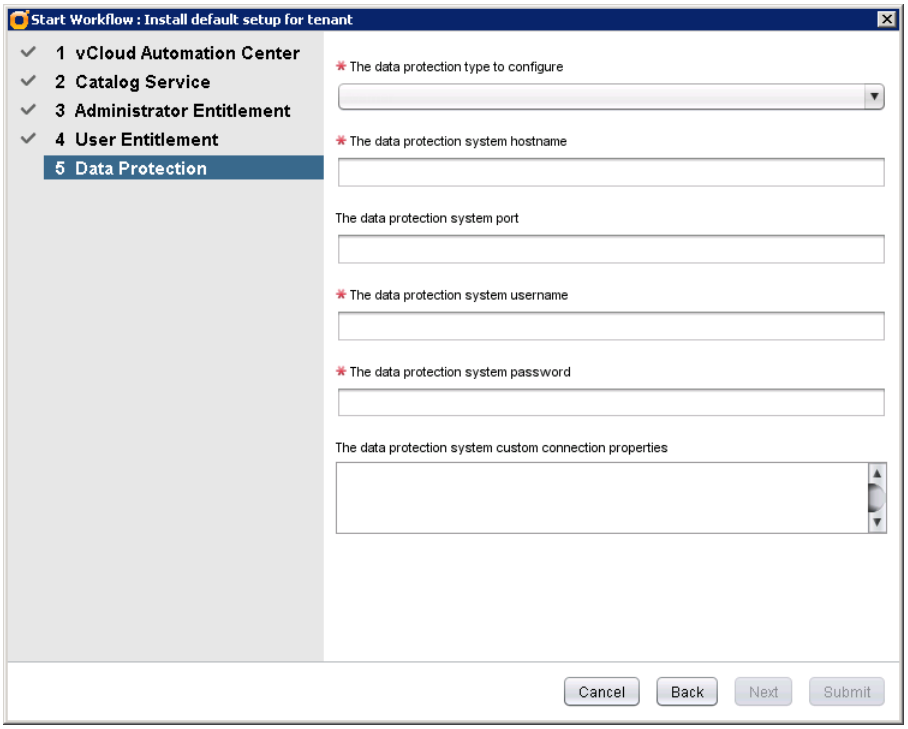
12. On the **User Entitlement** screen, do the following:
    - **The user entitlement name**: To select an existing entitlement name, or type a user entitlement name, click **Not set**.

      Note

      If you type the entitlement name, the system automatically creates the entitlement. However, a newly created entitlement does not have any users. Users must be added manually to the entitlement in vRealize Automation after the installation completes.
    - **The user entitlement description**: Optionally, type a description for the entitlement.
    - **The user entitlement business group name**: To select an existing business group name, or type the name of an existing business group, click **Not set**.
13. Click **Next**.

    The **Data Protection** screen displays.

Figure 19 Data Protection in Start Workflow wizard



14. On the **Data Protection** screen, do the following:
    - **The data protection type to configure**: Select the data protection system (Avamar or NetWorker) used to protect the tenant.
    - **The data protection system hostname**: Type the data protection system's FQDN.
    - **The data protection system port**: Leave the data protection system port field blank unless the data protection system has been configured to listen on a non-standard port.
    - **The data protection system username**: Type the username required to log in to the data protection system.
    - **The data protection system password:** Type the password required to log in to the data protection system.
    - **The data protection system custom connection properties**: Leave this field blank.

    Note

    The fields on this page are optional. However, if the data protection system is not added during the install, you must run the **Add a tenant data protection system** Catalog Item from vRA after the install.

15. To run the workflow, click **Submit**.
16. Verify that the workflow ran successfully as follows:
    a. After the workflow has finished running, watch for `State - completed` in the workflow output.

b. View the data protection endpoint by selecting the **Inventory** tab, and clicking **EMC Data Protection**. If the endpoint does not immediately display, right-click **EMC Data Protection** and select **Reload**.

c. If the vRealize Automation tenant-specific host was created by the workflow, verify that it exists for the tenant.

d. Log in to vRealize Automation as a tenant administrator (any user who was entitled to the data protection admin services published above).

e. On the **Catalog** tab, select the service that you created or selected.

f. Verify that you see the data protection service blueprints.

You use the services to add data protection to the business rules incorporated in a blueprint.

17. Optionally, check the vRealize Data Protection Extension configuration as described in Checking the EMC Plug-in for vRealize Automation configuration.

Licensing

Currently, you can order the EMC vRealize Data Protection Extension at no cost through the EMC DirectXpress (DXP) or ChannelXpress (CXP) ordering process. A License Authorization Code (LAC) letter is emailed or physically delivered to customers and partners during order processing and fulfillment. The LAC letter contains instructions for downloading software binaries as well as activating the license, entitlement, and generating the licensing key and/or file via the licensing website. The vRealize Data Protection Extension requires this licensing file, which you must place on the vRealize Orchestrator server.

The following sections describe where to put the licensing file on the Orchestrator server, and how to verify the validation check that is performed by the licensing.

Linux-based vRealize Orchestrator server

Procedure

1. Log in as `root` to the Linux system where the vRealize Orchestrator server is installed.
2. Browse to the following directory:

   `/var/lib/vco/app-server/conf/plugins/`

3. In this directory, create a folder named **`edplicense`**.
4. Secure FTP the license file from the download location to the `edplicense` directory.
5. To change the owner of the `edplicense` directory and of the license file to the vCO user, type the following commands:

```
chown vco:vco /var/lib/vco/app-server/conf/plugins/edplicense
chown vco:vco /var/lib/vco/app-server/conf/plugins/edplicense/
edplicenseFileName
```

6. Open the browser to the vRealize Orchestrator Configuration web application for the vRealize Automation system, and in the left-hand pane, select **Startup Options**, and restart the vRealize Orchestrator server.

Results

The license file will now reside in `/var/lib/vco/app-server/conf/plugins/edplicense`. The EMC vRealize Data Protection Extension will look in this directory to find the file and to validate its contents after any EMC plug-in operation is performed.

Verifying the licensing validation check

This section describes where to look in the log files to verify that the validation check performed by the plug-in licensing was successful.

The log files and their locations are listed as follows:

- Linux – `/var/lib/vco/app-server/logs, which is sym-link'ed to /var/log/vmware/vco/app-server/`
- Windows – `C:\Program Files\VMware\Infrastructure\Orchestrator\app-server\logs`
- Files:
  - `catalina.out` log file may or may not have an entry, depending on platform
  - `edp_4_vcac.log` file has an entry
  - `server.log` file has an entry

The following example shows a successful validation:

```
2016-12-05 23:33:46.236+0000 [ForkJoinPool.commonPool-worker-1]
[doStartup] INFO  {} [EdpAdapter] Starting EMC vRealize Data
Protection Extension v4.0.0.76
2016-12-05 23:34:23.322+0000 [http-nio-127.0.0.1-8280-exec-9]
[createPluginFactory] INFO  {} [EdpAdapter] Initializing EMC
vRealize Data Protection Extension v4.0.0.76
2016-12-05 23:34:23.591+0000 [http-nio-127.0.0.1-8280-exec-9]
[readFeatures] INFO  {} [EdpAdapter] License Feature:
vra_edp_plugin Valid: true
2016-12-05 23:34:23.600+0000 [http-nio-127.0.0.1-8280-exec-9]
[readFeatures] INFO  {} [EdpAdapter] License Feature:
VRA_EDP_PLUGIN Valid: true
```

The following example shows a validation that failed with an invalid file in place:

```
2016-12-05 23:40:10.570+0000 [ForkJoinPool.commonPool-worker-1]
[doStartup] INFO  {} [EdpAdapter] Starting EMC vRealize Data
Protection Extension v4.0.0.76
2016-12-05 23:40:48.869+0000 [http-nio-127.0.0.1-8280-exec-8]
[createPluginFactory] INFO  {} [EdpAdapter] Initializing EMC
vRealize Data Protection Extension v4.0.0.76
2016-12-05 23:40:49.128+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] WARN  {} [EdpAdapter] ClientTestFeature2: Warning!
Soft error detected=License path "/var/lib/vco/app-server/../app-
server/conf/plugins/edplicense" error: no valid license files
found. (-1,0)
2016-12-05 23:40:49.129+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] WARN  {} [EdpAdapter] ClientTestFeature2: No license
files were found.
2016-12-05 23:40:49.129+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] INFO  {} [EdpAdapter] License Feature:
vra_edp_plugin Valid: false
2016-12-05 23:40:49.137+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] WARN  {} [EdpAdapter] ClientTestFeature2: Warning!
Soft error detected=License path "/var/lib/vco/app-server/../app-
```

```
server/conf/plugins/edplicense" error: no valid license files
found. (-1,0)
2016-12-05 23:40:49.138+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] WARN  {} [EdpAdapter] ClientTestFeature2: No license
files were found.
2016-12-05 23:40:49.139+0000 [http-nio-127.0.0.1-8280-exec-8]
[readFeatures] INFO  {} [EdpAdapter] License Feature:
VRA_EDP_PLUGIN Valid: false
```

Upgrading the vRealize Data Protection Extension

This section describes how to upgrade an existing EMC vRealize Data Protection Extension installation to the latest version. It assumes that you have already downloaded the `edp4vcac-4.0.3.n.vmoapp` file, where *n* is the build number.

Note

Before upgrading, it is recommended that you back up or take snapshots of the vRealize infrastructure, including:

- the vRealize Automation server
- the vRealize Automation database
- the vRealize Orchestrator server(s) (if using external servers).

While upgrading the EMC vRealize Data Protection Extension, you can continue to perform data protection system operations, including scheduled backups. You cannot, however, perform the following:

- During the upgrade, you are not able to:
  - Run data protection
  - Restore data
  - View protection status
  - Add/remove data protection
  - Perform property group operations
  - Add/remove data protection systems
  - Set up a data protection property group
- During restart of the vRealize Orchestrator server(s), you are not able to:
  - Assign data protection during virtual machine provisioning
  - Retire the protection client during virtual machine destroy

After the upgrade completes, the existing EMC data protection systems will be available, and all policies, clients, and backups will still be available.

Note

If upgrading from vRealize Data Protection Extension version 3.0 or earlier, note the following changes to naming and workflows:

- Build Profiles are now identified as Property Groups
- Machine Blueprints are now identified as Blueprints and will become new Blueprints. Multi-machine Blueprints become Blueprints with multiple machine components.
- New Property Groups will be mapped to new blueprint components.

Install the vRealize Data Protection Extension vmoapp

Install the vRealize Data Protection Extension `vmoapp` and verify the installation as described in Installing the Plug-in for vRealize Automation.

Note

If using multiple vRealize Orchestrator nodes in a cluster, use the **vCO Orchestrator Control Center** to monitor the cluster synchronization progress.

Update the default setup in each vRealize Automation tenant

This procedure deletes and re-creates the catalog items and resource actions (and their forms) that were added to the vRealize Automation service catalog in the previous release.

If you previously applied form customizations to the catalog items or resource actions, or changed the icon, those changes are lost and must be reapplied in vRealize Automation. The update process maintains the previous entitlements and approval policies, if any. After performing this update, verify the entitlement(s) on each catalog item and resource action.

You can run the update workflow to update all tenants, or to update individual tenants.

Note

If you are using multiple vRealize Orchestrator nodes in a cluster, this update only must be run on one of them against the vRealize Automation server.

Running the update workflow for all tenants

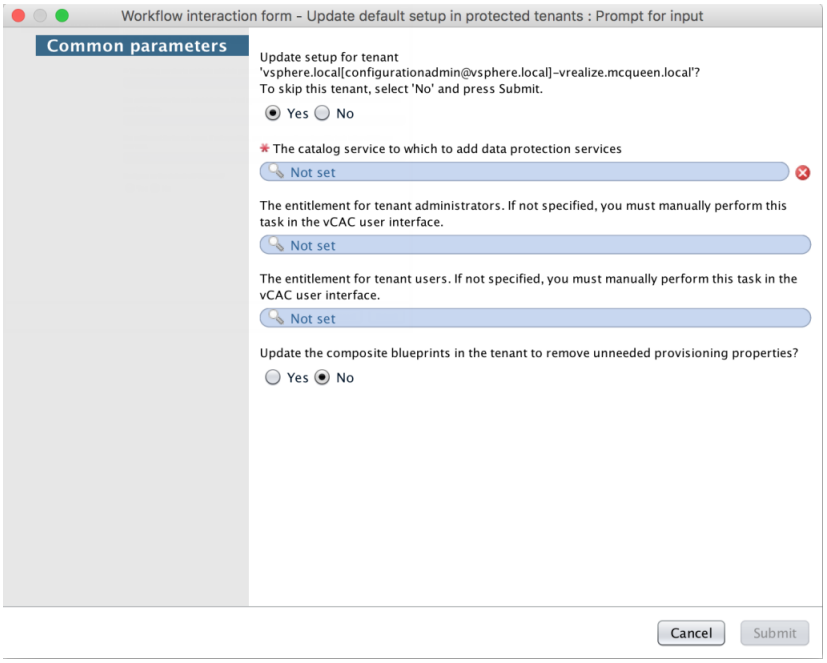
This section describes how to run the workflow that updates all the vRealize Automation tenants of the data protection systems that support the virtual machine's vCenter host.

Procedure

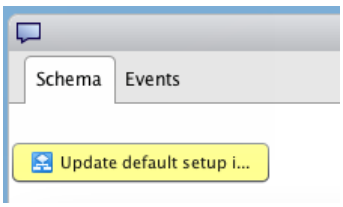
1. In the vRealize Orchestrator client, select the **Workflows** tab.
2. Browse to the following workflow:

   `Library/EMC/Data Protection/vRA/Installation/`
3. Select the **Update default setup for protected tenants** workflow, and click the green arrow (▶) in the upper-left corner of the right-hand pane to start the workflow.

Figure 20 Workflow interaction form



If the **Workflow interaction form** does not open automatically, select the icon at the top of the workflow editor.



Note

You are prompted with a workflow interaction form for each vRealize Automation tenant in the system that has been configured with the vRealize Data Protection Extension and supports the virtual machine's vCenter host. If you want to skip updating a particular tenant, select **No** for the **Update setup for tenant?** option, and then click **Submit** (do not click **Cancel**).

4. In the **Workflow interaction form**, click **Not set** for each of the parameters (catalog service, entitlement for tenant administrators, and entitlement for tenant users), and select the appropriate options in the **Chooser** dialog box.
5. When you have set the parameters, click **Submit**.

Running the update workflow for individual tenants

This section describes how to run the workflow that lets you select a vRealize Automation tenant to update.

Procedure

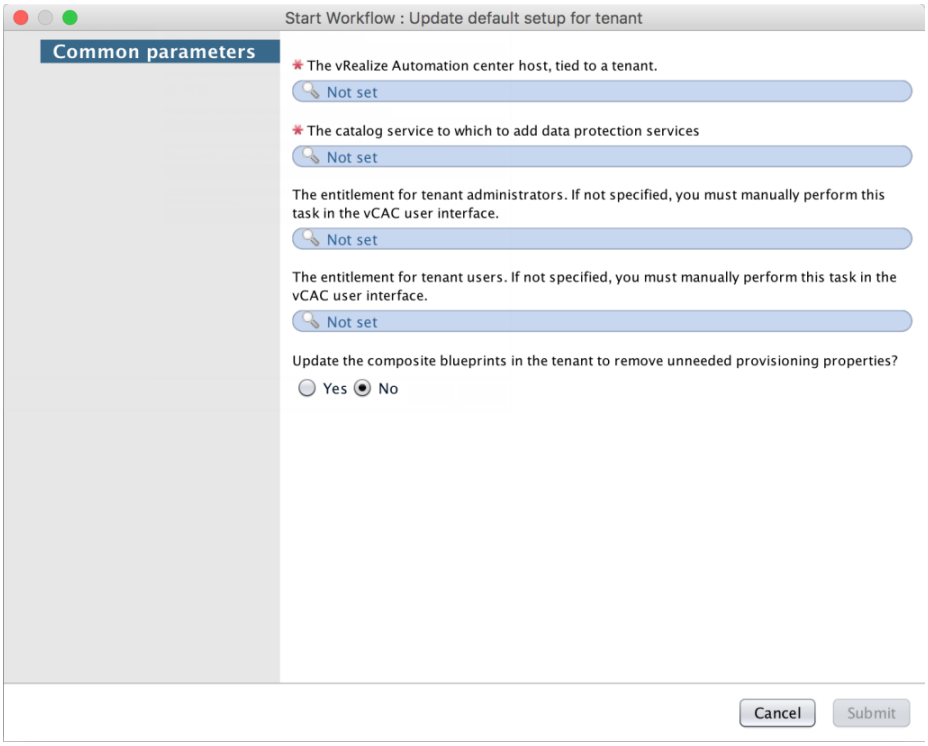
1. In the vRealize Automation client, select the **Workflows** tab.
2. Browse to the following workflow:

   `Library/EMC/Data Protection/vRA/Installation/`

3. Select the **Update default setup for tenant** workflow, and click the green arrow ( ) in the upper-left corner of the right-hand pane to start the workflow.

   The **Start Workflow : Update default setup for tenant** form opens.

   Figure 21 Start Workflow : Update default setup for tenant



4. For **The vRealize Automation center host, tied to a tenant** parameter, Click **Not set**, and select the vRealize Automation tenant that you want to update in the **Chooser** dialog box.
5. Click **Not set** for each of the remaining three parameters (catalog service, entitlement for tenant administrators, and entitlement for tenant users), and select the appropriate options in the **Chooser** dialog box.
6. An additional upgrade option will remove the old ExternalWfStub.* properties from upgraded blueprints, now referred to as property groups. Prior to selecting **Yes** to remove these properties, EMC recommends that you back up your blueprints by using the instructions at the following link.
7. When you have set the parameters, click **Submit**.

Update custom workflows and actions

In vRealize Orchestrator, if you have written custom workflows or actions that use the EMC vRealize Data Protection Extension's workflows, actions, or scripting objects, you must verify the code against the new version in the vRealize Orchestrator client.

Verifying the new version

After upgrading the EMC vRealize Data Protection Extension and restarting the vRealize Orchestrator server, use one of the following methods to verify that the system has the correct new version:

- Select **Help** > **Installed Plug-ins** in the vRealize Orchestrator Control Center.

- Select **Manage Plug-ins** in the left-hand pane of vRealize Orchestrator Control Centre.

  Note

  If you deployed the `.vmoapp` file using an http client, restart the vRealize Orchestrator Configuration server to see the updated version here.

- View the contents of the **Workflows** and **Actions** tabs for the `com.emc.edp4vcac` package in the vRealize Orchestrator client.
  All the workflows and actions should have a new version number.

Run cleanup script after upgrading

After upgrading to vRealize Data Protection Extension version 4.0, some unnecessary workflows and actions may remain in the vRealize Orchestrator server if you upgraded from version 3.0.0 or earlier.

You can remove these entries manually in the vRealize Orchestrator client of each vRealize Orchestrator server, or you can run a cleanup script.

The cleanup script cleanup-pkg-after-upgrade.sh is located in the docs/ folder of the `edp4vcac-4.0.3.n.zip` file, where *n* is the build number. You can run the script on the following:

- vRealize Automation Linux appliance
- vRealize Orchestrator Linux appliance
- Any Mac OS, Linux, or Windows (with cygwin, MKS or similar installed) machine which has curl and xmllint or xpath (from perl) installed.

To run the script, unzip or copy the script to a system where you can run it from, and then run one of the following commands. If you are using a vRO cluster, run the command against each vRealize Orchestrator server.

- `$ sh cleanup-pkg-after-upgrade.sh --prompt`. This command prompts you to type values.
- `$ sh cleanup-pkg-after-upgrade.sh --host <vrohost> --user <user@vsphere.local> -- port <443 or 8281> --pass <password>`

  Note

  Specify port 443 for when using the internal vRealize Orchestrator appliance, or port 8281 when using a stand-alone vRealize Orchestrator appliance.

Changes to workflow and actions directory locations from release 2.0 to 3.0 and later

If upgrading from the 2.0 release, workflow IDs remain the same, however, the location of the workflows changed in release 3.0.0. The folder `Library/EMC/Data Protection/vRA` contains most of the workflows originally under `Library/EMC/Data Protection/vCAC`. The folder `Library/EMC/Data Protection/vRO` contains the remaining workflows.

Also, all the actions that are originally located under the `com.emc.edp4vcac*` action modules are now located under `com.emc.edp*` action modules.

Uninstalling the vRealize Data Protection Extension

The following sections describe how to uninstall the vRealize Data Protection Extension. The tasks include removing data protection from each tenant, and uninstalling the extension from vRealize Orchestrator.

Uninstall EMC data protection from a single tenant

The following two sections describe how to remove default setup items, and how to reconfigure vRealize Automation blueprints for a single tenant. These procedures must be performed on each vRealize Automation tenant.

Remove default setup items

This procedure describes how to remove the catalog items and resource actions.

You can also remove the EMC data protection system configured for the vRealize Automation tenant.

1. Open the vRealize Orchestrator client.
2. In the **Workflows** tab, browse to `/Library/EMC/Data Protection/vRA/Installation/Uninstall`, and run the **Remove default setup for tenant** workflow.
3. Select the vRealize Automation host connection for the tenant.
4. Select if you want to remove the EMC data protection system(s) configured for the tenant.
   If you do not remove the configured systems for the tenant, you can still perform protection operations through vRealize Orchestrator.

Alternate Procedure
If preferred, you can uninstall the plug-in from a tenant using the following steps.

1. In vRealize Automation, delete the catalog items and resource actions manually.
2. In the vRealize Orchestrator client's **Workflows** tab, browse to `/Library/EMC/Data Protection/vRO/Configuration`, and run the **Remove a data protection system** workflow to remove the systems configured for the tenant.

Reconfigure vRealize Automation blueprints

After removing the default setup items, reconfigure the blueprints.

Procedure

1. Open vRealize Automation.
2. Browse to **Design** > **Blueprints**, and update any Blueprints available to the tenant that you had previously configured for data protection during provisioning and retiring.
3. Remove from the blueprint any property groups that were created and/or configured for data protection.
4. Browse to **Administration** > **Property Dictionary**, and remove any property groups that were created and/or configured for data protection (generally, by using the **Setup data protection property group**), and remove their associated property definitions.

Uninstall the plug-in from vRealize Orchestrator

This section describes how to uninstall the vRealize Data Protection Extension from vRealize Orchestrator.

Before you begin

The vRealize Data Protection Extension must have been uninstalled from each tenant in vRealize Automation.

Procedure

1. Open the **vRealize Orchestrator** client.
2. In the **Inventory** tab under the **EMC Data Protection** branch, verify that all the data protection systems were removed. If they were not, right-click each one, select **Run Workflow...** > **Remove a data protection system**, and run that workflow.

   Note

   Ensure that you take a backup or snapshot of the vRealize Orchestrator virtual machine in case you need to revert the changes.

3. For vRO versions up to version 7.2, use the instructions provided in the following VMware Knowledge Base article to remove all custom workflows, actions, policies, web view, configurations, settings, and resources that the plug-in contains:

   http://kb.vmware.com/kb/2064575

   Note the following information when performing the steps in the Knowledge Base article:

   - The dar file is `edp4vcac.dar`
   - For vRA releases up to version 4.0.2, the configuration file is `EDP.xml`
   - The package to remove in the vRealize Orchestrator client is `com.emc.edp4vcac`

4. For vRO versions 7.3 and later, use the instructions provided in the following VMware documentation:

   - https://kb.vmware.com/s/article/2151653
   - https://docs.vmware.com/en/vRealize-Orchestrator/7.3/com.vmware.vrealize.orchestrator-install-config.doc/GUID-F5C8EF0E-C169-43E1-8A6F-D9A191FE129D.html

   Note the following information when performing the steps in the Knowledge Base article:

   - The dar file is `edp4vcac.dar`
   - The package to remove in the vRealize Orchestrator client is `com.emc.edp4vcac`
   - If using a vRO cluster, repeat the steps in https://docs.vmware.com/en/vRealize-Orchestrator/7.3/com.vmware.vrealize.orchestrator-install-config.doc/GUID-F5C8EF0E-C169-43E1-8A6F-D9A191FE129D.html on all vRO nodes separately before starting vCO services.

5. Verify that all the `com.emc.edp` action modules are deleted; if not, delete them in the vRealize Orchestrator client.
6. Verify that the `/Library/EMC/Data Protection` workflow folder is empty and/or delete it in the vRealize Orchestrator client.

CHAPTER 3

Administration

This chapter includes the following topics:

Data protection configuration for the tenant

The EMC vRealize Data Protection Extension provides the ability to perform data protection operations within vRealize Automation.

These operations are configured at a per-tenant level and consist of two main components:

- A set of data protection XaaS Blueprints which are made available to data protection administrators.
- A set of XaaS Resource Actions which are made available so that owners of virtual machines can manage their own data protection needs on a per-virtual machine basis.

Clustered vRealize Orchestrator environment

The EMC vRealize Data Protection Extension supports a clustered vRealize Orchestrator (vRO) environment. However, the Data Protection system information is stored locally on each vRO appliance. Therefore, in a clustered vRealize Orchestrator environment, you must run the **Install default setup for tenant** workflow per tenant on one of the vRO appliances.

Additionally, if you want to replicate the configuration information among the other nodes in the cluster, you must synchronize this vRO appliance with the other nodes. For example, if the vRO appliance that you run the **Install default setup for tenant** workflow on is node A, to synchronize the other nodes in the cluster with node A:

1. Log in to the **vRO Control Center** of each of the other nodes.
2. Invoke **Join Node to Cluster**.
3. Specify the Remote Orchestrator Server as Node A (IP address or hostname).
4. Provide the Remote Orchestrator Server's **vRO Control Center** credentials.

This replicates the configuration information of node A into the current node. Even if the cluster was formed previously, you must repeat this step and specify the number of active nodes for any configuration changes to occur.

Note that in an environment with clustered vRO appliances, you may need to perform the steps above for the following workflows as well:

- **Remove a data protection system**—If you want to remove a tenant data protection system, run the **Remove a data protection system** workflow from the vRealize Orchestrator client of each vRO in the cluster, or from the vRealize service catalog, per tenant on one of the vRO appliances. This removes the EDP system from one of the nodes in the cluster. You must then perform the steps above to replicate this removal on the other nodes.
- **Add a tenant data protection system**—If you want to add a tenant data protection system, run the **Install default setup for tenant** or **Add a tenant data protection system** workflow per tenant on one of the vRO appliances. You must then perform the steps above to replicate this addition on the other nodes.
- **Update a tenant data protection system**—This is a vCO workflow that is not currently available in vRA, and is located under `Library/EMC/Data Protection/vRO/Configuration`. After running this workflow, you must then perform the steps above to replicate the update on the other nodes.

Note

In a clustered vRealize Orchestrator environment with load balancing of vRA traffic across two vRO systems, the EdpSystem ID on both vRO systems must match. If the IDs do not match, and you run the vRA request for findAll on one vRO and then send a findById using that list to the other vRO, the unique ID created for clients, policies, and so on, do not match and result in some empty select boxes in vRA. To ensure that both systems have the same EdpSystem ID, log in to the **vRO Control Center** and invoke **Join Node to Cluster**. This joins the vRealize Orchestrator server to another vRealize Orchestrator server to form or expand a cluster. The current server automatically replicates the configuration of the remote server. You can then restart the vRO services on the updated systems by using **Startup Options** in the **vRO Control Center**.

Avamar domains for tenant data protection policies

When you add a data protection system for a tenant, tenant domains are created in the Avamar data protection system. One tenant domain is created per vCenter domain, and one tenant domain is created under the EDP domain that you create when configuring the data protection system for application-consistent backup. If the domains exist, these existing domains are used.

If you create a domain manually, ensure that you create it as a direct sub-domain of the vCenter domain for VMware image backup, or EDP domain for application-consistent backup, with the vCenter domain representing the provisioning infrastructure for the tenant, and use the following naming convention:

`tenantUrlName_vRAServerFQDN`. For example, `vsphere.local_vraserver.domain.com`.

Note

Policies consist of two types — the policies for VMware image backups created in the vCenter domain under the tenant domain, and the policies for application consistent backups created in the EDP domain under the tenant domain.

Multi-tenancy support with NetWorker

NetWorker does not natively support multi-tenancy for VMware data protection.

In order to support multi-tenancy in vRA with NetWorker, EMC recommends that for each tenant in vRA there should be a dedicated NetWorker instance. The data protection policies in the tenant's NetWorker instance will then only apply to that tenant.

Add a second vCenter endpoint

When you add a vCenter endpoint to vRealize Automation, the data protection system administrator must manually add the vCenter client to the data protection system. Once that has been accomplished, the vRealize Data Protection Extension is used to add tenant domains in Avamar.

You can add tenant domains in Avamar using either of the following options:

- Restart the vRealize Orchestrator service.
- Log in to vRealize Orchestrator client and refresh using the following steps.

1. Select the **Inventory** tab.
2. Select the **EMC Data Protection** top node.
3. Click the **Refresh** button at the top right corner, or run the vRO **Update a tenant data protection system** workflow.

Note

In NetWorker, instead of this procedure, the data protection administrator assigns the vCenter to a protection group associated with a policy and workflow. The protection group can then protect the virtual machines in that specified vCenter.

Managing multiple vCenters with Avamar

The EMC vRealize Data Protection Extension handles a policy similar to a service level agreement (SLA). Only one SLA is allowed per policy name (Avamar group) per policy type (Image or Application Consistent).

To fulfill this SLA across vCenters, an administrator must create an Avamar group in each vCenter by using the Avamar Administration GUI.

Example 1 SLA named Gold where data center contains two vCenter servers

For an SLA named Gold that requires daily backups, where the data center contains two vCenters: The virtual machine can now belong to either vCenter, and Avamar can successfully perform the backup.

1. Create the Avamar Group for the Gold SLA under the domain `/vCenter1/tenant domain` with the desired settings.
2. Copy the group into the domain `/vCenter2/tenant domain`.

Managing multiple vCenters with NetWorker

The EMC vRealize Data Protection Extension handles a policy similar to a service level agreement (SLA). Only one SLA is allowed per policy name (protection group name in NetWorker).

To fulfill this SLA across vCenters with NetWorker, an administrator must create a NetWorker protection group for each vCenter using the NetWorker Management Console. The protection group is associated with the vCenter and the policy/workflow that specifies the SLA/policy details.

Example 2 For data center that contains two vCenter servers

1. Create two protection groups. For example, Gold-backup-vcenter1 and Gold-backup-vcenter2.
2. The protection groups are associated with vcenter1 and vcenter2 respectively and Gold-backup-vcenter1 and Gold-backup-vcenter2 policy-workflows respectively.

The EMC vRealize Data Protection Extension displays the protection group names for selection in vRA.

Tenant and EMC vRealize Data Protection Extension configurations

There are a number of different ways to configure data protection systems across tenants. The tenant administrator can choose between the following Avamar or NetWorker configurations based on their environment.

Avamar tenant configurations

A tenant administrator can choose between the following options to configure the Avamar data protection systems across tenants.

One tenant and one data protection system
The tenant administrator runs either the **Install default setup tenant** workflow from vRealize Orchestrator or the **Add a tenant data protection system** workflow from the vRealize Automation tenant. The section Avamar domains for tenant data protection policies provides information about how domains are added to the Avamar data protection system across tenants. In the case of NetWorker, no domains are added.

One tenant and multiple data protection systems
The tenant administrator runs either the **Install default setup tenant** workflow from vRealize Orchestrator or the **Add a tenant data protection system** workflow from the vRealize Automation tenant to add the first data protection system. The administrator then runs the **Add a tenant data protection system** workflow again from the same tenant to add a different data protection system. The sections Configuring an Avamar data protection system and Configuring a NetWorker data protection system provide more information for Avamar and NetWorker respectively.

Multiple tenants and one data protection system
The tenant administrator runs either the **Install default setup tenant workflow** from vRealize Orchestrator or the **Add a tenant data protection system** workflow from the vRealize Automation tenant for all tenants, specifying the same data protection system. This configuration is not supported with NetWorker.

Multiple tenants with each tenant pointing to different data protection systems
The tenant administrator runs either the **Install default setup tenant workflow** from vRealize Orchestrator or the **Add a tenant data protection system** workflow from the vRealize Automation tenant for all tenants, specifying a different data protection system.

Avamar multi-tenant configuration considerations

Note the following information with regard to Avamar multi-tenant configurations:

- The backup administrator can add a data protection policy to a tenant domain, or remove a data protection policy from a tenant domain, and can manually add domains in Avamar. If you configure multiple tenants, create a policy in each tenant domain by using the Avamar system's user interface or command line interface.
- After the Avamar server node has been added as the EMC data protection system, the tenants can be configured through requests from the vRealize Automation Service Catalog.
- Moving tenants from one Avamar system to another Avamar system is not supported.
- When you add protection using data protection actions rather than through a policy-protected blueprint, re-add data protection if the virtual machine is re-

provisioned. Virtual machines that are provisioned from blueprints with policy protection do not have this limitation.

NetWorker multi-tenant configuration considerations

NetWorker does not natively support multi-tenancy for VMware data protection. In order to support multi-tenancy in vRA with NetWorker, EMC recommends a dedicated NetWorker instance for each tenant in vRA.

In cases where the backup administrator is allowed to view all virtual machines across multiple tenants, it may be possible to share a NetWorker instance for multiple vRA tenants.

Data protection administration

After the one-time configuration of the data protection system connection information, the tenant administrator must assign available data protection policies to virtual machine blueprints.

Service blueprints

The following table lists the EMC vRealize Data Protection Extension XaaS blueprint names and descriptions. These XaaS blueprints are added to the service catalog for the data protection administrator user with the Administrator Entitlement, which you create by running the **Install default setup for tenant** workflow in vRealize Orchestrator.

Table 4 Service catalog blueprints

Service blueprint name	Description
Add a tenant data protection system	Configures and adds an EMC Data Protection system to the vCenter Orchestrator inventory. EMC's Data Protection Suite consists of various software offerings for data backup, recovery, and archiving. Currently, you can add Avamar or NetWorker data protection systems using this workflow.
Remove a tenant data protection system	Removes an EMC vRealize Data Protection system from the vRealize Orchestration inventory. Typically, this service blueprint is only required if the user wants to change the data protection system.
Set up a data protection property group	Allows you to add or modify data protection on a new or existing property group. For Avamar, both image-level and application-consistent protection policies are available. If you select an application-consistent protection policy, an optional configuration field allows you to specify a time in minutes that the custom workflow should wait to discover a configured hostname of the virtual machine.
Restore deleted machine from backup	Restores a deleted virtual machine that had data protection and backups on an Avamar server. The machine is restored as a new virtual machine. Note that this is not available for NetWorker.

Configuring an Avamar data protection system

This topic describes how to configure an Avamar data protection system by using vRealize Automation. After you have configured the system, you can verify that it has been added by logging in to the vRealize Orchestrator Client.

Before you begin

You must be logged in to vRealize Automation as a user with the administrator entitlement, as defined in the **Install default setup for tenant** workflow.

Procedure

1. In vRealize Automation, select the **Catalog** tab.
2. In the left pane, click the data protection service.
3. In the **Services** pane, click **Request** for **Add a tenant data protection system**.

   The **Add a tenant data protection system** page displays, open on the **System Information** tab.
4. In the **System Information** tab:
   a. Select **Avamar** from the drop-down list.
   b. Type the FQDN of the system that you are adding.
   c. Optionally, select a port, and type custom properties.
   d. To display the **Credentials** tab, click **Next**.
5. In the **Credentials** tab:
   a. Type the username and password that is required to access the data protection system.
   b. Click **Submit**.
6. To close the request configuration message, click **OK**.
7. Select the **Requests** tab, and view the progress of the Avamar addition until it completes successfully.
8. To verify that the data protection system has been successfully added, log in to the VMware vRealize Orchestrator Client.

   The client opens on the **My Orchestrator** tab.
9. Select the **Inventory** tab.
10. In the **Inventory** tab, click the arrow beside **EMC Data Protection** to expand its list.

    You should see the Avamar system.

Note

The Avamar system does not display any policies if the policies were incorrectly added to `/vCenter/tenant domain` in the **Avamar Administration** GUI.

Configuring a NetWorker data protection system

This topic describes how to configure a NetWorker server by using vRealize Automation. After you have configured the system, you can verify that it has been added by logging in to the vRealize Orchestrator Client.

Before you begin

You must be logged in to vRealize Automation as a user with the administrator entitlement, as defined in the **Install default setup for tenant** workflow.

Procedure

1. In vRealize Automation, select the **Catalog** tab.
2. In the left pane, click the data protection service.
3. In the **Services** pane, click **Request** for **Add a tenant data protection system**.

   The **Add a tenant data protection system** page displays, open on the **System Information** tab.
4. In the **System Information** tab:
   a. Select **NetWorker** from the drop-down list.
   b. Type the FQDN of the system that you are adding.
   c. Optionally, select a port, and type custom properties.
   d. To display the **Credentials** tab, click **Next**.
5. In the **Credentials** tab:
   a. Type the username and password that is required to access the data protection system.
   b. Click **Submit**.
6. To close the request configuration message, click **OK**.
7. Select the **Requests** tab, and view the progress of the NetWorker addition until it completes successfully.
8. To verify that the data protection system has been successfully added, log in to the VMware vRealize Orchestrator Client.

   The client opens on the **My Orchestrator** tab.
9. Select the **Inventory** tab.
10. In the **Inventory** tab, click the arrow beside **EMC Data Protection** to expand its list.

    You should see the NetWorker server.

Note

The NetWorker server does not display any policies if the protection group was not associated with a policy/workflow in the NetWorker Management Console's **NetWorker Administration** GUI.

Setting up data protection on a blueprint

To add data protection to a blueprint in vRealize Automation, perform the following steps. Once the data protection has been added to the blueprint, the business group user can apply data protection to a virtual machine at the time of provisioning.

During this procedure, you create a property group that contains either a list of user-selectable policies, or a single, non-selectable policy. A selectable-policy property group allows the business group user to choose a policy when requesting a blueprint. A non-selectable-policy property group contains a single policy that is applied automatically when the business group user requests a blueprint.

Procedure

1. In vRealize Automation, browse to **Catalog** > **Setup data protection property group**, and click **Request**.

   The **Setup a data protection property group** page displays.

2. Create a property group or select an existing one.

   - To create a property group:

     a. Select **[New Property Group]** from the drop-down list.

     b. Specify a name, a unique ID, and an optional description.

     Note

     The property group created will only be visible by the current tenant.

     c. To display the **Data Protection** tab, click **Next**.

   - To use an existing property group, select the property group from the drop-down list, and click **Next** to display the **Data Protection** tab.

     Note

     You can use existing property groups that do not have data protection. Any required data protection properties will be added to the property group. If the property group already has data protection properties, you can select one or more policies to add to the existing policy for the property group.

3. In the **Data Protection** tab, you can decide whether the business group user can select one or more protection policies when the blueprint is requested. Also, you can select the policy or policies that the property group uses.

   The property group can contain either a list of selectable policies or a single, non-selectable policy that is applied automatically to the virtual machine at provisioning time.

   - To create or update a property group with selectable policies:

     a. In the **Allow user to select data protection policy when blueprint is run?** drop-down, select **Yes**.

     b. If the VM is a database server (for example, if the VM is an Oracle database), EMC recommends protecting the virtual machine with both the Application consistent data protection policy and an Image level data protection policy.

     c. Select the checkbox next to one or more policies in the list.

Note

Ensure that the selected policy's detailed information contains the name of the vCenter that will manage the virtual machines to be provisioned in the future.

d. If you select an Application Consistent Data Protection policy (Avamar only), specify a time in minutes that the custom workflow should wait to discover a configured hostname of the virtual machine. The default is 10 minutes.

- To create or update a property group with a non-selectable policy that is applied automatically to the virtual machine at provisioning time:

  a. In the **Allow user to select data protection policy when blueprint is run?** drop-down, select **No**.

  b. If the VM is a database server (for example, if the VM is an Oracle database), EMC recommends protecting the virtual machine with both the Application consistent data protection policy and an Image level data protection policy.

  c. Select one policy in the list.

  d. If you select an Application Consistent Data Protection policy (Avamar only), specify a time in minutes that the custom workflow should wait to discover a configured hostname of the virtual machine. The default is 10 minutes.

4. Click **Submit**.

   Edit the blueprint by navigating to the **Design** > **Blueprints** tab, and adding the property group to either the blueprint directly or to one or more components of the blueprint. The vRealize Automation documentation available at the following link provides more information.

Configuring application-consistent data protection (Avamar only)

Application consistent data protection allows you to use Avamar plug-ins for applications to protect the application data. This is only supported for stand-alone or simplex configuration of the application.

File system backup is also supported. This feature is available with the File System plug-in which is part of the Avamar client. Avamar plug-ins are installed after the client install. You can protect file system data when it is specified in the Dataset that is part of the Avamar Group for data protection. The *Avamar Backup Clients User Guide* provides more information.

Versions 7.3.x and 7.4 of the Avamar plug-ins that are listed in the following table are supported by the current release of the vRealize Data Protection Extension.

Table 5 Avamar plug-ins supported for application-consistent data protection

Plug-in	Related Documentation
EMC Avamar for Oracle	EMC Avamar for Oracle User Guide
EMC Avamar for SQL Server	EMC Avamar for SQL Server User Guide
EMC Avamar for Exchange VSS	EMC Avamar for Exchange VSS User Guide

Table 5 Avamar plug-ins supported for application-consistent data protection (continued)

Plug-in	Related Documentation
EMC Avamar for SharePoint VSS	EMC Avamar for SharePoint VSS User Guide

Note

At this time, only stand-alone implementations of these applications are supported. The related documentation is available on https://support.emc.com/products/.

Procedure

1. Using VMware vCenter Server, create a virtual machine.
2. Install the application (Oracle, SQL Server, SharePoint VSS, or Exchange VSS) on the virtual machine.
3. Using the instructions that are provided in the related Avamar plug-in documentation, install the appropriate Avamar plug-in on the virtual machine, and perform any desired actions to prepare the application for data protection.

   Note

   Any changes to the application at this point are applied to all provisioned virtual machines.

4. Using vCenter, create a virtual machine template.
5. Use this virtual machine template to create the blueprint in vRA.
6. Using Avamar Administrator, create policies for the application under the EMC Data Protection (EDP) domain.
7. Using the vRealize Data Protection Extension, follow the instructions that are provided in Setting up data protection on a blueprint on page 61 to configure data protection for a new or existing blueprint.
8. Set up DHCP/VMware/Other customization to provide an IP address and hostname to the virtual machine during vRA provisioning. During provisioning, the vRealize Data Protection Extension reads the hostname of the virtual machine and activate the Avamar client to set up data protection. Ensure that the DNS configured in the Avamar server can resolve the hostname.
9. After a virtual machine is provisioned, ensure that the Avamar dataset that is used in the Avamar Group includes the databases that require protection. Follow the instructions provided in the related Avamar plug-in documentation.

Restoring application backups

You can perform restores of application backups by using the **Avamar** user interface.

The Avamar (versions 7.3.x and 7.4) Plug-in user guides, available at http://support.emc.com, provide instructions.

Supported Advanced Services actions for application-consistent data protection

The vRealize Data Protection Extension supports the following Advanced Services actions for application-consistent data protection.

Add data protection
This operation adds an application policy to a virtual machine for data protection. It activates a client if it has not already been activated.

Remove data protection
This operation removes an application policy from a virtual machine to remove data protection.

Note

Even if all data protection is removed from the virtual machine, the client is still activated.

View protection status
This operation displays the policies that protect the virtual machine, and also a list of backups of the virtual machine, including application backups.

Run data protection
This operation runs data protection for a virtual machine protected by an EMC data protection policy. Application data protection policies are also supported.

Destroy
When you run this operation, vRA shuts down and deletes the virtual machine. Before shutdown, vRA invokes a custom workflow which tries to backup the virtual machine. If the virtual machine is associated with one or more image policies and/or application policies, the workflow tries the backup using at least one of each policy type. This action provides you with an image backup and an application backup before the client is retired.

Restore a virtual machine to a new location using advanced options

Tenant administrators can use advanced options to restore a virtual machine backed up with Avamar or NetWorker to a new location. These options are additional to the options available to a business group user when restoring a virtual machine to a new location.

Before you begin

- You must be logged in to vRealize Automation as a user with the administrator entitlement, as defined in the **Install default setup for tenant** workflow.
- The virtual machine that you plan to restore must have one or more existing image level backups to Avamar or NetWorker. Restores of virtual machines that are backed up using an Avamar application-consistent policy are not available.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the left pane, click **Machines**.

   The **Machines** list displays in the right pane.
3. In the **Owned by** list, select the group that owns the virtual machine that you plan to restore.

   Only the machines that are owned by that group are displayed in the **Machines** list.

4. Click the row of the machine that you want to restore.

   The row is highlighted.

   Note

   If you are unsure if a machine has been backed up, select **View protection status** from the **Actions** menu. Existing image-level backups are listed in the scrolling status field.

5. From the **Actions** menu, select **Advanced restore to new**.

   The **Advanced restore to new** page opens on the **Restore Options** tab.

6. In the **Restore Options** tab, select a backup from the drop-down list or search for backups by date range. You can also limit the number of backups that are listed.

   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.

   b. Select the maximum number of backups that you want to view.

   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.

   d. Select the backup that you want to restore.

   When you select a backup, the new name for the virtual machine is populated automatically. You can change the name if preferred.

7. To display the **Advanced Options** tab, click **Next**.

   The advanced options on this tab are described in the following list.

   - **Reservation:** Where to create the virtual machine. The reservation the original virtual machine was in is selected by default. Only the reservations available for the original virtual machine's owner are visible based on the business groups they belong to.
   - **Datastore:** Which datastore within the reservation to put the virtual machine in. The list of available datastores is based on the datastores that have been configured for the selected reservation. The datastore that is used for the original virtual machine's first disk is selected by default if the datastore has been added to the selected reservation. If the restored virtual machine has multiple disks, then all these disks are created in the selected datastore.
   - **Destination Resource Pool Path:** The Resource Pool to put the virtual machine in. The pool from the original virtual machine is selected by default. You can select a different pool if preferred.
   - **New VM folder:** The folder from the original virtual machine is selected by default. You can select a different folder if preferred.
   - **Blueprint for new virtual machine:** The blueprint you use to import the new virtual machine into vRealize Automation. Displays the published blueprints entitled to the original virtual machine owner.
   - **Component in the blueprint:** The component in the blueprint to use when importing the new virtual machine.
   - Set **Inherit custom properties from source vm?** to **Yes** if you want to import the source virtual machine custom properties and key values to the restored virtual machine. Set **Inherit custom properties from source vm?** to **No** if you want to apply the blueprint custom properties and key values to

the restored virtual machine. If you select **No**, **Blueprint for new virtual machine** will be enabled and you can then choose the required blueprint and component in the blueprint to associate to the virtual machine.

- Set **Remove Nic** to **Yes** if you want to remove the NIC from the restored virtual machine. Set **Remove Nic** to **No** if you do not want to remove the NIC from the restored virtual machine. If set to **No**, then the **Reconnect NIC** option will be enabled.

8. Select the advanced options that you want to use to restore the virtual machine, and then click **Next**.
9. If a warning message appears indicating that vRealize Automation does not have the ability to do an automated import, accept the warning and click **Submit**.
10. To close the request confirmation message, click **OK**.
11. To view the progress of the restore, select the **Requests** tab.
12. When the workflow completes, perform the following to verify the workflow:
    a. Select the **Infrastructue** tab.
    b. Select **Managed Machines** in the left pane. In this list, the name of the restored virtual machine appears. You can also verify options that you selected for restoring the virtual machine, such as the blueprint or the reservation.

    The machine will display the Items tab after the vRealize Automation import process completes.

Restore a deleted virtual machine (Avamar only)

Deleted virtual machines that had data protection and backups on an Avamar server retain these backups until the retention period expires. Backups are retained even when the virtual machine is deleted from the VMware infrastructure. As a tenant administrator, you can restore one of these backups as a new virtual machine.

Before you begin

- You must be logged in to vRealize Automation as a user with the administrator entitlement, as defined in the **Install default setup for tenant** workflow.
- The virtual machine that you plan to restore must have one or more existing image level backups to Avamar. Restores of virtual machines that are backed up using an Avamar application-consistent policy are not available.

Note

This feature does not provide a filter by tenant. Therefore, when restoring a deleted virtual machine, you, as a tenant administrator, can see every deleted machine on the Avamar server. If security concerns exist regarding a multi-tenant system, it is recommended that each tenant have its own unique Avamar server for storing backups. Alternatively, you can add entitlement for this catalog item to only appropriate users.

Procedure

1. In vRealize Automation, select the **Catalog** tab.
2. In the left pane, click the data protection service.

3. In the right pane, click **Request** for the **Restore deleted machine from backup** catalog item.

   The **Restore deleted machine from backup page** opens on the **Select VM** tab.

4. On the **Select VM** tab, select which virtual machine to restore. The **Filter By Name?** option is set to **Yes** by default. If you select **No**, the **Name Filter** option is no longer visible.

   a. If you want to filter the results by virtual machine name, leave the **FIlter By Name?** option set to **Yes**, and type the filter criteria in the **Name Filter** field.

      You can filter by partial or full virtual machine name, and/or by the date the machine was deleted. The date was added by Avamar when the deletion occurred, and is in the format `yyyy.mm.dd`. For example, 2015.08.31.

   b. To display the list of machines that match the filter criteria, click the **Deleted Machine** drop-down list.

      Note

      This list includes all machines that match the filter criteria, including machines that do not have backups.

   c. Select the machine that you want to restore, and click **Next** to display the **Select backup** tab.

5. In the **Select backup** tab, select a backup from the drop-down list or search for backups by date range. You can also limit the number of backups that are listed.

   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.

   b. Select the maximum number of backups that you want to view.

   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.

   d. Select the backup that you want to restore.

6. In the **Import Information** tab, specify the new owner's vRealize Automation username, and select the business group, reservation, and blueprint that the new VM has when it is restored.

   The username is contained in the **Owner** field by default.

   a. In the **Owner** field, type the username of the owner. For example, **`Annie@machine.local`**.

      The **Business Group** list is populated with the business groups that are common to you (as the tenant administrator) and to the owner that you specified. If the username of the new owner is invalid, or if there are no common business groups between you and the owner, the list is empty.

   b. Select the **Business Group** for the new owner.

   c. Select the **Reservation** that you want to use to determine what resources are available on the new virtual machine. Only the reservations that are available for the selected business group are contained in the **Reservation** list.

   d. Set **Remove Nic** to **Yes** if you want to remove the NIC from the restored virtual machine. Set **Remove Nic** to **No** if you do not want to remove the

NIC from the restored virtual machine. If set to **No**, then the **Reconnect NIC** option will be enabled.

e. **Blueprint for new virtual machine** is the blueprint you use to import the new virtual machine into vRealize Automation, and displays the published blueprints entitled to the original virtual machine owner.

f. **Component in the blueprint** is the component in the blueprint to use when importing the new virtual machine.

g. Click **Next**, or select the **Restore Location** tab.

7. In the **Restore Information** tab, you specify details about the physical hardware for the new virtual machine based on the reservation.

   a. In the **New Virtual Machine Name** field, type a name for the new machine, or accept the default name, which is the original name plus a current timestamp.

      During the restore, the system prevents the new virtual machine name from overwriting an existing virtual machine.

   b. Select a **Host**.

      The hosts that are contained in the list are the ESX hosts that are available in the selected reservation.

   c. Select a **Datastore**.

      The datastores that are contained in the list have been enabled in the selected reservation and that are visible to the selected ESX host.

   d. Select a **Resource Pool**.

      The resource pools that are contained in the list have been filtered based on the selected datastore.

   e. Select a **Virtual Machine Folder**.

      The folders that are contained in the list have been filtered based on the selected datastore.

   f. If a warning appears that vRealize Automation does not have the ability to do an automated import, accept the warning and click **Submit**.

      The size of the deleted virtual machine that you are restoring directly affects the length of time that is required to complete the restore. The larger the machine, the more time it takes.

8. When the workflow completes, perform the following to verify the workflow:

   a. Select the **Infrastructue** tab.

   b. Select **Managed Machines** in the left pane. In this list, the name of the restored virtual machine appears. You can also verify options that you selected for restoring the virtual machine, such as the blueprint or the reservation.

   The machine will display the Items tab after the vRealize Automation import process completes.

CHAPTER 4

Business Group User Operations

This chapter includes the following topics:

Provisioning a protected virtual machine

You can provision a protected virtual machine by requesting a blueprint that has a data protection policy assigned to it. Depending on how the tenant administrator configured the blueprint, a policy that is used to protect the machine may or may not be selectable. If the policy is not selectable during provisioning, a policy that is pre-selected by the administrator is applied to the virtual machine by default.

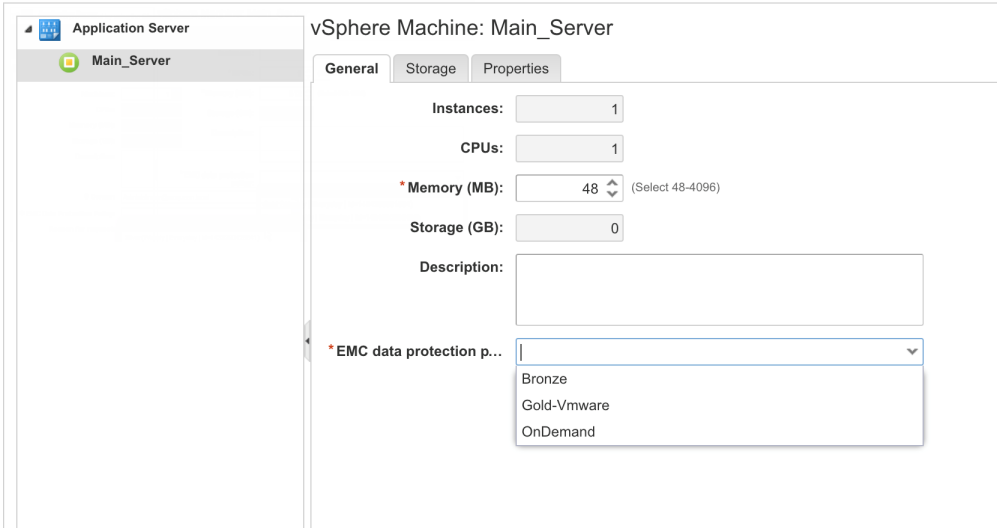
Procedure

1. In vRealize Automation, select the **Catalog** tab.
2. In the list of service catalogs, locate a blueprint that contains data protection, and click the blueprint's **Request** button.

   The **New Request** page for the blueprint displays.

   If the blueprint contains selectable policies, you can select one from the **EMC data protection policy** drop-down list as shown in the following figure.

   Figure 22 Select policy for the blueprint

   If a policy is not selectable on this page, that means that a policy has already been configured for the blueprint and is applied by default to the virtual machine that you are provisioning.
3. Optionally, change any of the remaining values on the **New Request** page as needed.
4. Click **Submit**.
5. To close the request confirmation message, click **OK**.
6. If you want to monitor the status of the provisioning request, select the **Requests** tab.

   To refresh the page, click the **Refresh** button at the bottom of the page.

Results

After the virtual machine has been provisioned successfully, it will be listed in the **Machines** list on the **Items** tab. The remaining sections in this chapter describe the data protection and restore actions that you can perform on the virtual machine.

Data protection actions

This section describes the EMC vRealize Data Protection Extension actions that the business group user can perform. These tasks include:

- Adding data protection to a virtual machine
- Running data protection on a virtual machine
- Viewing the protection status of a virtual machine
- Removing data protection from a virtual machine

Adding data protection to a virtual machine

The steps in the following procedure describe how to add data protection to an existing, unprotected virtual machine by adding one, or more protection policies.

Before you begin

At least one protection policy must support the vCenter that manages the virtual machine to be provisioned.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine to which you want to add data protection.

   The row is highlighted.
3. Click **Actions**, and select **Add data protection** from the menu.

   The **Add data protection** page displays.
4. Select a policy from the list of policies, and click **Submit**.
5. To close the request confirmation message, click **OK**.
6. If you want to monitor the status of the request, select the **Requests** tab.

   To refresh the information, click the **Refresh** button at the bottom of the page.

Running data protection on a virtual machine

The steps in the following procedure describe how to perform an immediate backup of a virtual machine that has been provisioned.

Before you begin

The virtual machine must have a policy assigned to it. At least one protection policy must support the vCenter that manages the virtual machine to be provisioned.

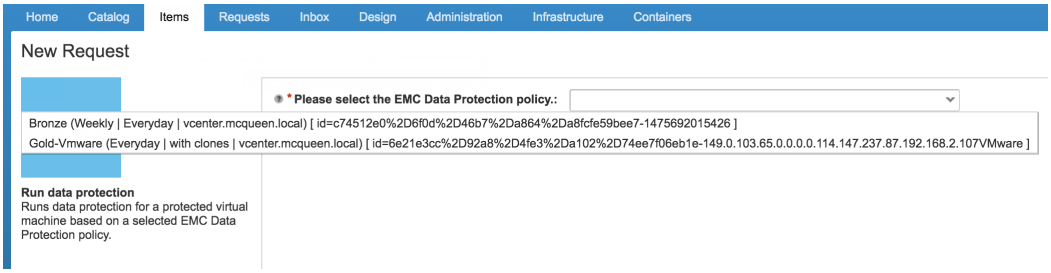
Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine that you want to back up.

   The row is highlighted.
3. Click **Actions**, and select **Run data protection** from the menu.

   The **Run data protection** page displays.
4. Select a policy from the list, and click **Submit**.

Figure 23 Select policy to run data protection



5. To close the request configuration message, click **OK**.
6. If you want to monitor the status of the request, select the **Requests** tab.

   To refresh the status, click the **Refresh** button.

Viewing the protection status of a virtual machine

The steps in the following procedure describe how to view the protection status of a virtual machine.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine for which you want to view protection status.

   The row is highlighted.
3. Click **Actions**, and select **View protection status** in the menu.

   The **View protection status** page displays with the machine's protection status.

Removing data protection from a virtual machine

The steps in the following procedure describe how to remove data protection from a virtual machine that has already been provisioned.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine from which you want to remove data protection.

   The row is highlighted.
3. Click **Actions**, and select **Remove data protection** from the menu.

   The **Remove data protection** page displays.
4. Click the checkbox beside one or more of the policies that you want to remove from the virtual machine.
5. Click **Submit**.
6. To close the request confirmation message, click **OK**.

Restore actions

This section describes the restore operations that the business group user can perform. These actions include restoring a virtual machine to its original location or to a new location, and restoring individual files.

Restore a virtual machine to its original location

The steps in the following procedure describe how to restore a backup of a virtual machine to its original location.

Before you begin

The virtual machine that you plan to restore must have an existing image-level backup to Avamar or NetWorker. Virtual machines that are backed up using an Avamar application-consistent policy are not available and must be restored by using the Avamar data protection system.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. Click the row of the machine whose backup you want to restore.

   The row is highlighted.
3. From the **Actions** menu, select **Restore data**.

   The **Restore data** page displays.
4. In the **Restore data** page, you can search for backups by date range, and you can limit the number of backups that are listed.
   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.
   b. Select the maximum number of backups that you want to view.
   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.
   d. Select the backup that you want to restore.
5. Select **Yes** to **Synchronize virtual machine power status?** if you want to synchronize the power status of the virtual machine by running data collection on the back-end.
6. Select **Yes** or **No** as required for the power off and power on options.
7. Click **Submit**.
8. To close the request confirmation message, click **OK**.
9. Select the **Requests** tab, and monitor the restore progress until it completes successfully.

Restore a virtual machine to a new location

The steps in the following procedure describe how to restore a backup of a virtual machine to a location that is different from the location of the original machine. When you restore a backup to a new location, a new virtual machine is created on the vCenter and then imported back into vRealize Automation. When the restore

completes, you can view the new virtual machine in the **Items** tab in vRealize Automation.

Before you begin

The virtual machine that you plan to restore must have one or more existing image level backups to Avamar or NetWorker. Virtual machines that are backed up using an Avamar application-consistent policy are not available.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. Click the row of the machine whose backup you want to restore.

   The row is highlighted.
3. From the **Actions** menu, select **Restore to new**.

   The **Restore to New** page displays.
4. In the **Restore to New** page, you can search for backups by date range, and you can limit the number of backups that are listed.

   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.

   b. Select the maximum number of backups that you want to view.

   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.

   d. Select the backup that you want to restore.

      When you select a backup, the new virtual machine name is provided automatically. If you prefer, you can change the name.
5. In the **Restoring Custom Properties** page:

   - Set **Inherit custom properties from source vm?** to **Yes** if you want to import the source virtual machine custom properties and key values to the restored virtual machine.
   - Set **Inherit custom properties from source vm?** to **No** if you want to apply the blueprint custom properties and key values to the restored virtual machine. If you select **No**, **Blueprint for new virtual machine** will be enabled and you can then choose the required blueprint and component in the blueprint to associate to the virtual machine.
   - Set **Reconnect NIC** to **Yes** if you want the virtual machine to connect to the NICs after the restore, or **No** if you want the virtual machine to stay disconnected from NICs after the restore.

   If a warning message appears indicating that vRealize Automation does not have the ability to do an automated import, accept the warning and click **Submit**.
6. To close the request confirmation message, click **OK**.
7. To view the progress of the restore, select the **Requests** tab.
8. When the restore and import complete successfully, the new virtual machine appears in the **Items** tab.

File-level restore for Avamar

You can restore individual files or a directory from an Avamar backup of a virtual machine by using the **EMC Data Protection Restore Client**.

Before you begin

The virtual machine that you plan to restore must have one or more existing backups to Avamar. Virtual machines that are backed up using an Avamar application-consistent policy are not available.

Also, ensure that you install the `EDP-FLR.rpm` rpm package on the Avamar server, which is required for Avamar data protection. The section Install the Dell EMC Data Protection Restore Client (Avamar systems only) provides more information.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine from whose backup you want to restore a file.

   The row is highlighted.
3. From the **Actions** menu, select **File level restore**.

   The **File level restore** page displays with the **Select Backup** tab.
4. In the **Select Backup** tab, you can search for backups by date range, and you can limit the number of backups that are listed.

   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.

   b. Select the maximum number of backups from each source that you want to view. This includes cloned backups.

   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.

   d. Select the backup that you want to restore.

   When you click **Next**, the **Browse FLR** tab displays a URL to open the **EMC Data Protection Restore Client**.
5. To open the **EMC Data Protection Restore Client** in a new tab or window, right-click the URL.
6. Log in with your user credentials.

   After successful log in to the **EMC Data Protection Restore Client**, the **Select items to restore** panel opens, which contains the selected backup.
7. To display the backup's top-level item in the right-hand pane, select the backup.
8. In the right-hand pane, browse to the file or directory that you want to restore, and double-click the item.

   The file or directory name turns green, and the **Next** button becomes active.
9. Click **Next**.

   The **Restore options** panel opens.
10. Select the client in the left pane, and then browse to the location to which you want to restore the file or directory.

11. Click **Finish**.

    Click **Yes** in the **Restore Confirmation** message box.

12. To display the **Restore Monitor**, click the arrow that is located in the lower right-hand corner of the **EMC Data Protection Restore Client** window.

    The **Restore Monitor** expands up from the bottom. Click the **Refresh** button on the right side of the monitor as needed.

File-level restore for NetWorker

You can restore individual files or a directory from a NetWorker backup of a virtual machine by using the **EMC Data Protection Restore Client**.

Before you begin

The virtual machine that you plan to restore must have one or more existing backups to NetWorker, and the backup or clone must reside on a Data Domain device.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the **Machines** list, click the row of the virtual machine from whose backup you want to restore a file.

   The row is highlighted.
3. From the **Actions** menu, select **File level restore**.

   The **File level restore** page displays with the **Select Backup** tab.
4. In the **Select Backup** tab, you can search for backups by date range, and you can limit the number of backups that are listed.

   a. If you want to filter the backups by date range, select **Yes**, and select the **Start Date** and time and the **End Date** and time.

   b. Select the maximum number of backups from each source that you want to view. This includes cloned backups.

   c. To display the backups that match the filter criteria, click the **Backup** drop-down list.

   d. Select the backup that you want to restore.

   When you click **Next**, the **Browse FLR** tab displays a URL to open the **EMC Data Protection Restore Client**.
5. To open the **EMC Data Protection Restore Client** in a new tab or window, right-click the URL.
6. Log in as one of the following:

   - If you are using a Microsoft Windows system, log in as Administrator.
   - If you are using a Linux system, log in as root.

   For NetWorker, if the user is part of the VMwareFLR Users group, you can login using those credentials.

7. NetWorker requires you to install the FLR Agent on the virtual machine being restored in order to update the file system. If the FLR Agent is not installed, you will be prompted to enter your user credentials to install the FLR Agent. Ensure that you leave the checkbox next to **Keep EMC vProxy FLR Agent on target Virtual Machine?** selected if you plan to perform a file level restore in the future.

After successful log in to the **EMC Data Protection Restore Client**, the **Select restore destination** page displays.

8. In the **Select restore destination** page, navigate to the location where you would like to restore the folder/files. After selecting the destination, click **Next**.

   The **Select items to restore** page displays

9. In the **Select items to restore** page, select the desired backup to display that backup's top-level item in the right-hand pane, and then browse to the file or directory that you want to restore. Double-click the item you want to restore.

   The file or directory name turns green, and the **Restore** button becomes active.

10. When all the files/folders you want to restore are selected, click **Restore**.

    Click **Yes** in the **Restore Confirmation** message box.

11. To display the **Restore Monitor**, click the arrow that is located in the lower right-hand corner of the **EMC Data Protection Restore Client** window.

    The **Restore Monitor** expands up from the bottom. Click the **Refresh** button on the right side of the monitor as needed.

Expiring or destroying a virtual machine

The steps in this procedure describe how to expire or destroy a virtual machine. To perform these standard vRA machine actions, you must have the appropriate entitlements. Otherwise, these actions do not display in the **Items** tab.

Before you begin

The destroy operation occurs in a strict sequence so that orderly removal of virtual machines from data protection systems occurs before the virtual machine is actually destroyed. For example, a virtual machine may be protected by one or multiple data protection (Avamar, NetWorker) endpoints and/or multiple policies within the same data protection endpoint. Removal of a virtual machine from vSphere without first removing it from related data protection policies can cause errors in the data protection endpoint. Therefore, in order to keep systems consistent regarding virtual machine status, the following sequence occurs:

1. Removal of the virtual machine from all data protection endpoint policies it is associated with.
2. After the completion of step one, the virtual machine is destroyed in vSphere.
3. After the completion of step two, vRealize Automation removes the VM from its inventory and it is no longer listed in the vRA **Items** > **Machines** tab for that tenant user.

Procedure

1. In vRealize Automation, select the **Items** tab.
2. In the Machines list, click the row of the virtual machine that you want to expire or destroy.

   The row is highlighted.

3. Click **Actions**, and select either Expire or Destroy from the menu.

   A confirmation message displays.

4. Select the **Deployments** tab to view a tree structure of the machine(s) in each executed blueprint. You can select a deployment and click the **Destroy** action to delete all the machines in the deployment, or you can select individual machine(s) of the deployment and click the **Destroy** action.

5. Click **Submit**.
6. To close the request confirmation dialog box, click **OK**.

Results

Note

Data protection is not removed when the virtual machine is expired. It is removed when the virtual machine is destroyed. The virtual machine can expire and be archived before it is destroyed, but the EMC vRealize Data Protection Extension retires the client and removes the policy only when the machine is destroyed.

Note

The Destroy operation is a vRealize Automation action that a tenant administrator must entitle to the user.

CHAPTER 5

Logging and Supportability

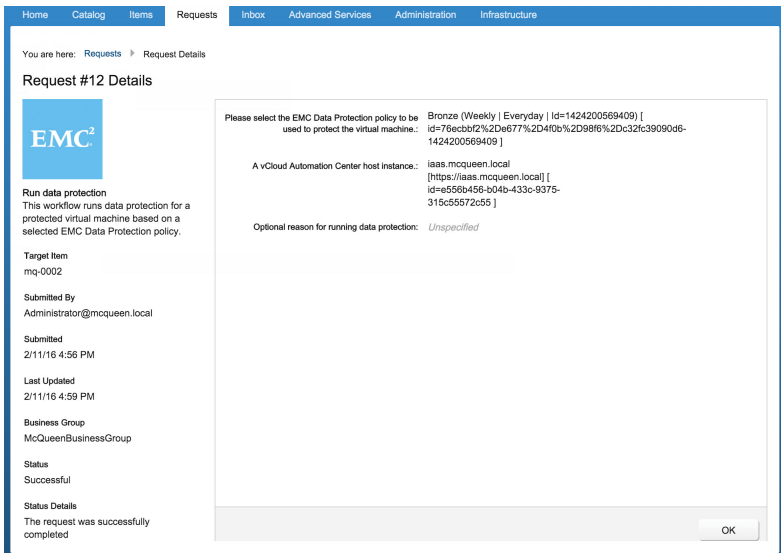
This chapter includes the following topics:

Monitoring status

You can monitor the status of the requests and view request details from the **Requests** tab in vRealize Automation Center.

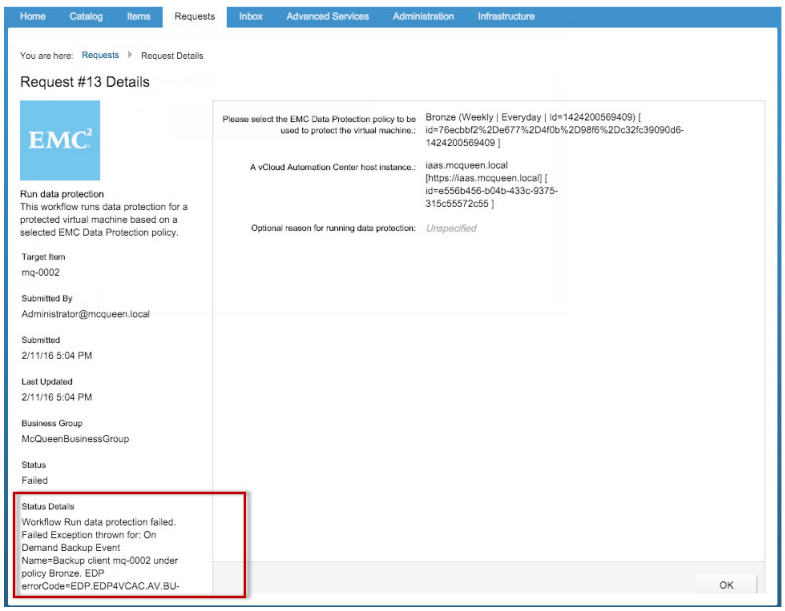
The following figure shows status details for a successful request.

Figure 24 Successful request in vRA



The following figure shows status details for a request failure.

Figure 25 Failed request in vRA



Check the status details shown in the text area that is highlighted in the figure above to determine the meaning of the error and use the information for troubleshooting.

Event and error message codes

The following table lists the events and error codes that exist for the EMC vRealize Data Protection Extension.

Note

in the following error codes, {provider} indicates the data protection system.

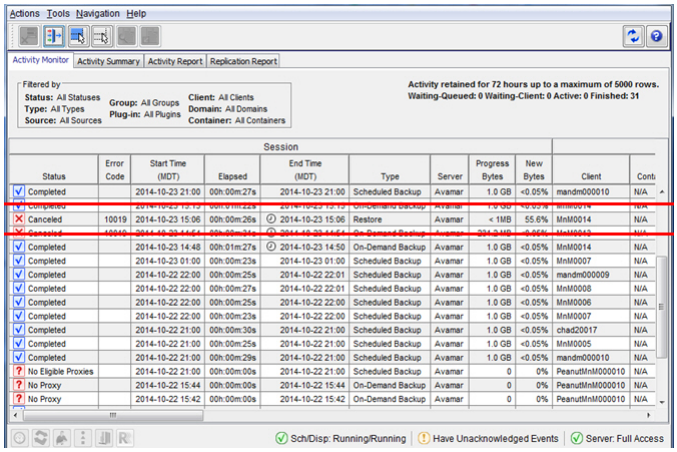
Table 6 Event and error codes

Error code	Description
EDP.EDP4VCAC. {provider}.BU-000005	EDP: General error from the EMC vRealize Data Protection Extension. Please check data protection for details.
EDP.EDP4VCAC. {provider}.BU-000010	EDP: Backup cancelled and failed to backup client.
EDP.EDP4VCAC. {provider}.BU-000030	EDP: Backup failed with backup operation error.
EDP.EDP4VCAC. {provider}.BU-000040	EDP: One or more disks protected by backup policy may have been migrated to new datastores. Please edit the backup job and verify the correct disks are still protected.
EDP.EDP4VCAC. {provider}.BU-000050	EDP: Backup failed because policy was disabled.
EDP.EDP4VCAC. {provider}.RST-000200	EDP: Restore cancelled, check data protection provider for underlying reason.
EDP.EDP4VCAC. {provider}.RST-000210	EDP: Restore failed, check data protection provider for underlying reason.
EDP.EDP4VCAC. {provider}.RST-000220	EDP: Restore failed because client is running.
EDP.EDP4VCAC.{provider}. RST-000230	EDP: Restore failed because disk restore step failed. Please verify disks in backup and try again.

Avamar Client activity window

In addition to monitoring the status through the vRealize Automation Requests details, you can log in to the Avamar UI and view status details from the Activity Monitor.

Figure 26 Avamar Client activity window



NetWorker activity monitoring and log files

The EMC vRealize Data Protection Extension uses the NetWorker REST API. Logs for the NetWorker REST API are located in /nsr/logs/restapi.

Other NetWorker logs are provided in the following locations:

- Backup— `/nsr/logs/policy/policy-name/workflow-name`
- Recovery—`/nsr/logs/recover`

Single-click log capturing and packaging

Log bundling occurs in two areas of the product: vRealize Automation and Avamar. The EMC vRealize Data Protection Extension logs are included in the bundling facility of vRealize Automation.

vRealize Automation log bundling

vRealize Automation has a log bundle facility separate from Avamar log bundling.

You can export vRealize Orchestrator log and configuration settings using the **Export logs and application settings** vRealize Orchestrator workflow, which is located in `/Library/Troubleshooting`.
Please reference vRealize Automation documentation for log bundling specifics.

The following procedure describes how to collect the log bundle manually when using a vRealize Automation appliance.

Procedure

1. Log in to the vRealize Automation appliance management site.
2. Click the **vRA Settings** tab on the menu bar.

3. Click the **Cluster** tab.
4. Click **Create Support Bundle**.
5. When log collection completes, click the bundle link to download the file.

vRealize Orchestrator log bundling

You can collect the vRealize Orchestrator log files from vRealize Orchestrator Configuration.

Procedure

1. Log in to vRealize Orchestrator Control Center at:

   `http://<orchestrator_server_ip_address>:8283/vco-controlcenter`

2. In the **Export Logs** section, click **EXPORT LOGS**.

   The system generates a .zip file bundle that you can download and save locally.

Log locations

The following table contains log descriptions and locations for the EMC vRealize Data Protection Extension and the Avamar system.

The most up-to-date log information is provided at the following links:

- Default log locations
- Log locations for VMware vRealize Automation 7.x

Table 7 Default log locations

vRealize Automation component log description	Default log location
IaaS installation configuration logs	`C:\Program Files (x86)\VMware\vCAC\Server\ConfigTool\Log`
IaaS Manager Server logs	`C:\Program Files (x86)\VMware\vCAC\Server\Logs`
IaaS Model Manager Web (Repository) logs	`C:\Program Files (x86)\VMware\vCAC\Server\Model Manager Web\Logs`
IaaS Distributed Execution Manager (DEM) Orchestrator and Worker logs	`C:\Program Files (x86)\VMware\vCAC\Distributed Execution Manager\ atdhl-ms1-70.sqa.local DEO\Logs`
IaaS Proxy Agent logs	`C:\Program Files (x86)\VMware\vCAC\Agents\Agent_Name\Logs`
vRealize Automation Identity Appliance logs	`/var/log/vmware/sso/`
vRealize Automation Appliance logs	`/var/log/vmware/vcac/`
vRealize Automation Appliance Apache error log	`/var/log/apache2/error_log`
vRealize Automation Appliance Upgrade logs	`/opt/vmware/var/log/vami/`

Table 7 Default log locations (continued)

vRealize Automation component log description	Default log location
vRealize Orchestrator Appliance	In the vRealize Orchestrator Appliance (and the vRealize Orchestrator in the vRealize Automation Appliance), both the vRealize Orchestrator server and configuration server use tomcat logging, so the logs are in: • `/var/lib/vco/app-server/logs`, which is sym-linked to `/var/log/vmware/vco/app-server/`. The `edp_4_vcac.log` in this directory contains the log messages from the EMC vRealize Data Protection Extension. • `/var/lib/vco/configuration/logs`, which is sym-linked to `{{/var/log/vmware/vco/configuration/}}`. Mostly you will look in `catalina.out`. • vRealize Automation is similar: `/var/lib/vcac/logs`, which is sym-link'ed to `/var/log/vmware/vcac`.
Avamar log description	**Avamar log location**
Avamar MCS	`/usr/local/avamar/var/mc/server_log/mcserver.log.x`
Avamar GSAN	`/data01/cur/gsan.log`
Avamar documentation	`https://support.emc.com/products/759_Avamar-Server/Documentation`
NetWorker log description	**NetWorker log location**
NetWorker REST API	`/nsr/logs/restapi`
NetWorker documentation	`https://support.emc.com/products/1095_NetWorker/Documentation/`

CHAPTER 6

Troubleshooting

This chapter includes the following topics:

General Troubleshooting

Infrastructure administrators can obtain detailed failure status in the following locations in vRealize Automation:

- **Infrastructure** > **Recent Events**
- **Infrastructure** > **Monitoring** > **Logs**

Note

Non-Infrastructure administrators can use the **View protection status** action to see if the assignment occurred, but cannot see the logs.

Items to investigate when data protection is not added

Investigate the following items if a virtual machine is successfully provisioned but data protection is not added.

- Is the data protection system up and running?
- Does the policy exist in NetWorker or Avamar? For Avamar, is the policy in the right tenant domain under the correct vCenter client? See Avamar domains for tenant data protection policies or Tenant and EMC vRealize Data Protection Extension configurations for more information.
- Is the environment configured correctly? In the vRealize Orchestrator client, select the **Workflows** tab, browse to `/Library/EMC/Data Protection/vRA`, and run the **Check EMC data protection configuration** workflow. To see if there are any errors or warnings, check the logs.

Troubleshooting the EMC vRealize Data Protection Extension

The following are known issues that you may encounter when working with vRealize Automation components.

Major components for NetWorker data protection

NetWorker communicates with a number of major components, both internal and external, and checks automatically to verify the operational status of these components so that data protection operations can run and complete successfully.

NetWorker's major internal components consist of the following:

- nsrctrld, nsrd (server)
- nsrmmdbd (media database)
- nsrindexd (index database)
- nsrsnmd (storage node management)
- nsrmmd (device management)
- nsrexecd (client)
- auth daemons (written in java)

- gstd (GUI)
- nsrjobd (jobs management and database)

In order to perform a check of internal components, nsrctrld (the server monitor daemon) spawns nsrd (the server daemon), and nsrd then spawns and monitors most other daemons. Also, nsrd will re-spawn daemons if they stop or are unresponsive.

You can use nsrports -a and nsrrpcinfo to manually check the status of the communication path for all internal components.

NetWorker also uses the storage node management daemon nsrsnmd to automatically check that external components such as the vProxy appliance, Data Domain system, datastores, and vCenter, are running normally, and re-spawns the daemon if nsrsnmd stops. If nsrsnmd stops, the daemon will be restarted.

For the status of the vProxy appliance, you can use NSR VMware proxy.

Note

For issues and general questions related to the NetWorker VMware integration, refer to the EMC NetWorker 9.1 VMware Integration Guide, particularly the sections related to Best Practices and Troubleshooting.

A Day 2 operation such as Restore Data times out when submitting the operation from the vRA web portal

When you run the **Restore Data** workflow for a NetWorker-protected virtual machine from **vRealize Automation**, the operation might fail with an error similar to the following on the vRA web portal.

```
The connection to the vCenter Orchestrator server timed out.
```

If this error occurs, log in to each vRealize Automation server node in the cluster and change the following default timeout values in the file `/usr/lib/vcac/server/webapps/o11n-gateway-service/WEB-INF/classes/META-INF/spring/root/o11n-gateway-service-context.xml` to a higher value:

- <property name="connectionTimeout" value="#{vcoConfig['vco.connection.timeout.millis']?:60000}"></property>
- <property name="socketTimeout" value="#{vcoConfig['vco.socket.timeout.millis']?:30000}"></property>
- <property name="reconnectTimeout" value="#{vcoConfig['vco.reconnect.timeout.millis']?:1000}"></property>
- <property name="connectionRequestTimeout" value="#{vcoConfig['vco.connection.request.timeout.millis']?:60000}"></property>

Note

The settings above are an example for a given number of NetWorker clients. Set your timeout values according to the scale of the total number of backup clients present in NetWorker or Avamar.

For up to 300 virtual machines, it is recommended to set the *connectionTimeout* to 120000 milliseconds. For 300 to 1000 virtual machines, it is recommended to set the *connectionTimeout* to 240000 milliseconds.

Note

After modifying these variables, you must restart the **vcac-server** service on each vRA appliance in the cluster. For example, from the command line, type `service vcac-server restart`.

The following response/cache timeout parameters are specific to Avamar (mcjava) and NetWorker. These parameters are registered by running the vRO **Update a tenant data protection system** workflow and typing the values in the text box on the **System Information** tab:

- edp.timeout—The amount of time the DPE waits for the EDP systems to respond.
- mcjava.response.timeout—The number of seconds (s) that DPE waits for Avamar to respond.
- mcjava.cache.timeout—The number of seconds (s) before the DPE Avamar cache expires.
- networker.response.timeout—The number of seconds or milliseconds that DPE waits for NetWorker to respond.
- networker.cache.timeout—The number of seconds (s) before the DPE NetWorker cache expires.

For example, the default values are
`edp.timeout=120s;mcjava.response.timeout=60s;networker.response.timeout=60s`

Note

vRA/vRO timeout values must be greater than the value for *edp.timeout*, and the *edp.timeout* value must be greater than the Avamar and NetWorker timeout values.

vCenter View cache in NetWorker requires refresh when new virtual machine provisioned

When a new virtual machine is provisioned, protecting the virtual machine may take a long time. This is because NetWorker's vCenter view cache requires a refresh for the new virtual machine to be visible to NetWorker. Other factors affecting the amount of time may be if there are many virtual machines being provisioned at the same time, or if there are a large number of virtual machines in the vCenter.

Avamar policies do not display when running Setup a Data Protection Property Group or Add Data Protection workflows

A recently added, modified or deleted Avamar policy may not immediately display in the vRA policy lists when running the **Setup a Data Protection Property Group** or **Add Data Protection** workflows.

You can either wait for a few minutes or perform the following steps if you require these policies to display immediately.

Log into the vRealize Orchestrator client and refresh using the following steps:

1. Select the **Inventory** tab.
2. Select and expand the **EMC Data Protection** top node.
3. Right-click the Avamar protection system node and select **Reload**, or click **Refresh** in the top right corner to refresh all vRealize Orchestrator objects, including all of the data protection systems.

Alternatively, you can log into the vRealize Orchestrator client and flush the cache using the following steps:

1. Select the **Workflows** tab.
2. Navigate to **EMC** > **Data Protection** > **vRO** > **Utilities**.
3. Run **Flush cached data** or **Flush cached data on system**.
4. Ensure that the Avamar policies have been created under the correct domain.

Run data protection in vRA or NMC fails for NetWorker policy

When you run data protection for a NetWorker policy from vRealize Automation or perform the backup from the NetWorker Management Console, the operation may fail with an error similar to the following. This error will appear in the NetWorker log file for the associated policy if this occurs.

```
ERROR: Build number: 8298 Failed to lock Virtual Machine for
backup: Another EMCvProxy operation 'Backup' is active on VM
```

If this occurs, log into the **vSphere Client** and navigate to the **Hosts and Clusters** view. In the **VM summary** page, remove the annotation in the virtual machine within the **Annotations** section.

Null error when provisioning from blueprint with deleted policy

When it is discovered that a virtual machine is not protected by the data protection system as expected, there may have been a change to the underlying data protection system itself.

The vRealize Automation user provisions a virtual machine, which uses a build profile configured with the data protection policy.

The result of the provisioning request: **Success**.

The cause of the error: A change to the underlying data protection system has removed the policy attached to the blueprint. Protection cannot be added to the virtual machine and fails.

The protection failure is NOT a hard failure for the provisioning request. At the version level of the system, there is no way to show a warning through the UI of the vRealize Automation system.

Therefore, a message is logged in the `catalina.out` log file of the vRealize Orchestrator system. The vRealize Data Protection Extension logs the following message:

```
[McsdkProtectionProvider] EDP: Backup Policy could not be found
and may have been deleted.
```

No available policy found from virtual machine properties when there is no EDP system

When it is discovered that a virtual machine is not protected by the data protection system as expected, the underlying data protection system may not be available.

The vRealize Automation user provisions a virtual machine, which uses a build profile configured with the data protection policy.

The result of the provisioning request: **Success**.

The cause of the error: The underlying data protection system has either been removed or is not functional. Protection cannot be added to the virtual machine and fails.

The protection failure is NOT a hard failure for the provisioning request. At the version level of the system, there is no way to show a warning through the UI of the vRealize Automation system.

Therefore, a message is logged in the `catalina.out` log file of the vRealize Orchestrator system. The vRealize Data Protection Extension logs the following message:

`EDP Provider is null.`

`No available policy found from VM properties of <VM-name>, skipping protection policy assignment.`

vRealize Automation event subscriptions

The vRealize Data Protection Extension uses a new method introduced in vRealize Automation 7 called event subscriptions.

In vRealize Automation, **Administration** > **Events** > **Event Logs** lists all events in the vRealize Automation system, including machine workflows.

For Provisioning, events with descriptions of "Workflow 'Machine provisioned subscription' has started" and "Workflow 'Machine provisioned subscription' has completed" appear.

For Destroy, events with descriptions of "Workflow 'Machine unprovisioned subscription' has started" and "Workflow 'Machine unprovisioned subscription' has completed" appear.

Virtual machine is not added to application policy if agent in virtual machine is not activated

Occasionally, the virtual machine may not be added to an application policy for application data protection after provisioning, or an **Add data protection** resource action may fail to add the virtual machine to an application policy for application data protection.

This occurs when the agent in the virtual machine is not activated, due to the following reasons:

- The virtual machine may not be on the network
- The virtual machine may not have a hostname configured. The configured hostname must be on DNS (Domain Name Service) for Avamar to communicate with the agent at the hostname
- The firewall on the virtual machine may be blocking port 28002. Avamar tries to communicate with the application agent on this port in the virtual machine, as described in the *Avamar Administrator's Guide* in the section "Client paging."

Exchange plug-in re-added in Avamar when client deleted using Avamar Administrator

When you use the **Avamar Administrator** GUI to delete an Exchange client activated with Avamar, Avamar automatically restores the Exchange plug-in under the `/clients` folder. For the EMC vRealize Data Protection Extension, you may not notice that this has occurred because the Extension searches for application clients under `/EDP/`*`tenant_name`* and not `/clients`.

This issue does not occur when the client is retired. EMC recommends that you retire the client using **Avamar Administrator** instead of deleting the client.

Checking the EMC vRealize Data Protection Extension configuration

The EMC vRealize Data Protection Extension provides a utility workflow that can diagnose some of the potential configuration issues between itself and vRealize Automation, vRealize Orchestrator, vCenter, and Avamar.

Procedure

1. Log in to the **vRealize Orchestrator** client.
2. Select the **Workflows** tab, and browse to the following location:

   `Library/EMC/Data Protection/vRA`
3. Select the **Check EMC data protection configuration** workflow, and click the green arrow () in the upper-left corner of the right-hand pane to start the workflow.
4. While the workflow is running, select the **Logs** tab to monitor its progress.

Results

If errors are discovered, the workflow run fails and errors are logged. If warnings are discovered, the workflow run passes and warning messages are logged. All errors and warnings display in the **Logs** tab and are written to the `/var/log/vco/app-server/server.log` file on the server running the vRealize Orchestrator instance (typically the vRealize Automation server machine).

Configuration checks performed by the EMC data protection configuration workflow

The **Check EMC data protection configuration** workflow runs the following configuration checks:

- Ensures that the required plug-ins and packages are installed. If the required plug-ins are not installed, the workflow fails immediately with a validation error. To see more information regarding the error:
  1. Select **Tools** > **User Preferences**.
  2. Select **Workflows**.
  3. Clear the selection for **Validate a workflow before running it** checkbox.
  4. Click **Save & Close**.
  5. Re-run the **Check EMC data protection configuration** workflow, which is located in `/Library/EMC/Data Protection/vRA`.
- Ensures that the vRA Infrastructure Administration and vCloud Automation Center connections are in the vRealize Orchestrator inventory. You can typically address these issues by running the following workflows in the specified order:
  - The **Add an IaaS host** workflow, which is located in `Library/vCloud Automation Center/Infrastructure Administration/Configuration/`.
  - The **Add a vRA host** workflow, which is located in `Library/vCloud Automation Center/Configuration`.
- Ensures that the vCenter Server connection(s) are in the vRealize Orchestrator inventory, and that they match up with the vSphere endpoint(s) configured in the

vRealize Automation Infrastructure configuration. To add missing vCenter Server connections to vRealize Orchestrator, run **Add a vCenter Server instance** workflow, which is located in `Library/vCenter/Configuration`.

- Ensures the machine lifecycle event subscriptions are configured in each tenant.
- Ensures that at least one vRealize Automation host per tenant has sufficient permissions. The user connected to the vRealize Automation host requires the Infrastructure Architect, Tenant Administrator, and XaaS Architect roles.
- Ensures that any configured EMC data protection systems are valid and connected, and have protection policies.
- If there are clients in the EMC data protection systems, ensures that the *VirtualCenter.FQDN* field in the vSphere Client under **Administration** > **vCenter Server Settings** > **Advanced Properties** matches the vCenter server configured in the EDP Protection System.

You can run the **Check EMC data protection configuration** workflow multiple times as you correct issues with the configuration.

Error and warning messages

The following table lists error and warning messages that can occur when you run the **Check EMC data protection configuration** workflow, which is located in `/Library/EMC/Data Protection/vRA`. It also provides a number of possible solutions that you can use to resolve the error and warning conditions.

Table 8 Error and warning messages

Messages	Type	Possible solution(s)
Missing vCAC Infrastructure plugin.	Error	• In vRealize Orchestrator client, select **Help** > **Installed Plug-ins...** and verify the vCAC plug-in is installed. • Install the VMware vCenter Orchestrator Plug-In for vCloud Automation Center from VMware.com.
Missing vCAC Cafe plugin.	Error	• In vRealize Orchestrator client, select **Help** > **Installed Plug-ins...** and verify the vCACCAFE plug-in is installed. • Install the VMware vCenter Orchestrator Plug-In for vCloud Automation Center from vmware.com.
Missing EDP plugin.	Error	• In vRealize Orchestrator client, select **Help** > **Installed Plug-ins...** and verify the EDP plug-in is installed. • Install the EMC vRealize Data Protection Extension from emc.com.
Missing default IaaS host in vCO inventory.	Error	To add the host to vRealize Orchestrator, run the `Library/vCloud Automation Center/Infrastructure Administration/Configuration/Add an IaaS host` workflow.
Found <X> IaaS hosts in vCO inventory, with <Y>	Warning	To remove the other hosts from vRealize Orchestrator, run the `Library/vCloud`

Table 8 Error and warning messages (continued)

Messages	Type	Possible solution(s)
not connected to <vcac-url>. Only the '<vcac-name>' host is used, which might not be the expected one.		`Automation Center/Infrastructure Administration/Configuration/Remove an IaaS host` workflow.
Failed to get provisioning groups from IaaS host <vcac-url>, other operations might not work.	Error	• Verify that the IaaS server is running and accessible. Restart, if needed. • Verify that the IaaS server connection is in the **Inventory** tab of the vRealize Orchestrator client, under **vCAC Infrastructure Administration**. • Check the log files on the IaaS server.
Unexpected exception checking vcac hosts: <error>	Error	• Verify that the IaaS server is running and accessible. Restart, if needed. • Check the log files on the vRealize Orchestrator server for more information related to the error. • Check the log files on the IaaS server.
Missing default vCAC cafe host in vCO inventory.	Error	To add a vsphere.local tenant host to vRealize Orchestrator, run the `Library/vCloud Automation Center/Configuration/Add a vCAC host` workflow.
Found <X> 'vsphere.local' tenant vCAC cafe hosts in vCO inventory, with <Y> not connected to<cafe-url>.	Error	To remove the other hosts from vRealize Orchestrator, run the `Library/vCloud Automation Center/Configuration/Remove a vCAC host` workflow.
Found <X> 'vsphere.local' tenant vCAC cafe hosts in vCO inventory, but they point to same vcac url which should work fine. This can occur when vCAC 6.1+ creates the 'Default' vCAC cafe host connections.	Warning	To remove the other hosts from vRealize Orchestrator, optionally run the `Library/vCloud Automation Center/Configuration/Remove a vCAC host` workflow.
No vCenter connections found in vCO inventory.	Error	To add the vCenter server connection(s) to vRealize Orchestrator, run the `Library/vCenter/Configuration/Add a vCenter Server instance` workflow.
Malformed endpoint URL '<vsphere-endpoint-url>' : must be of type: https://hostname/sdk or https://IP_Address/sdk.	Warning	Verify and fix the vSphere endpoint URL in the vRealize Automation **Infrastructure** tab.

Table 8 Error and warning messages (continued)

Messages	Type	Possible solution(s)
Failed to find vCenter connection in vCO matching '<vsphere-endpoint-url>' vSphere endpoint in IasS host '<vcac-name>'.	Warning	• To add the vCenter server connection to vRealize Orchestrator, run the `Library/vCenter/Configuration/Add a vCenter Server instance` workflow. • To update the vCenter server connection in vRealize Orchestrator to match what is configured in the vRealize Automation **Infrastructure** tab, run the `Library/vCenter/Configuration/Update a vCenter Server instance` workflow.
vCenter endpoint in IaaS host '<vcac-name>' has invalid uri '<vsphere-endpointurl>'.	Warning	Verify and fix the vSphere endpoint URL in the vRealize Automation **Infrastructure** tab.
Failed to find vSphere endpoints in IaaS host ' <vcac-name>'.	Warning	Create the vSphere endpoint(s) in the vRealize Automation **Infrastructure** tab.
Unexpected exception checking IaaS vSphere connection endpoints: <error>	Error	• Verify the IaaS server is running and accessible. Restart, if needed. • Check the log files on the vRealize Orchestrator server for more information related to the error. • Check the log files on the IaaS server.
Failed to find the vCenter hostname and IP information:<vcenter>	Warning	• Verify the vCenter connection information in the vRealize Orchestrator client **Inventory** tab, under vCenter Server. • To correct the vCenter Server information for the connection in vRealize Orchestrator, run the `Library/vCenter/Configuration/Update a vCenter Server instance` workflow.
No EdpSystems have been configured for data protection.	Warning	• Use the **Add a tenant data protection system** catalog item in vRealize Automation, if you already ran the install workflow for the tenant. • To configure a vRealize Automation tenant, including the data protection system, run the `Library/EMC/Data Protection/vRA/Installation/Install default setup for tenant` workflow. • To configure a data protection system instance for a vRealize Automation tenant, without doing the other tenant setup steps, run the `Library/EMC/Data Protection/vRA/Installation/Utilities/Create or`

Table 8 Error and warning messages (continued)

Messages	Type	Possible solution(s)
		`update a tenant data protection system` workflow. • To manually setup a data protection system, run the `Library/EMC/Data Protection/vRO/Configuration/Add a data protection system` workflow.
Avamar EdpSystem '<name>' (<host>) has no available policies.	Warning	Create the Backup Groups in the appropriate <tenant>_<vrealize-host> subdomain of each vCenter client domain in Avamar.
Avamar EdpSystem '<name>' (<host>) is enabled but disconnected.	Warning	• Verify that the Avamar server, including the MCS, is running and accessible. • Check the description of the connection in the vRealize Orchestrator client **Inventory** tab under **EMC Data Protection**, which shows any error that occurred at connection startup. • Check the logs files on the vRealize Orchestrator server for more information related to the error.
Failed to find a matching vCenter for the vCenter configured in the EdpServer: <name>. EdpServer FQDN=<vcenter-hostname>. vCenter FQDN(s)=<vcenter-hostname>. Please check the VirtualCenter.FQDN setting in the vCenter Advanced Properties	Warning	• To add the vCenter server connection to vRealize Orchestrator, run the `Library/vCenter/Configuration/Add a vCenter Server instance` workflow. • To update the vCenter server connection in vRealize Orchestrator to match what is configured in the Avamar server, run the `Library/vCenter/Configuration/Update a vCenter Server instance` workflow. • Verify or update the *VirtualCenter.FQDN* setting in the **Advanced Properties of the vCenter server** settings in the vSphere web client to match what is configured in the Avamar server.
Unable to get policies from Avamar EdpSystem '<name>' (<host>): <error>	Error	• Verify that the Avamar server, including the MCS, is running and accessible. • Check the logs files on the vRealize Orchestrator server for more information related to the error.
Unexpected exception checking EdpSystems: <error>	Error	Check the logs files on the vRealize Orchestrator server for more information related to the error.
Unable to find vRealize Automation machine provisioning event subscription for '<tenant>' tenant EMC data	Warning	Run the installation for the tenant, if not done already, and then update the default setup for the tenant.

Table 8 Error and warning messages (continued)

Messages	Type	Possible solution(s)
protection system(s), or Unable to find vRealize Automation machine unprovisioning event subscription for '<tenant>' tenant EMC data protection system(s).		
Unexpected exception checking vRealize Automation event subscriptions: <error>	Error	Check the log files on the vRealize Orchestrator server for more information.
None of the <n> vRealize Automation hosts for tenant '<tenant>' appear to have the Infrastructure Architect, Tenant Administrator, and XaaS Architect roles. The EMC data protection default tenant setup workflows requires a vRealize Automation host with a user configured with those roles.	Error	Verify that the Roles of the user(s) of the vRealize Automation hosts.