

Using the vCenter Orchestrator Plug-In for vCloud Director 5.5

vRealize Orchestrator 5.5



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VMware, Inc.
3401 Hillview Ave.
Palo Alto, CA 94304
www.vmware.com

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Using the vCenter Orchestrator Plug-In for vCloud Director 5.5

Using the vCenter Orchestrator Plug-In for vCloud Director 5.5 provides information and instructions about configuring and using the VMware[®] vCenter Orchestrator plug-in for VMware[®] vCloud Director 5.5.

Intended Audience

This information is intended for anyone who is installing and configuring the plug-in, and using the API of the plug-in. *Using the vCenter Orchestrator Plug-In for vCloud Director 5.5* is written for experienced users who are familiar with virtual machine technology, with Orchestrator workflow development, and with vCloud Director.

For more information about Orchestrator, see http://www.vmware.com/support/pubs/orchestrator_pubs.html.

For more information about vCloud Director, see http://www.vmware.com/support/pubs/vcd_pubs.html.

Introduction to the VMware vCenter Orchestrator Plug-In for vCloud Director

The vCloud Director plug-in (VMware vCenter Orchestrator plug-in for vCloud Director) allows interaction between vCenter Orchestrator and vCloud Director.

You can use the plug-in to run Orchestrator workflows that automate vCloud Director processes. The plug-in contains a set of standard workflows. You can also create custom workflows that implement the plug-in API to automate tasks in your vCloud Director environment.

This section includes the following topics:

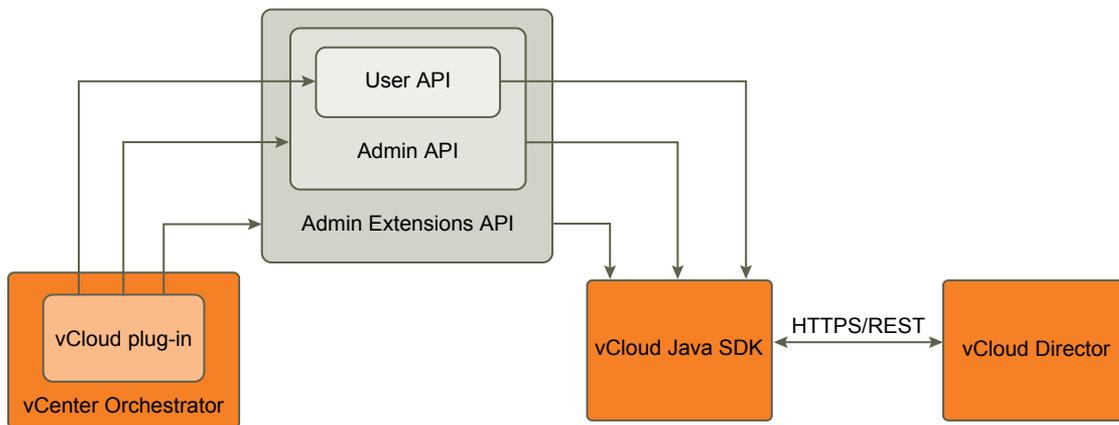
- [vCloud Director Plug-In Components](#)
- [Installing and Configuring the vCloud Director Plug-In](#)

vCloud Director Plug-In Components

The vCloud Director plug-in relies on a number of components to function properly.

vCenter Orchestrator and vCloud Director provide the platform for the plug-in, and the plug-in provides interaction between those products.

Figure 1-1. Component Relations



The vCloud Director plug-in implements the User, Admin, and Admin Extensions API classes that correspond to the types of API classes in vCloud Director. All users can read User API classes and users with appropriate rights can modify these classes. Users with administrative rights can modify Admin API and User API classes. The Admin Extensions API classes are VMware-specific and only system administrators can modify these classes. System administrators can also modify Admin API and User API classes.

The vCloud Java SDK provides the communication platform between the JavaScript API of the plug-in and the vCloud Director REST API.

Role of vCenter Orchestrator with the vCloud Director Plug-In

You must use the Orchestrator configuration interface to install and configure the vCloud Director plug-in. You use the Orchestrator client to run and create workflows and access the plug-in API.

The vCloud Director plug-in is powered by vCenter Orchestrator. Orchestrator is a development and process-automation platform that provides a library of extensible workflows to manage the VMware vCenter infrastructure and other technologies.

Orchestrator allows integration with management and administration solutions through its open plug-in architecture. vCloud Director is one example of an administration solution that you can integrate with Orchestrator by using plug-ins.

Plug-In Interaction with vCloud Director

You use the plug-in to run Orchestrator workflows that interact with vCloud Director to perform automated tasks in the vCloud infrastructure.

With vCloud Director, you can build secure, multitenant clouds by combining virtual infrastructure resources into virtual datacenters. The virtual datacenters are a fully automated, catalog-based service that users access through Web-based portals and programmatic interfaces.

Installing and Configuring the vCloud Director Plug-In

You must use the Orchestrator configuration interface to install and configure the vCloud Director plug-in.

vCloud Director Plug-In Functional Prerequisites

To be able to install and use the vCloud Director plug-in, your system must meet the following product prerequisites.

vCenter Orchestrator

Verify that you have a running instance of Orchestrator. You can log in to the Orchestrator configuration interface at https://orchestrator_server:8283. Version 5.5 of the plug-in works with vCenter Orchestrator 5.5.

For information about setting up Orchestrator, see the documentation about installing and configuring the respective Orchestrator version.

vCloud Director

Verify that you have access to a vCloud Director instance. You can test your user credentials at https://vcloud_director_server. Version 5.5 of the plug-in works with vCloud Director 5.5.

For information about setting up vCloud Director, see the *vCloud Director Installation and Configuration Guide*.

Install the vCloud Director Plug-In

To be able to use the vCloud Director plug-in, you must download the .vmoapp file containing the plug-in and install it using the Orchestrator configuration interface.

Prerequisites

- Verify that you are logged in to the Orchestrator configuration interface at https://orchestrator_server:8283.
- Verify that you have downloaded the .vmoapp file from <http://www.vmware.com/products/datacenter-virtualization/vcenter-orchestrator/plugins.html>.

Procedure

- 1 On the **General** tab, click **Install Application**.
- 2 Upload the vCloud Director plug-in.
 - a Click the magnifying glass icon.
 - b Select the .vmoapp file to install.
 - c Click **Open**.
 - d Click **Install**.

The vCloud Director plug-in tab appears in the Orchestrator configuration interface.

- 3 On the **Startup Options** tab, click **Restart service** to complete the plug-in installation.

Authentication Strategy

When you configure the vCloud Director plug-in, you must select an authentication method for managing users when they log in to your vCloud Director instance.

Basic Authentication

The basic authentication method provides a way to log in with user name and password.

SAML Authentication

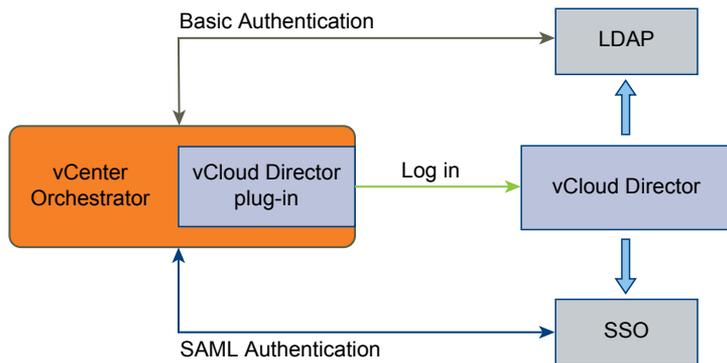
The Security Assertion Markup Language (SAML) authentication method provides a token log in. This token is shared between all instances used by the user.

If you decide to use Basic Authentication and Session per user methods, ensure that the Orchestrator server is configured for LDAP authentication. The vCloud Director plug-in uses the user name and password of the current user to log in to vCloud Director.

If you decide to use SAML Authentication and Session per user methods, ensure that the Orchestrator server is configured for Single Sign On authentication. The plug-in uses the Single Sign On token provided by the Orchestrator server to log in to vCloud Director.

The following figure shows the Session per user method to connect vCenter Orchestrator, vCloud Director plug-in, LDAP server or Single Sign On Server, and vCloud Director, when using SAML or Basic authentication.

Figure 1-2. Session Per User Method



If you decide to use Basic Authentication and Shared session methods, the Orchestrator server authentication mode is ignored and the plug-in uses a predefined user name and password to log in to vCloud Director.

If you decide to use SAML Authentication and Shared session methods, the Orchestrator server authentication mode is ignored and the plug-in uses the SAML token provided by a callback action to log in to vCloud Director. You must implement the callback action in your Orchestrator client.

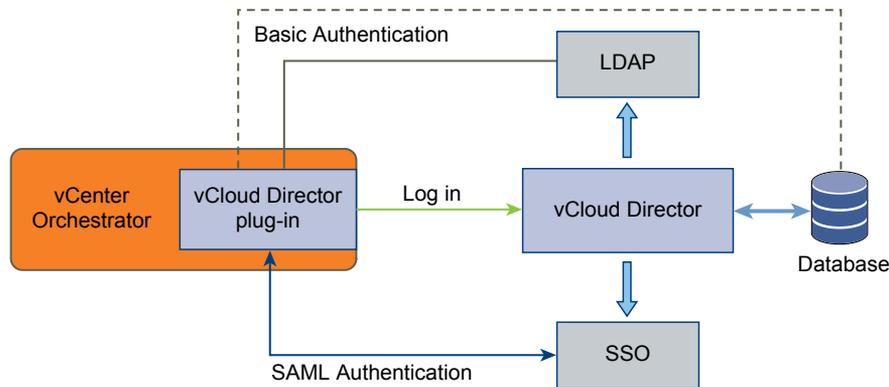
Scripting example of the callback action

```

String acquireSamlToken() {
    var tokenKey = "cd5727e0-b5fd-11e1-afa6-0800200c9a66";
    var properties = new VclSharedProperties();
    var token = properties.getProperty(tokenKey);
    if (token == null) {
        var tokenLifetime = 600000; // 10 min lifetime
        token = // TODO: your logic to acquire the token
        properties.putProperty(tokenKey, token, tokenLifetime);
    }
    return token;
}

```

The following figure shows the Shared session method to connect vCloud Director plug-in, LDAP server or Single Sign On Server, and vCloud Director when using SAML or Basic authentication.

Figure 1-3. Shared Session Method

Configure the vCloud Director Plug-In

To be able to manage vCloud Director instances by using the vCloud Director plug-in, you must configure the connection parameters for each vCloud Director instance.

Prerequisites

- Using the **Network** tab of the Orchestrator configuration interface, import the SSL certificate for the vCloud Director instance that you want to connect.
- Synchronize the time on the virtual machines on which the Orchestrator server, vCloud Director server and Single Sign On server are installed. To synchronize the time, see [Synchronize the Time by Using the vSphere Web Client](#).

Procedure

- 1 Log in to the Orchestrator client and select **Design** or **Run** from the drop-down menu in the top left corner.
- 2 Click the **Workflows** view in left pane of the Orchestrator client.
- 3 Expand the hierarchical list to **Library > vCloud Director > Plug-in Configuration** and navigate to the Add a connection workflow.
- 4 Right-click the Add a connection workflow and select **Start workflow**.
- 5 In the **Host** text box, type the IP address or the DNS name of the vCloud Director instance.
- 6 In the **Port** text box, type the port number.
The default port is 443.
- 7 Select whether to enable the new connection.
- 8 In the **Max. Connections** text box, type the maximum number of concurrent connections to the vCloud Director instance.
- 9 In the **Connection timeout (ms)** text box, type the timeout interval in milliseconds.
- 10 Click **Next**.

11 Select the authentication method for managing user access on the vCloud Director instance.

Option	Description
Per User Session	Select this option if your vCloud Director is in an Active Directory domain. Make sure that the user has the necessary permissions to perform the required operations. Caution Each user who logs in to Orchestrator creates a new session to the vCloud Director instance. Multiple sessions can rapidly strain CPU, memory, and bandwidth.
Shared Session	Select this option to allow Orchestrator to create only one connection to the vCloud Director instance. Type the credentials of a user who is a vCloud Director administrator.

Note If the authentication data comes from LDAP or Single Sign On, make sure the vCloud Director organization is configured with the same LDAP or Single Sign On instance and the user is imported in this organization.

12 Select whether to use SAML authentication and provide the needed details.

Option	Description
No	Provides basic authentication
Yes	Provides SAML authentication

13 In the **Organization** text box, type the name of the organization that users can access, and click **Submit**.

- Type **System** if you want administrators to be able to run User API, Admin API, and Admin Extensions API operations in all organizations on the vCloud Director instance.
- Type the name of a specific organization if you want administrators to be able to run only User API and Admin API operations in the specified organization.

14 Repeat [Step 4](#) through [Step 13](#) for each vCloud Director instance.

Synchronize the Time by Using the vSphere Web Client

You must synchronize the time on the virtual machines on which the Orchestrator server, vCloud Director server, and Single Sign On server are installed, to avoid possible errors such as the imported workflows return an incorrect error message or the inventory does not get upgraded.

Procedure

- 1 Configure all your ESXi hosts to synchronize with the NTP server.
 - a In the vSphere Web Client, select the ESXi host.
 - b On the **Manage** tab, click **Time Configuration**, and click the **Edit** link.
 - c Select **Use Network Time Protocol (Enable NTP client)**.
 - d From the **NTP Service Startup Policy** drop-down menu, select **Start and stop with host**.

- e In the **NTP Servers** text box, add all your NTP servers.
 - f Click **Start** or **Restart** to update the NTP service settings.
 - g Click **OK**.
- 2 Synchronize the time on all your virtual machines.
- a In the vSphere Web Client, right-click a virtual machine and select **Edit Settings**.
 - b On the **VM Options** tab, click **VMware Tools** and select **Synchronize guest time with host**.

Using the vCloud Director Plug-In Workflows

2

The vCloud Director plug-in workflow library contains workflows that allow you to manage vCloud Director instances and run custom vCloud Director operations.

You can use the **Inventory** view in the Orchestrator client to manage the available vCloud Director resources by running workflows on them.

This section includes the following topics:

- [Using the vCloud Director Plug-In Inventory](#)
- [Access the vCloud Director Plug-In Workflow Library](#)
- [Standard User Workflows](#)
- [Admin Workflows](#)
- [Admin Extension Workflows](#)

Using the vCloud Director Plug-In Inventory

The vCloud Director plug-in exposes all objects in the connected vCloud Director instances in the **Inventory** view. You can use the **Inventory** view to add authorization elements or to run workflows on vCloud Director objects.

You can enable the **Use contextual menu in inventory** option to display the workflows that are available for an inventory object. After the option is enabled, when you right-click an object in the Orchestrator inventory, all available workflows for the object are displayed.

Disabling the Inventory Update

When you develop a complex workflow, you can disable the automatic update of the list of inventory objects, to avoid performance issues.

The inventory is synchronized on each change in vCloud Director. When you develop complex workflows, the frequent update of elements might cause a huge number of inventory change notifications and performance issues. You can avoid performance issues by preventing redundant inventory updates.

To disable the inventory update, you must call the `VclProfiler.enableInventoryNotifications(false)` method. The `VclProfiler.enableInventoryNotifications()` method is reference counted. To allow multiple workflows to disable or enable inventory updates when needed, you should match each call to `enableInventoryNotifications(false)` with `enableInventoryNotifications(true)`. By default, inventory updates are enabled. Disabling the inventory updates affects all users of the plug-in.

Access the vCloud Director Plug-In Workflow Library

You must use the Orchestrator client to access the elements from the vCloud Director plug-in workflow library.

The vCloud Director plug-in workflow library contains building block workflows that allow you to run automated processes related to the management of vCloud Director instances. The workflows are grouped into categories depending on their functional area. You can integrate standard workflows from the workflow library in custom workflows.

Procedure

- 1 Log in to the Orchestrator client as an administrator and select **Design** or **Run** from the drop-down menu in the left upper corner.
- 2 Click the **Workflows** view in the Orchestrator client left pane.

Option	Action
Access the set of standard workflow categories	In the hierarchical list, select Library > vCloud Director and expand the selection.
Access the set of administrative workflow categories	In the hierarchical list, select Library > vCloud Director > Admin and expand the selection.
Access the set of administrative extension workflow categories	In the hierarchical list, select Library > vCloud Director > Admin > Extension and expand the selection.

Standard User Workflows

The vCloud Director workflow category contains standard workflows related to vCloud Director management.

Catalog Item Workflows

The Catalog Item workflow category contains workflows related to catalog item management.

You can access these workflows from **Library > vCloud Director > Catalog Item**.

Workflow Name	Description
Add a catalog item	Adds a new item to a catalog. The new item can be a media file or a vApp template.
Delete a catalog item	Deletes a catalog item from a catalog.
Update a catalog item	Updates a catalog item.

Disk Workflows

The Disk workflow category contains workflows related to disk management.

You can access these workflows from **Library > vCloud Director > Disk**.

Workflow Name	Description
Create a disk	Creates a new disk.
Delete a disk	Deletes a selected disk.
Update a disk	Updates a disk.

Media Workflows

The Media workflow category contains workflows related to media management.

You can access these workflows from **Library > vCloud Director > Media**.

Workflow Name	Description
Clone media	Clones a media file.
Delete media	Deletes a media file.
Update media	Updates a media file.
Upload media	Uploads a media file. The uploaded media can be an ISO file or a floppy file.

Plug-In Configuration Workflows

The Plug-in Configuration workflow category contains workflows related to vCloud Director connection management.

You can access these workflows from **Library > vCloud Director > Plug-in Configuration**.

Workflow Name	Description
Add a connection	Adds a new vCloud Director connection to the plug-in configuration.
Delete a connection	Deletes a vCloud Director connection from the plug-in configuration.

Task Workflows

The Task workflow category contains workflows related to task management.

You can access these workflows from **Library > vCloud Director > Task**.

Workflow Name	Description
Wait for a task	Waits for a task to be completed.

vApp Workflows

The vApp workflow category contains workflows related to vApp management tasks such as cloning a vApp, adding a vApp network, enabling maintenance mode for it, and so on.

You can access these workflows from **Library > vCloud Director > vApp**.

Workflow Name	Description
Add a vApp with a new virtual machine	Adds a new vApp containing a single virtual machine.
Add a vApp network	Add a new vApp network to a vApp.
Add a vApp template virtual machine	Adds a virtual machine to a vApp from a template.
Add a vApp virtual machine	Adds a virtual machine to a vApp.
Capture a vApp	Captures a vApp as a vApp template.
Clone a vApp	Clones a vApp.
Compose a vApp	Composes a vApp from vApp or virtual machine templates.
Delete a vApp	Deletes a vApp.
Delete a vApp network	Deletes a vApp network.
Download a vApp	Downloads a vApp to a local file system.
Enable maintenance mode	Enables or disables the maintenance mode for a vApp.
Rename a vApp	Renames a vApp.
Share a vApp	Updates the sharing configuration of a vApp.
Update a vApp	Updates a vApp.

vApp Custom Properties Workflows

The Custom Properties workflow category contains workflows related to vApp custom parameter management.

You can access these workflows from **Library > vCloud Director > vApp > Custom Properties**.

Workflow Name	Description
Add a custom parameter	Adds a custom parameter to the vApp product section.
Modify a vApp custom parameter value	Modifies a vApp's custom parameter.
Remove a custom parameter from a vApp	Removes a custom parameter from a vApp.

Network Workflows

The Network workflow category contains workflows related to network configuration management.

You can access these workflows from **Library > vCloud Director > vApp > Network > Config**.

Workflow Name	Description
Add an organization vDC network to a vApp	Adds an organization vDC network to a vApp.

Workflow Name	Description
Fence vApp networks	Sets the bridged network configuration to NAT-routed and disables the firewall service.

You can access the DHCP workflow from **Library > vCloud Director > vApp > Network > Config > DHCP**.

Workflow Name	Description
Set up a DHCP service	Sets up a DHCP service on a vApp network.

You can access the Firewall workflows from **Library > vCloud Director > vApp > Network > Config > Firewall**.

Workflow Name	Description
Add a firewall rule	Adds a firewall rule to the firewall service on a vApp network.
Clear firewall rules	Clears all firewall rules of the firewall service on a vApp network.
Set up a firewall service	Sets up a firewall service on a vApp network.

You can access the NAT workflows from **Library > vCloud Director > vApp > Network > Config > NAT**.

Workflow Name	Description
Add a NAT rule	Adds a NAT rule to the NAT service on a vApp network.
Clear NAT rules	Clears all NAT rules of the NAT service on a vApp network.
Set up a NAT service	Sets up a NAT service on a vApp network.

You can access the Routing workflows from **Library > vCloud Director > vApp > Network > Config > Routing**.

Workflow Name	Description
Add a static route	Adds a static route to the static routing service on a vApp network.
Clear static routes	Clears all static routes of a static routing service on a vApp network.
Set up a static routing service	Sets up a static routing service on a vApp network.

vApp Power Workflows

The Power workflow category contains workflows related to vApp power management.

You can access these workflows from **Library > vCloud Director > vApp > Power**.

Workflow Name	Description
Deploy a vApp	Deploys a vApp and optionally powers it on.
Discard a suspended state vApp	Discards the state of a suspended vApp.
Power off a vApp	Powers off a vApp. Does not free the resources reserved for the vApp.
Power on a vApp	Powers on a vApp.
Reboot a vApp	Sends a notification to the vApp's guest virtual machines to reboot.

Workflow Name	Description
Reset a vApp	Resets a vApp.
Shut down a vApp	Sends a notification to the vApp's guest virtual machines to shut down.
Suspend a vApp	Suspends a vApp. Does not free the resources reserved for the vApp.
Undeploy a vApp	Stops or suspends a vApp and frees the resources reserved for the vApp.

vApp Snapshot Workflows

The Snapshot workflow category contains workflows related to vApp snapshot management.

You can access these workflows from **Library > vCloud Director > vApp > Snapshot**.

Workflow Name	Description
Create a snapshot	Creates a vApp snapshot.
Remove all snapshots	Removes all vApp snapshots.
Revert to current snapshot	Reverts to the current vApp snapshot.

VM Workflows

The VM workflow category contains workflows related to virtual machine management.

You can access these workflows from **Library > vCloud Director > vApp > VM**.

Workflow Name	Description
Delete a virtual machine	Deletes a virtual machine.
Eject media	Ejects media from a virtual machine.
Insert media	Inserts media into a virtual machine.
Rename a virtual machine	Renames a virtual machine.
Wire a virtual machine network	Connects a virtual machine's NIC with a vApp network and assigns IP properties to the NIC.

VM CPU Workflows

The CPU workflow category contains workflows related to virtual machine CPU management.

You can access the workflow from **Library > vCloud Director > vApp > VM > CPU**.

Workflow Name	Description
Change the number of CPUs	Changes the number of CPUs of a virtual machine.

VM Custom Properties Workflows

The Custom Properties workflow category contains workflows related to virtual machine custom parameter management.

You can access these workflows from **Library > vCloud Director > vApp > VM > Custom Properties**.

Workflow Name	Description
---------------	-------------

Workflow Name	Description
Add a custom parameter to a virtual machine	Adds a custom parameter to a vApp product section.
Modify the custom parameter value for a virtual machine	Modifies a virtual machine's custom parameter.
Remove a custom parameter from a virtual machine	Removes a custom parameter from a virtual machine.

VM Guest Customization Workflows

The Guest Customization workflow category contains workflows related to virtual machine guest customization.

You can access these workflows from **Library > vCloud Director > vApp > VM > Guest Customization**.

Workflow Name	Description
Change computer name	Changes the computer name of a virtual machine.
Customize guest OS	Customizes the computer name and SID.

VM Hard Disk Workflows

The Hard Disk workflow category contains workflows related to virtual machine hard disk management.

You can access these workflows from **Library > vCloud Director > vApp > VM > Hard Disk**.

Workflow Name	Description
Add a hard disk	Adds a hard disk to a virtual machine.
Attach a hard disk	Attaches a hard disk to a virtual machine.
Change hard disk capacity	Changes a virtual machine's hard disk capacity.
Detach a hard disk	Detaches a hard disk from a virtual machine.
Remove a hard disk	Removes a hard disk from a virtual machine.

VM Memory Workflows

The Memory workflow category contains workflows related to virtual machine memory management.

You can access the workflow from **Library > vCloud Director > vApp > VM > Memory**.

Workflow Name	Description
Change memory capacity	Changes the memory capacity of a virtual machine.

VM NIC Workflows

The NIC workflow category contains workflows related to virtual machine NIC management.

You can access these workflows from **Library > vCloud Director > vApp > VM > NIC**.

Workflow Name	Description
Add a NIC	Add a NIC to a virtual machine.
Remove a NIC	Removes a NIC from a virtual machine.

Workflow Name	Description
Update virtual machine MAC address	Changes the MAC address of a virtual machine.
Update virtual machine MAC and IP addresses	Changes the NICs MAC addresses and updates the IP for network cards with a pool allocation mode.

VM Power Workflows

The Power workflow category contains workflows related to virtual machine power management.

You can access these workflows from **Library > vCloud Director > vApp > VM > Power**.

Workflow Name	Description
Deploy a virtual machine	Deploys a virtual machine and optionally powers it on.
Discard a suspended state virtual machine	Discards the state of a suspended virtual machine.
Power off a virtual machine	Powers off a virtual machine. Does not free the resources reserved for the virtual machine.
Power on a virtual machine	Powers on a virtual machine.
Reboot a virtual machine	Sends a notification to the virtual machine guest operating system to reboot.
Reset a virtual machine	Resets a virtual machine.
Shut down a virtual machine	Sends a notification to the virtual machine guest operating system to shut down.
Suspend a virtual machine	Suspends a virtual machine. Does not free the resources reserved for the virtual machine.
Undeploy a virtual machine	Stops or suspends a virtual machine and frees the resources reserved for the virtual machine.

VM Screen Workflows

The Screen workflow category contains workflows related to virtual machine screen management.

You can access these workflows from **Library > vCloud Director > vApp > VM > Screen**.

Workflow Name	Description
Acquire a ticket	Acquires a ticket for the remote console of a virtual machine.
Get a thumbnail	Gets a screenshot of a virtual machine's desktop.

VM Snapshot Workflows

The Snapshot workflow category contains workflows related to virtual machine snapshot management.

You can access these workflows from **Library > vCloud Director > vApp > VM > Snapshot**.

Workflow Name	Description
Create a snapshot	Creates a virtual machine snapshot.
Remove all snapshots	Removes all virtual machine snapshots.
Revert to current snapshot	Reverts to the current virtual machine snapshot.

vApp Template Workflows

The vApp Template workflow category contains workflows related to vApp template management.

You can access these workflows from **Library > vCloud Director > vApp Template**.

Workflow Name	Description
Clone a vApp template	Clones a vApp template.
Delete a vApp template	Deletes a vApp template.
Download a vApp template	Downloads a vApp template as an OVF.
Instantiate a vApp template	Instantiates a vApp template as a vApp.
Update a vApp template	Updates a vApp template.
Upload a vApp template	Uploads an OVF as a vApp template.

Admin Workflows

The Admin workflow category contains workflows related to vCloud Director administrative management.

Catalog Workflows

The Catalog workflow category contains workflows related to catalog management.

You can access these workflows from **Library > vCloud Director > Admin > Catalog**.

Workflow Name	Description
Add a catalog	Adds a catalog to an organization.
Delete a catalog	Deletes a catalog.
Publish a catalog	Publishes or unpublishes a catalog to all organizations external to the catalog's organization.
Share a catalog	Updates the sharing configuration of a catalog.
Update a catalog	Updates a catalog.

Group Workflows

The Group workflow category contains workflows related to group management.

You can access these workflows from **Library > vCloud Director > Admin > Group**.

Workflow Name	Description
Delete a group	Deletes a group.
Import a group	Imports a group from the configured directory service to an organization.
Update a group	Updates a group.

Organization Workflows

The Organization workflow category contains workflows related to organization management.

You can access these workflows from **Library > vCloud Director > Admin > Organization**.

Workflow Name	Description
Add an organization	Adds an organization to a vCloud Director instance.
Delete an organization	Deletes an organization.
Enable an organization	Enables an organization.
Update an organization	Updates an organization.

Role Workflows

The Role workflow category contains workflows related to role management.

You can access these workflows from **Library > vCloud Director > Admin > Role**.

Workflow Name	Description
Add a role	Adds a role to a vCloud Director instance.
Delete a role	Deletes a role.
Update a role	Updates a role.

User Workflows

The User workflow category contains workflows related to user management.

You can access these workflows from **Library > vCloud Director > Admin > User**.

Workflow Name	Description
Add a user	Adds a user to an organization or imports it from LDAP.
Delete a user	Deletes a user.
Enable a user	Enables or disables a user.
Update a user	Updates a user.

vDC Workflows

The vDC workflow category contains workflows related to virtual data center management.

You can access these workflows from **Library > vCloud Director > Admin > vDC**.

Workflow Name	Description
Add a vDC	Adds a vDC to an organization.
Delete a vDC	Deletes a vDC.

Workflow Name	Description
Enable a vDC	Enables a vDC.
Update a vDC	Updates a vDC.

vCD Gateway Workflows

The Gateway workflow category contains workflows related to vDC gateway management.

You can access these workflows from **Library > vCloud Director > Admin > vDC > Gateway**.

Workflow Name	Description
Add a gateway	Adds a new gateway to a virtual datacenter.
Delete a gateway	Deletes a gateway from a virtual datacenter.
Update a gateway	Updates a gateway within a virtual datacenter.

Network Configuration Workflows

The Configuration workflow category contains workflows related to network configuration.

You can access the Gateway workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config**.

Workflow Name	Description
Add a gateway interface	Adds a new interface to a gateway.

You can access the DHCP workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config > DHCP**.

Workflow Name	Description
Add a DHCP pool	Adds a new DHCP pool to the DHCP service.
Enable a DHCP service	Enables or disables the DHCP service on a gateway.
Set up a DHCP service	Sets up a DHCP service on a gateway.

You can access the Firewall workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config > Firewall**.

Workflow Name	Description
Add a firewall rule	Adds a firewall rule to the firewall service on a gateway.
Clear firewall rules	Clears all firewall rules of the firewall service on a gateway.
Set up a firewall service	Sets up a firewall service on a gateway.

You can access the NAT workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config > NAT**.

Workflow Name	Description
Add a NAT rule	Adds a NAT rule to the NAT service on a gateway.

Workflow Name	Description
Clear NAT rules	Clears all NAT rules of the NAT service on a gateway.
Enable a NAT service	Enables or disables a NAT service on a gateway.
Set up a NAT service	Sets up a NAT service on a gateway.

You can access the Routing workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config > Routing**.

Workflow Name	Description
Add a static route	Adds a static route to the static routing service on a gateway.
Clear static routes	Clears all static routes of a static routing service on a gateway.
Enable a static routing service	Enables or disables the routing service on a gateway.
Set up a static routing service	Sets up a static routing service on a gateway.

You can access the VPN workflows from **Library > vCloud Director > Admin > vDC > Gateway > Config > VPN**.

Workflow Name	Description
Add a VPN endpoint	Adds a VPN endpoint to the VPN service on a gateway.
Add a VPN tunnel	Adds a VPN tunnel to the VPN service on a gateway.
Clear VPN tunnels	Clears all VPN tunnels of the VPN service on a gateway.
Set up a VPN service	Sets up a VPN service on a gateway.

vDC Network Workflows

The Network workflow category contains workflows related to organization network management.

You can access these workflows from **Library > vCloud Director > Admin > vDC > Network**.

Workflow Name	Description
Add an organization vDC network	Adds an organization vDC network to a virtual datacenter.
Delete an organization vDC network	Deletes a network within a virtual datacenter.
Update an organization vDC network	Updates a network within a virtual datacenter.

vDC Storage Profile Workflows

The Storage profile workflow category contains workflows related to storage profile management.

You can access these workflows from **Library > vCloud Director > Admin > vDC > Storage Profile**.

Workflow Name	Description
Add a storage profile	Adds a storage profile to a virtual datacenter.
Delete a storage profile	Deletes a storage profile from a virtual datacenter.
Update a storage profile	Updates a storage profile within a virtual datacenter.

Admin Extension Workflows

The Extension workflow category contains workflows related to vCloud Director administrative extensions management.

Licensing Reports Workflows

The Licensing Reports workflow category contains workflows related to licensing reports management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > Licensing Reports**.

Workflow Name	Description
Print licensing reports	Prints the licensing reports of a vCloud Director instance.

Notification Workflows

The Notifications workflow category contains workflows related to notification management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > Notifications**.

Workflow Name	Description
Configure blocking tasks	Configures the blocking tasks settings of a vCloud Director instance.
Enable notifications	Enables or disables notifications from a vCloud Director instance.
Set up an AMQP broker	Configures the AMQP broker settings for a given vCloud Director instance.

VIM Server Workflows

The VIM Server workflow category contains workflows related to vCenter Server management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VIM Server**.

Workflow Name	Description
Import a virtual machine as a vApp	Imports a virtual machine from an available vCenter Server as a vApp.
Import a virtual machine as a vApp template	Imports a virtual machine from an available vCenter Server as a vApp template.
Import a virtual machine into a vApp	Imports a virtual machine from an available vCenter Server instance into an existing vApp.
Reconnect to a vCenter Server instance	Tries to force a reconnection to a vCenter Server instance from its vCloud Director host.
Register a vCenter Server instance	Registers a vCenter Server instance to a vCloud Director instance.
Unregister a vCenter Server instance	Unregisters a vCenter Server instance.
Update a vCenter Server instance	Updates a vCenter Server instance.

VMW Datastore Workflows

The VMW Datastore workflow category contains workflows related to datastore management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VMW Datastore**.

Workflow Name	Description
Enable a datastore	Enables or disables a datastore.

VMW Host Workflows

The VMW Host workflow category contains workflows related to ESX host management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VMW Host**.

Workflow Name	Description
Enable an ESX host	Enables or disables an ESX host.
Prepare an ESX host	Prepares or unprepares an ESX host.
Repair an ESX host	Tries to repair an ESX host.
Upgrade an ESX host agent	Tries to upgrade an ESX host agent.

VMW Network Pool Workflows

The VMW Network Pool workflow category contains workflows related to network pool management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VMW Network Pool**.

Workflow Name	Description
Add a network pool	Adds a network pool to a vCloud Director instance.
Delete a network pool	Deletes a network pool.
Update a network pool	Updates a network pool.

VMW Provider Network Workflows

The VMW Provider Network workflow category contains workflows related to provider network management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VMW Provider Network**.

Workflow Name	Description
Add an external network	Adds an external network to a vCloud Director instance.
Add an IP scope	Adds an IP scope to an external network.

Workflow Name	Description
Delete an external network	Deletes an external network.
Update an external network	Updates an external network.

VMW Provider vDC Workflows

The VMW Provider vDC workflow category contains workflows related to provider vDC management.

You can access these workflows from **Library > vCloud Director > Admin > Extensions > VMW Provider vDC**.

Workflow Name	Description
Add a provider vDC	Adds a provider vDC to a vCloud Director instance.
Add a resource pool to a provider vDC	Adds a resource pool to a provider vDC.
Delete a provider vDC	Deletes a provider vDC.
Enable a provider vDC	Enables or disables a provider vDC.
Enable a resource pool	Enables or disables a resource pool visible for a provider vDC.
Remove a resource pool from an ESX provider vDC	Removes a resource pool from a provider vDC.
Update a provider vDC	Updates a provider vDC.

vCloud Director Plug-In Scripting API

3

The vCloud Director plug-in scripting API contains classes, with their respective attributes and methods, that allow interaction between vCenter Orchestrator and vCloud Director. The scripting API maps the classes of the vCloud API to Orchestrator JavaScript classes that you can use to develop custom Orchestrator workflows that interact with vCloud Director.

This section includes the following topics:

- [API Categories](#)
- [Access the vCloud Director Plug-In API](#)
- [Using Generic Queries](#)
- [Using Non-Generic Queries](#)
- [Decorator Objects](#)
- [Scripting Examples](#)

API Categories

The main categories of vCloud Director API classes are User API, Admin API, and Admin Extensions API. With the User API, you can perform basic tasks. The Admin API adds administrative capabilities. With the Admin Extensions API, you can manage components of the VMware virtual infrastructure.

The mapping of the vCloud Director 5.5 plug-in API classes corresponds to the vCloud SDK for Java 5.5 class mapping. For reference about classes and categories, see

<http://communities.vmware.com/community/vmtn/developer/forums/vcloudsdkjava>.

User API

User API classes are typically readable by all users, and can be modified by users with appropriate rights.

With the User API, you can examine organizations and virtual datacenters (vDCs). You can create vApps in the organizations and in vDCs, and manage the created vApps. You can control vApp networks and create vApp templates and media files, such as ISO and floppy images. You can store vApp templates and media files in catalogs for easy access and sharing between organizations and vDCs.

Admin API

Admin API classes are typically readable by all users, but can be created and modified only by a system administrator, organization administrator, or another user who has administrative rights.

With the Admin API, you can administrate and create organizations, vDCs, organization networks, and authorization entities, such as roles, rights, users, and groups. You can create, delete, and modify a catalog of templates and media files.

Admin Extensions API

Admin Extensions API classes can be created and modified only by a system administrator.

The Admin Extensions API is specific to VMware. With the Admin Extensions API, you can manage entities such as provider vDCs, network pools, and vCenter Server instances.

Access the vCloud Director Plug-In API

Orchestrator provides an API Explorer to allow you to search the vCloud Director plug-in API and see the documentation for JavaScript objects that you can use in scripted elements.

Procedure

- 1 Log in to the Orchestrator client and select **Design** or **Run** from the drop-down menu in the left upper corner.
- 2 Select **Tools > API Explorer**.
- 3 To expand the hierarchical list of vCloud Director plug-in API objects, double-click the **vCloud** module in the left pane.

What to do next

You can copy code from API elements and paste it into scripting boxes. For more information about API scripting, see *Developing with VMware vCenter Orchestrator*.

Using Generic Queries

When you use generic queries, such as `QueryService.queryRecords` and `QueryService.queryIdRecords`, you must use specific query types and field types to get the appropriate result record types.

The following table lists the expected query types, field types, and record result types when working with generic queries.

VclQueryRecordType Value and Query Fields Enumeration Type	Query Result Record Type
ADMINALLOCATEEXTERNALADDRESS VclQueryAdminAllocatedExternalAddressField	VclQueryResultAdminAllocatedExternalAddressRecord
ADMINCATALOG VclQueryAdminCatalogField	VclQueryResultAdminCatalogRecord
ADMINCATALOGITEM VclQueryAdminCatalogItemField	VclQueryResultAdminCatalogItemRecord
ADMINGROUP VclQueryAdminGroupField	VclQueryResultAdminGroupRecord
ADMINMEDIA VclQueryAdminMediaField	VclQueryResultAdminMediaRecord
ADMINORGNETWORK VclQueryAdminOrgNetworkField	VclQueryResultAdminOrgNetworkRecord
ADMINORGVDC VclQueryAdminVdcField	VclQueryResultAdminVdcRecord
ADMINSHADOWVM VclQueryAdminShadowVMField	VclQueryResultAdminShadowVMRecord
ADMINTASK VclQueryAdminTaskField	VclQueryResultAdminTaskRecord
ADMINUSER VclQueryAdminUserField	VclQueryResultAdminUserRecord
ADMINVAPP VclQueryAdminVAppField	VclQueryResultAdminVAppRecord
ADMINVAPPNETWORK VclQueryAdminVAppNetworkField	VclQueryResultAdminVAppNetworkRecord
ADMINVAPPTEMPLATE VclQueryAdminVAppTemplateField	VclQueryResultAdminVAppTemplateRecord
ADMINVM VclQueryAdminVMField	VclQueryResultAdminVMRecord
ALLOCATEEXTERNALADDRESS VclQueryAllocatedExternalAddressField	VclQueryResultAllocatedExternalAddressRecord
BLOCKINGTASK VclQueryBlockingTaskField	VclQueryResultBlockingTaskRecord
CATALOG VclQueryCatalogField	VclQueryResultCatalogRecord
CATALOGITEM VclQueryCatalogItemField	VclQueryResultCatalogItemRecord
CELL VclQueryCellField	VclQueryResultCellRecord

VclQueryRecordType Value and Query Fields Enumeration Type	Query Result Record Type
DATASTORE VclQueryDatastoreField	VclQueryResultDatastoreRecord
DATSTOREPROVIDERVDCRELATION VclQueryDatastoreProviderVdcRelationField	VclQueryResultDatastoreProviderVdcRelationRecord
DVSWITCH VclQueryDvSwitchField	VclQueryResultDvSwitchRecord
EVENT VclQueryEventField	VclQueryResultEventRecord
EXTERNALNETWORK VclQueryNetworkField	VclQueryResultNetworkRecord
GROUP VclQueryGroupField	VclQueryResultGroupRecord
HOST VclQueryHostField	VclQueryResultHostRecord
MEDIA VclQueryMediaField	VclQueryResultMediaRecord
NETWORKPOOL VclQueryNetworkPoolField	VclQueryResultNetworkPoolRecord
ORGANIZATION VclQueryOrgField	VclQueryResultOrgRecord
ORGNETWORK VclQueryOrgNetworkField	VclQueryResultOrgNetworkRecord
ORGVDC VclQueryOrgVdcField	VclQueryResultOrgVdcRecord
ORGVDCRESOURCEPOOLRELATION VclQueryOrgVdcResourcePoolRelationField	VclQueryResultOrgVdcResourcePoolRelationRecord
PORTGROUP VclQueryPortgroupField	VclQueryResultPortgroupRecord
PROVIDERVDC VclQueryVMWProviderVdcField	VclQueryResultVMWProviderVdcRecord
PROVIDERVDCRESOURCEPOOLRELATION VclQueryProviderVdcResourcePoolRelationField	VclQueryResultProviderVdcResourcePoolRelationRecord
RESOURCEPOOL VclQueryResourcePoolField	VclQueryResultResourcePoolRecord
RIGHT VclQueryRightField	VclQueryResultRightRecord
ROLE VclQueryRoleField	VclQueryResultRoleRecord

VclQueryRecordType Value and Query Fields Enumeration Type	Query Result Record Type
STRANDEDUSER VclQueryStrandedUserField	VclQueryResultStrandedUserRecord
TASK VclQueryTaskField	VclQueryResultTaskRecord
USER VclQueryUserField	VclQueryResultUserRecord
VAPP VclQueryVAppField	VclQueryResultVAppRecord
VAPPNETWORK VclQueryVAppNetworkField	VclQueryResultVAppNetworkRecord
VAPPORGNETWORKRELATION VclQueryVAppOrgNetworkRelationField	VclQueryResultVAppOrgNetworkRelationRecord
VAPPTEMPLATE VclQueryVAppTemplateField	VclQueryResultVAppTemplateRecord
VIRTUALCENTER VclQueryVirtualCenterField	VclQueryResultVirtualCenterRecord
VM VclQueryVMField	VclQueryResultVMRecord

Using Non-Generic Queries

When you use non-generic queries, the name of the query method determines the result record type.

Example: Records Returned by Non-Generic Queries

The following are examples of records returned by non-generic queries.

- `queryVmRecords` returns records of type `VclQueryResultVMRecord`.
- `queryvAppRecords` returns records of type `VclQueryResultVAppRecord`.

Example: Enumeration Types for Query Filter Creation

The following are examples of enumeration types that should be used when creating a query filter.

- `queryVmRecords` accepts fields of type `VclQueryVMField`.
- `queryvAppRecords` accepts fields of type `VclQueryVAppField`.

Decorator Objects

Decorator objects hide the complexity of the vCloud Director REST API.

Decorators provide an easy-to-use interface to the vCloud Director REST API when working with data collections and data objects. Decorators manipulate live object or collection instances. For example, every modification of a collection affects the container object.

VclAbstractRecordResultSet Decorator

The `VclAbstractRecordResultSet` decorator object makes the manipulation of generic query record results easier. This decorator provides methods for getting records of the expected type, as well as navigating between record result pages.

VclRecordResultSet Decorator

The `VclRecordResultSet` decorator object makes the manipulation of specific query record results easier. This decorator provides methods for getting records of a predefined type, as well as navigating between record result pages.

VclReferenceResultSet Decorator

The `VclReferenceResultSet` decorator object makes the manipulation of generic or specific query reference results easier. This decorator provides methods for getting object references, as well as navigating between reference result pages.

Scripting Examples

You can cut, paste, and adapt the JavaScript examples to help you write scripts for common vCloud Director tasks.

For more information about scripting, see the *vCenter Orchestrator Developer's Guide*.

Example: Get Records for All Enabled Organizations

The following JavaScript example uses the `AdminQueryService` object to get records for all enabled organizations on a given vCloud Director instance.

```
var host = ...
var queryService = host.toAdminObject().getAdminQueryService();

var expression = new VclExpression(VclQueryOrgField.ISENBLED, "true", VclExpressionType.EQUALS);
var filter = new VclFilter(expression);
var params = new VclQueryParams();
params.setFilter(filter);

var resultSet = queryService.queryOrgRecords(params);
```

```

while (resultSet != null) {
    // the records should be of type related to the query
    // in this case the type is VclQueryResultOrgRecord
    var records = resultSet.getRecords();
    System.log(records.length + " records found");
    for (var i = 0; i < records.length; i++) {
        System.log(records[i].name);
    }
    if (resultSet.hasNextPage()) {
        resultSet = resultSet.getNextPage();
    } else {
        break;
    }
}

```

Example: Get References to All Enabled Organizations

The following JavaScript example uses the `AdminQueryService` object to get references to all enabled organizations on a given vCloud Director instance.

```

var host = ...
var queryService = host.toAdminObject().getAdminQueryService();

var expression = new VclExpression(VclQueryOrgField.ISEENABLED, "true", VclExpressionType.EQUALS);
var filter = new VclFilter(expression);
var params = new VclQueryParams();
params.setFilter(filter);

var resultSet = queryService.queryOrgReferences(params);
while (resultSet != null) {
    // the type of the references is predefined – VclReference
    var references = resultSet.getReferences();
    System.log(references.length + " references found");
    for (i = 0; i < references.length; i++) {
        System.log(references[i].href);
    }
    if (resultSet.hasNextPage()) {
        resultSet = resultSet.getNextPage();
    } else {
        break;
    }
}

```

Example: Get Records for All Virtual Machines Inside a vApp

The following JavaScript example uses the `QueryService` object to get records for all virtual machines inside a vApp.

```

var vapp = ...

var queryService = vapp.getHost().getQueryService();

```

```

var expression = new VclExpression(VclQueryVMField.CONTAINER, vapp.getReference().href,
VclExpressionType.EQUALS);
var filter = new VclFilter(expression);
var params = new VclQueryParams();
params.setFilter(filter);

var resultSet = queryService.queryRecords(VclQueryRecordType.ADMINVM, params);
while (resultSet != null) {
    var records = resultSet.getRecords(new VclQueryResultAdminVMRecord());
    System.log(records.length + " records found");
    for (i = 0; i < records.length; i++) {
        System.log(records[i].name);
    }
    if (resultSet.hasNextPage()) {
        resultSet = resultSet.getNextPage();
    } else {
        break;
    }
}
}

```

Example: Resume a Blocking Task Related to a vApp Deployment Notification

With the following JavaScript example, you can resume a blocking task related to a vApp deployment notification.

```

var host = ...
var message = ...

var helper = new VclNotificationHelper();
helper.setMessage(message);

if (helper.getNotificationEventType() == VclEventType.VAPP_DEPLOY) {
    var vappLink = helper.getEntityLink();
    var vapp = host.getEntityById(vappLink.type, vappLink.id);
    // do something with the vApp ...

    if (helper.isBlockingTask()) {
        var taskLink = helper.getBlockingTaskLink();
        var task = host.getEntityById(taskLink.type, taskLink.id);
        task.resume("put the resuming message here");
    }
}
}

```

Example: Configure a DHCP Service on a vApp Network

With the following JavaScript example, you can configure a DHCP service on a vApp network.

```

var dhcpService = ...
var vapp = ...
var networkName = ...
var networkConfigSection = vapp.getNetworkConfigSection();

```

```

var found = false;
var existingNetworkConfigArray = networkConfigSection.networkConfig.enumerate();
for (index = 0; index < existingNetworkConfigArray.length; index++) {
    var networkConfig = existingNetworkConfigArray[index];
    if (networkConfig.networkName == networkName) {
        var networkConfiguration = networkConfig.configuration;
        if (networkConfiguration.fenceMode == VclFenceModeValuesType.BRIDGED.value) {
            throw 'Dhcp service cannot be applied to network "' + networkName + '"!';
        }
        if (networkConfiguration.features == null) {
            networkConfiguration.features = new VclNetworkFeatures();
        }
        var serviceSet = networkConfiguration.features.networkService;
        var services = serviceSet.find(new VclDhcpService());
        if (services.length > 0) {
            for (i = 0; i < services.length; i++) {
                serviceSet.remove(services[i]);
            }
        }
        serviceSet.add(dhcpService);
        found = true;
    }
}
if (!found) {
    throw 'Network "' + networkName + '" does not exist!';
}
task = vapp.updateSection(networkConfigSection);

```

Example: Configure a DHCP Service on a Gateway

With the following JavaScript example, you can configure a DHCP service on a gateway.

```

var gatewayDhcpService = ...
var gateway = ...
var gatewayConfiguration = gateway.configuration;
if (gatewayConfiguration.edgeGatewayServiceConfiguration == null) {
    gatewayConfiguration.edgeGatewayServiceConfiguration = new VclGatewayFeatures();
}
var serviceSet = gatewayConfiguration.edgeGatewayServiceConfiguration.networkService;
var services = serviceSet.find(new VclGatewayDhcpService());
if (services.length > 0) {
    for (i = 0; i < services.length; i++) {
        serviceSet.remove(services[i]);
    }
}
serviceSet.add(gatewayDhcpService);
task = gateway.update();

```

Example: Add a VPN Endpoint

With the following JavaScript example, you can add a VPN endpoint to a gateway.

```
var vpnEndpoint = ...
var gateway = ...
var gatewayConfiguration = gateway.configuration;
if (gatewayConfiguration.edgeGatewayServiceConfiguration == null) {
    gatewayConfiguration.edgeGatewayServiceConfiguration = new
VclGatewayFeatures();
}
var serviceSet = gatewayConfiguration.edgeGatewayServiceConfiguration.networkService;
var services = serviceSet.find(new VclGatewayIpsecVpnService());
if (services.length == 0) {
    throw 'VPN service not found on gateway ' + gateway.name;
}
services[0].endpoint.add(vpnEndpoint);
gateway.configuration = gatewayConfiguration;
task = gateway.update();
```

Example: Obtain Performance Statistics

With the following JavaScript example, you can obtain performance statistics for the vCloud Director plug-in.

```
VclProfiler.enableInstanceCounters(true);
...
var instances = VclProfiler.getInstanceCount("VclReference");
System.log("references: " + instances);
...
VclProfiler.enableInstanceCounters(false);
...
var host = ...
var cacheHitCount = VclProfiler.getCacheHitCount(host);
System.log("cache hits: " + cacheHitCount);
var cacheMissCount = VclProfiler.getCacheMissCount(host);
System.log("cache misses: " + cacheMissCount);
var cacheObjCount = VclProfiler.getCacheObjectCount(host);
System.log("cache objects: " + cacheObjCount);
...

```

Example: Get the Plug-In Version

With the following JavaScript example, you can get the plug-in version and distinguish future plug-in versions.

```
var version = VclHostManager.getVersion();
if (version == "5.5") {
    System.log("Plug-in 5.5 is installed!");
}
```

Example: Get Entity Instance Count

With the following JavaScript example, you can get any class instance count.

```
VclProfiler.enableInstanceCounters(true);
...
var className = VclProfiler.getClassNameByFinderType(VclFinderType.HOST);
System.log(VclProfiler.getInstanceCount(className));
...
VclProfiler.enableInstanceCounters(false);
```