Cisco ACI vRealize 8 Plug-in Guide

Revised: December 6, 2022

New and Changed Information

The table provides an overview of the significant changes to this document.

Release	Description
Cisco ACI vRealize 8 Plug-in, Release 1.0.0	The document provides details about Cisco ACI and VMware vRealize Automation, Release 8.x integration. Support for vRealize 8.2.
Cisco ACI vRealize 8 Plug-in, Release 1.0.1	Support for vRealize 8.2, 8.3, and 8.4.

Overview

Cisco Application Centric Infrastructure (ACI), in addition to integrating with VMware vCenter, integrates with VMware's products vRealize Automation (vRA) and vRealize Orchestrator (vRO). vRA and vRO are parts of the VMware vRealize Automation Suite for building and managing multivendor hybrid cloud environments.

VMWare vRealize Automation Appliance Services, Release 8.x

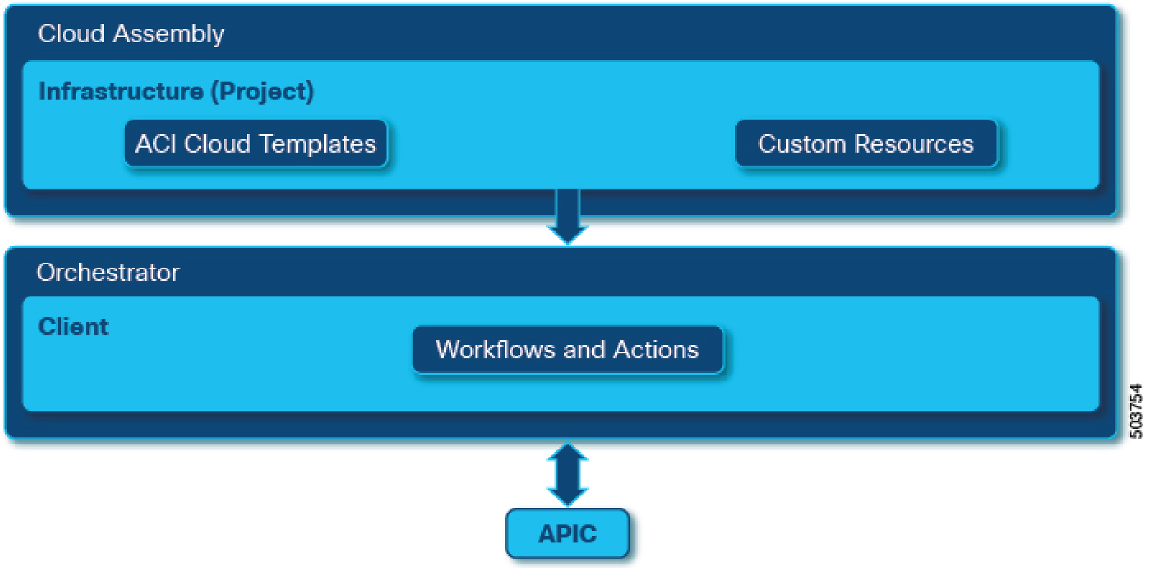
The user experience for vRealize Automation has significantly changed for vRealize Automation, Release 8.x. vRA 8.x implements a Kubernetes-based architecture, with HTML 5 based GUI. *See VMware's vRealize Automation, Release 8.x documentation for more information.*

The scope of this document is to provide details of Cisco ACI support for vRA 8.x.

The Cisco ACI vRealize Automation 8.x plug-in uses the following services provided by vRA 8.x:

- **Orchestrator**—hosts the Cisco ACI vRealize 8 plug-in and the workflow engine. Workflows allow users to perform actions on the plugged-in technology objects. Actions on the APIC objects are performed using workflows. The custom workflows are packaged as part of the Cisco ACI vRealize 8 plug-in and are designed to create/delete APIC resources. You can use the embedded orchestrator service or a standalone vRO.
- **Cloud Asssembly**—manages the infrastructure and cloud templates.
- **Service Broker**—manages content sources, catalog items and approvals.

Figure 1: vRA 8.x Appliance Services



Software Requirements

For the supported versions of vCenter and Cisco APIC, see the ACI Virtualization Compatibility Matrix.

Platform	Supported Release
vRealize Automation Suite	vRealize Lifecycle Manager 8.x vRealize Identity Manager 8.x vRealize Automation Appliance 8.x

CPU and Memory Utilization

The Cisco ACI vRealize 8 plug-in has no significant impact on CPU and memory utilization. At peak usages, the CPU is approximately 2% and the memory consumption is less than 2%.

Orchestrator

vRealize Automation Orchestrator is the core service that enables the integration between Cisco ACI and vRA. The components of Orchestrator are:

- Control Center—for managing plug-ins and enabling logs.
- Client—for designing, debugging, and running vRO workflows and actions.
- Inventory View—for browsing through the APIC objects.

Cloud Assembly

vRealize Automation Cloud Assembly connects public and private cloud providers so that you can deploy machines, applications, and services that you create for the resources. The main purpose of Cloud Assembly is to design, develop and deploy cloud templates.

The components of Cloud Assembly are:

- Infrastructure— for provisioning and maintaining various compute and cloud resources.
- Custom Resources—are building blocks for designing a ACI cloud template. Drag and drop the custom resources on the canvas to design a custom cloud template.
- Cloud Template—for automating the deployment of ACI resources using the custom resources, canvas and YAML editor.

Cloud Assembly relays the deployment information to the Orchestrator, which is responsible to run the corresponding/respective workflows. Cloud Assembly can not directly communicate with the APICs; communication to APIC is only via the Orchestrator.

Cisco ACI with VMware vRealize Automation 8.x

vRA integration is delivered through a set of cloud templates imported into the vRA appliance. The cloud templates leverage the vRO workflows, providing a set of APIC custom resources that allows you to deploy, manage, and remove networking components.

The Cisco ACI vRealize 8 plug-in allows the creation and deletion of the following APIC objects:

- Tenant
- Application Profile
- VRF
- Bridge Domain (BD) and BD subnet
- Endpoint Groups
- Contracts and filters

Benefits of Integrating Cisco ACI with vMWare vRealize Automation 8.x

vRA acts as a single pane for automating and deploying applications on cloud and on premises environments. Cisco ACI vRealize 8 plug-in enables faster deployment of applications with networking services. This consumption model allows users to deploy single and multi-tier application workloads in a single click with pre-defined, as well as customizable compute and network policies.

Integrating Cisco ACI with VMware vRealize Automation 8.x

To access the Cloud Services Console, login to VMware vRealize Automation Appliance 8.x as the organizational owner using, `https://<appliance_FQDN >/ .`

Getting Started with the Cisco ACI and VMware vRealize Automation 8.x Integration

Here is a list of mandatory prerequisites before integrating vRA 8.x with Cisco ACI:

- Install vRealize Automation Release 8.x. *See VMware vRealize 8.x documentation.*
- Set up the vRealize Appliance. *See VMware vRealize 8.x documentation.*
- Download and unzip the Cisco ACI vRealize 8 plug-in package.
- Install Python 3.8 and `requests` and `pyYaml` libraries.
- For role based control access for APIC, an APIC user must be created with a valid security domain and access privileges.

Note For details about Cisco ACI integration with vRA 7.x, see the *Cisco ACI with VMware vRealize* chapter in the *Virtualization Guide* on the Cisco APIC Document support page.

Cisco APIC Account to vRA Project Association

A project is an abstraction of the compute resources. A set of users gain access to the underlying services and resources through Projects. A project can roughly be compared to an AWS account or a subscription in Azure.

An APIC account is treated as a networking resource for a vRA Project. A vRA project can be connected to an APIC account using the provided Orchestrator workflows. One APIC account can be reused by multiple projects, similar to using the same compute resources for deploying various applications on cloud or an on-prem datacenter. However, multiple APIC accounts can not be linked to one project.

As part of ACI-integration with vRA, this release supports pairing up vRA project with a ACI fabric managed by an APIC-cluster. As part of the plug-in design, the APIC accounts are auto-selected implicitly based on the vRA Project to APIC association. Therefore, when the ACI cloud templates are deployed within a project, the ACI resources are created on the connected APIC. This provides stronger access control and isolation among tenants.

The vRO service administrator has to setup APIC connections with the vRA projects accordingly. APIC accounts can be added with administrator and tenant users.

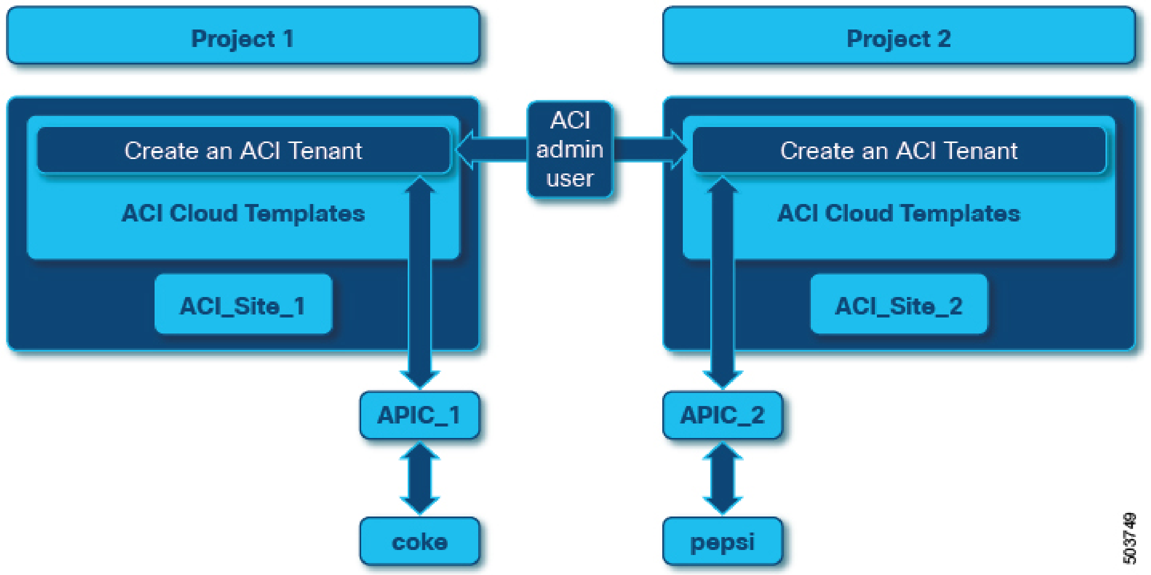
Note Tenant user must have *write* permissions to be able to deploy resources on the respective APIC.

In the example:

Project 1: ACI_Site_1 creates a tenant “coke” on APIC Account, APIC_1, by deploying the Cloud Template, *Create an ACI Tenant*.

Project 2: ACI_Site_2 creates a tenant “pepsi” on APIC Account, APIC_2, by deploying the Cloud Template with the project. You do not need to provide the APIC account while deploying ACI Cloud Templates as long as the APIC account is added to the Project.

Figure 2: Cisco APIC and vRA Project Association



Identifying the Project ID

Use this procedure to identify the project ID for a project.

Before you begin

Create a project. For details about how to create a project, see *VMware vRealize 8.x documentation*.

Procedure

Step 1 Login to vRA appliance.

Step 2 Navigate to **Cloud Assembly** > **Infrastructure** > **Projects**.

Step 3 Select the project that contains the ACI Cloud templates.

The project ID is indicated towards the end of the URL. Remove the first 2 characters after the last "%" sign. In the example, here - `https://vra82-app-1.ascisco.net/automation-ui/#/provisioning-ui;ash=%2Fprojects%2Fedit%2F7164f405-0e2f-403e-aedd-1a5c4d64c9f7`, the Project ID is, 7164f405-0e2f-403e-aedd-1a5c4d64c9f7.

Note Project ID is mandatory for creating an APIC to project association.

Role Based Access Control in VMware vRealize Automation 8.x

You can create an APIC Account with non admin users. Ensure that a user account with required security domains and roles is created in APIC. Also make sure that the user has the appropriate access rights.

APIC offers the following access rights:

- readPriv: User with readPriv can only retrieve information about the APIC objects.
- writePriv: Users can create APIC objects in the assigned security domain.

vRealize Automation 8.x creates a default organization. The user installing the vRA suite is assigned the Organization Owner role. The Organization Owner can create new users and assign them roles. Roles define the set of tasks that a particular user can perform.

The roles offered in vRealize Automation can be classified into three categories:

- Organizational
- Service
- Project

Roles	**Responsibilities**
Organization	• Has administrator level permissions. • Can create and manage other users.
Service	Service administrator: • Read and write access to the entire user interface and API resources for a service. • Can perform all tasks. Service User: • Can be assigned a project role by the service admin. • Can create and deploy resources.
Project	Project administrator: • Provision infrastructure, add and manage users for a project. Project Member: • Design and deploy cloud templates within a project.

Each service, namely Cloud Assembly and Service Broker can have their own set of service administrators, users and viewers. For more information on user management, see *VMware vRealize 8.x documentation*.

Configuring Orchestrator

Configuring the Orchestrator includes these two procedures:

1. Installing the Cisco ACI vRealize 8 Plug-in, on page 8
2. Connecting to an APIC Instance, on page 8

Installing the Cisco ACI vRealize 8 Plug-in

Use this procedure to install the Cisco ACI plug-in using Control Center.

Before you begin

Download the Cisco ACI vRealize 8 plug-in, **tar.gz** file.

Procedure

Step 1 Log in to vRO's Control Center , as a root user.

```
Example: https://vra-fqdn/vco-controlcenter
```

Step 2 Navigate to **Manage Plug-ins**.

Step 3 Select the `.dar` file in the Cisco ACI package.

Step 4 Click **Upload**.

Note The vRO Client restarts and should take around 5-10 mins.

Step 5 Verify that the Cisco ACI vRealize 8 plug-in (com.cisco.apic package) is properly installed in the vRO client using **Orchestrator** > **Assets** > **Packages**.

Connecting to an APIC Instance

Use this procedure to connect to an APIC instance.

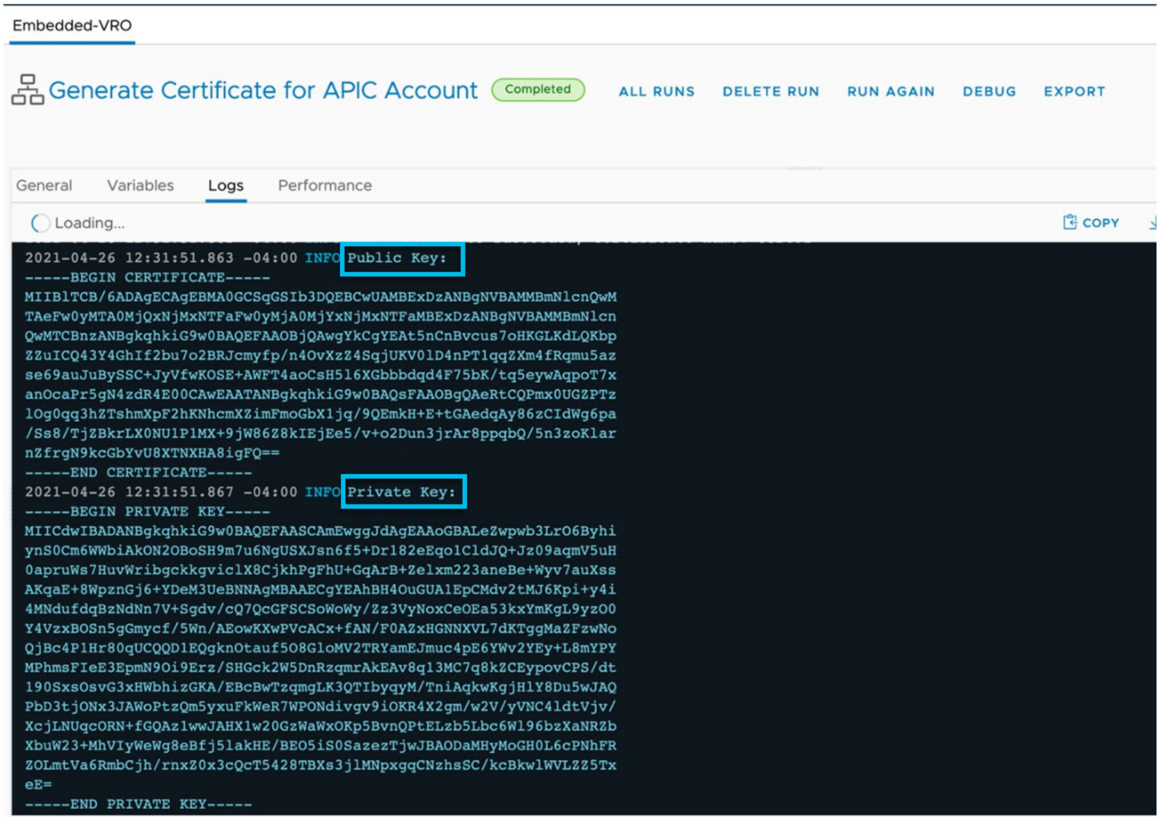
Before you begin

The vRO service administrator must configure an APIC Account by running the APIC_Configuration workflows included in the plug-in package.

Note An APIC Account can only be created via the vRO service. APIC Configurations using Cloud Assembly are not supported.

Prerequisite procedure, required to generate a self-signed certificate:

1. Navigate to **Orchestrator** > **Library** > **WorkFlows** > **Generate Certificate for APIC Account** > **Run**.
2. Enter a Certificate Name.
3. In the **Logs** tab, check for the public and private keys.
4. Copy and add the **Public Key** (displayed under **Logs**) to the APIC user. Include ——*BEGIN CERTIFICATE*---- and ——*END CERTIFICATE*----. Ensure to use the same certificate name in APIC.



```
2021-04-26 12:31:51.863 -04:00 INFO Public Key:
-----BEGIN CERTIFICATE-----
MIIBlTCB/6ADAgECAgEBMA0GCSqGSIb3DQEBCwUAMBExDzANBgNVBAMMBmNlcnQwM
TAeFw0yMTA0MjQxNjMxNTFaFw0yMjA0MjYxNjMxNTFaMBExDzANBgNVBAMMBmNlcn
QwMTCBnzANBgkqhkiG9w0BAQEFAAOBjQAwgYkCgYEAt5nCnBvcus7oHKGLKdLQKbp
ZZuICQ43Y4GhIf2bu7o2BRJcmyfp/n4OvXzZ4SqjUKV0lD4nPT1qqZXm4fRqmu5az
se69auJuBySSC+JyVfwKOSE+AWFT4aoCsH5l6XGbbbdqd4F75bK/tq5eywAqpoT7x
anOcaPr5gN4zdR4E00CAwEAATANBgkqhkiG9w0BAQsFAAOBgQAeRtCQPmx0UGZPTz
lOg0qq3hZTshmXpF2hKNhcmXZimFmoGbX1jq/9QEmkH+E+tGAedqAy86zCIdWg6pa
/Ss8/TjZBkrLX0NU1P1MX+9jW86Z8kIEjEe5/v+o2Dun3jrAr8ppqbQ/5n3zoKlar
nZfrgN9kcGbYvU8XTNXHA8igFQ==
-----END CERTIFICATE-----
2021-04-26 12:31:51.867 -04:00 INFO Private Key:
-----BEGIN PRIVATE KEY-----
MIICdwIBADANBgkqhkiG9w0BAQEFAASCAmEwggJdAgEAAoGBALeZwpwb3LrO6Byhi
ynS0Cm6WWbiAkON2OBoSH9m7u6NgUSXJsn6f5+Dr182eEqolCldJQ+Jz09aqmV5uH
0apruWs7HuvWribgckkgviclX8CjkhPgFhU+GqArB+Zelxm223aneBe+Wyv7auXss
AKqaE+8WpznGj6+YDeM3UeBNNAgMBAAECgYEAhBH4OuGUA1EpCMdv2tMJ6Kpi+y4i
4MNdufdqBzNdNn7V+Sgdv/cQ7QcGFSCSoWoWy/Zz3VyNoxCeOEa53kxYmKgL9yzO0
Y4VzxBOSn5gGmycf/5Wn/AEowKXwPVcACx+fAN/F0AZxHGNNXVL7dKTggMaZFzwNo
QjBc4P1Hr80qUCQQD1EQgknOtauf5O8GloMV2TRYamEJmuc4pE6YWv2YEy+L8mYPY
MPhmsFIeE3EpmN9Oi9Erz/SHGck2W5DnRzqmrAkEAv8q13MC7q8kZCEypovCPS/dt
19OSxsOsvG3xHWbhizGKA/EBcBwTzqmgLK3QTIbyqyM/TniAqkwKgjHlY8Du5wJAQ
PbD3tjONx3JAWoPtzQm5yxuFkWeR7WPONdivgv9iOKR4X2gm/w2V/yVNC4ldtVjv/
XcjLNUqcORN+fGQAz1wwJAHX1w20GzWaWxOKp5BvnQPtELzb5Lbc6Wl96bzXaNRZb
XbuW23+MhVIyWeWg8eBfj5lakHE/BEO5iS0SazezTjwJBAODaMHyMoGH0L6cPNhFR
ZOLmtVa6RmbCjh/rnxZ0x3cQcT5428TBXs3jlMNpxgqCNzhsSC/kcBkwlWVLZZ5Tx
eE=
-----END PRIVATE KEY-----
```

Steps to add certificate in APIC:

- Login to the APIC GUI as administrator.
- Select **Admin** on the menu.
- Navigate to **Security Management** > **Local Users**.
- Select the APIC user.
- In the Work pane, in the **User Certificate** section, click the (+) icon to add the certificate. The **Create Certificate** window is displayed.
- In the **Name** field, enter the certificate name.
- In the **Data** field, paste the certificate content that you copied earlier (initial step of Step 4).
- Click **Submit**.

Procedure

Step 1 Navigate to **Orchestrator** > **Library** > **Workflows** > **Add APIC Account** > **Run**.

Two authentication methods are provided:

- User Authentication

- Self-signed certificate

Perform Step 2 or Step 3 below, based on the authentication method.

Step 2 Select **User Authentication** and enter the APIC user name and password.

Step 3 For **Self-signed** certificate-based authentication, enter the private key and a passphrase to encrypt the private key.

The **Private Key** is displayed under **Logs**.

Step 4 Switch to the **Projects** tab and add the vRA Project IDs to this APIC.

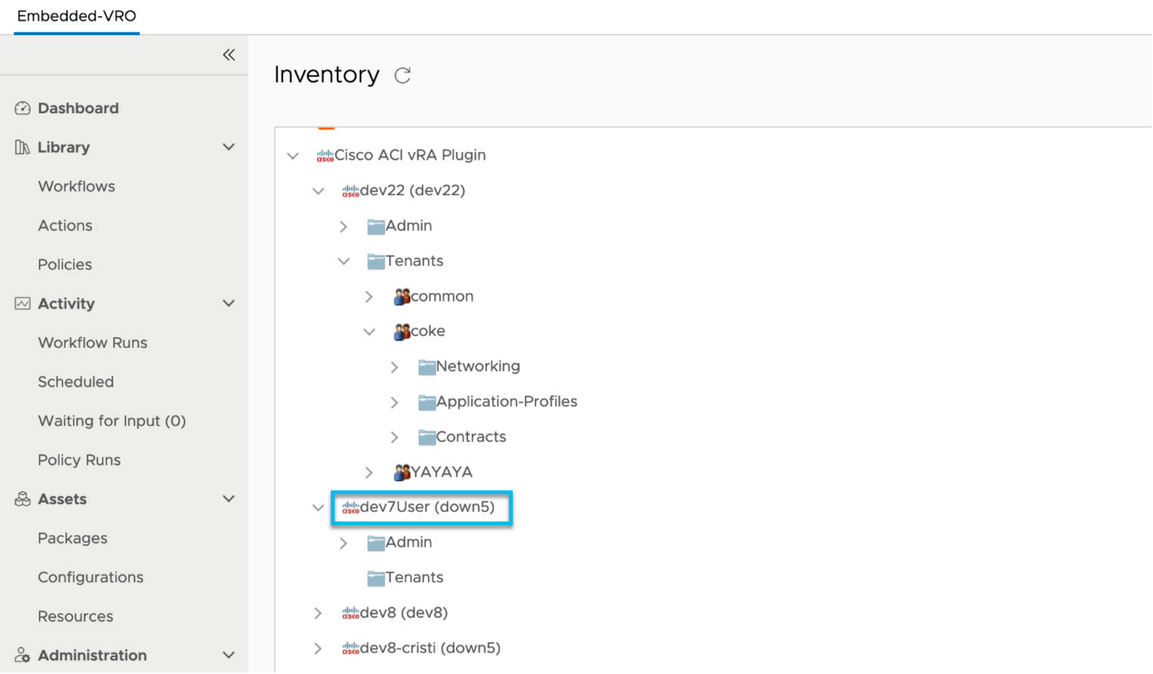
Note You can use **Add/Delete vRA Projects to an APIC** workflow to add projects to an existing APIC Account.

Step 5 Click **Run**.

Step 6 Verify that the APIC Account was successfully added by ensuring that the workflow run was successful.

Step 7 Navigate to **Administration** > **Inventory** to ensure that APIC objects are displayed under its account.

If there is a *down5* string next to the created APIC account, it indicates that the connection is unsuccessful. In such a case, delete the APIC account before attempting to re-create it. With reference to the example below, *down5* appended to the **dev7User** APIC account indicates that it is not connected.



APIC Workflows

Each custom resource and catalog item are implemented as a workflow in the vRealize Orchestrator. When a cloud template containing an ACI custom resource is deployed, the corresponding Orchestrator workflow is executed in the backend.

The following APIC configuration workflows are provided to the user:

Workflow	Description
Add APIC Account	Creates the APIC account with user credentials and self-signed certificate.
Add vRA Projects to an APIC Account	Links projects to existing APIC accounts.
Set Default APIC Account	Updates the default APIC account.
Display vRA projects in an APIC Account	Lists all the vRA project(s) and APIC associations.
Update APIC Account	Updates an existing APIC account in case of connection failure.
Delete APIC Account	Deletes the APIC account, and also unlinks the projects.
Delete projects in an APIC Account	Deletes vRA Projects from an APIC account. Delete projects before deleting an APIC account.

Running a Workflow

Use this procedure to run a workflow using Orchestrator.

Procedure

Step 1 Log in to the vRA instance as an administrator.

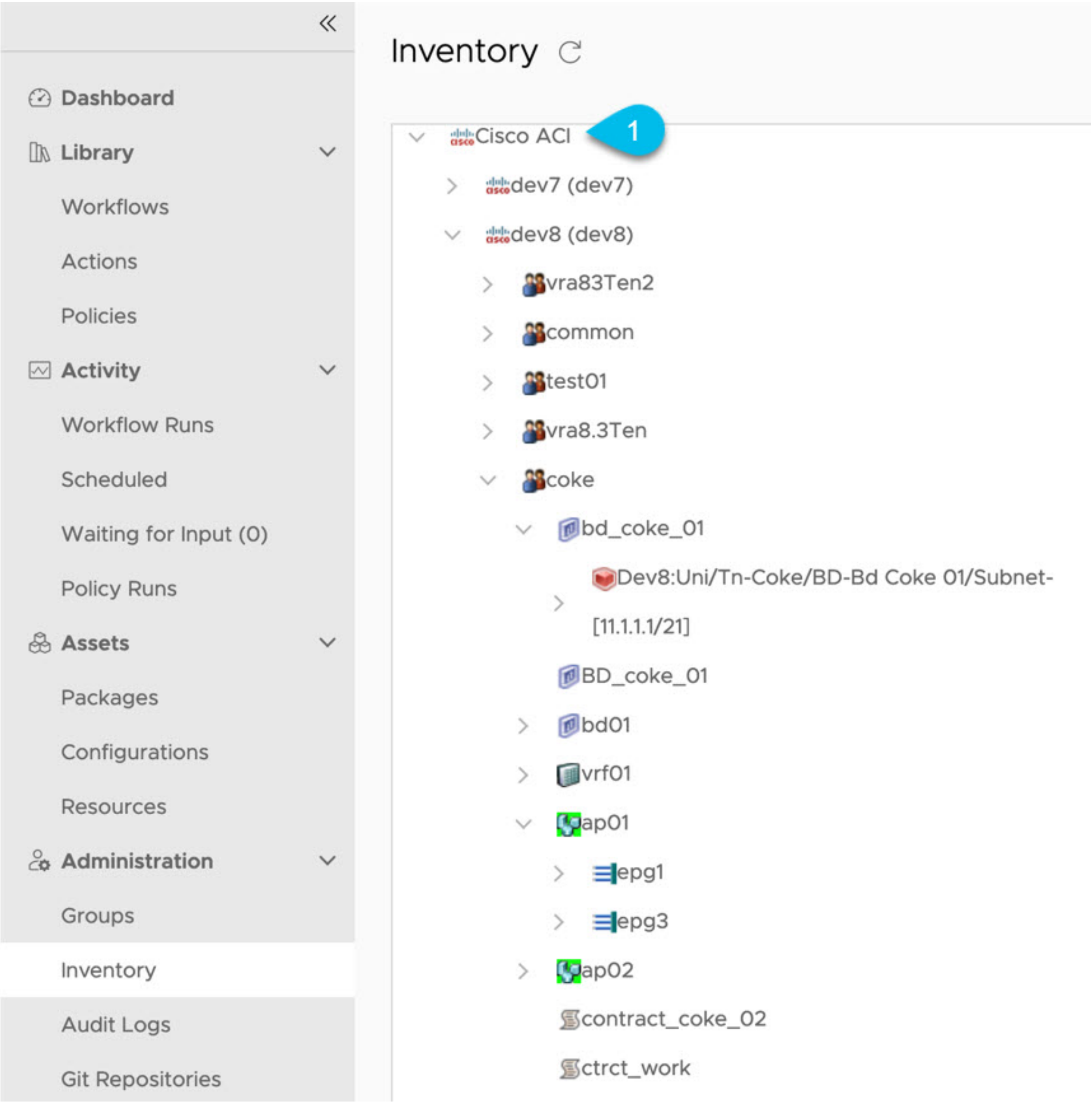
Step 2 Navigate to **Orchestrator** > **Library** > **Workflows**.

Step 3 Enter the information in the fields and click **Run**.

Inventory View for Cisco ACI Plugin

Navigate to **Orchestrator** > **Administration** > **Inventory**. Use the **Inventory View**, to ensure that the Orchestrator is connected to an APIC.

Figure 3: Inventory View



Configuring Cloud Assembly

By default, a set of cloud templates are provided. You can create a custom cloud template using the ACI custom resources and the YAML editor in Cloud Assembly. To create APIC objects, you must deploy cloud templates. Use cloud templates to configure multiple ACI objects at the same time.

For example, *Deploy ACI network resources* creates and deletes the following APIC objects:

- Tenant
- Application Profile
- VRF

- Bridge Domain
- Application EPG

Each object will be deployed in a hierarchical fashion under the newly created tenant.

Note In earlier versions of VMware vRealize Automation, Cloud Templates were referred to as Blueprints.

Configuring Cloud Assembly includes these two procedures:

1. Importing Custom Resources and Cloud Templates , on page 13
2. Designing Cloud Templates, on page 13

Importing Custom Resources and Cloud Templates

Use this procedure to import ACI custom resources and cloud templates to Cloud Assembly.

Before you begin

Ensure that the python version is 3.8.

Procedure

Run the `cisco_vra_8_utils.py` from `/apic-vrealize-0.1.0.xx/utils` folder to import custom resources and cloud templates.

You need to have Python requests and pyYaml libraries to run the script. The python script can create a vRA project or use an existing project. Provide the following arguments:

- --url the FQDN for you vRA instance
- -a <service admin-user> the admin username for your vRA Cloud Assembly
- -p <password> the password for your admin account
- -i or -e <file> the file used for importing/exporting elements
- -r <project> the name of the project where to import blueprints

You must specify either to export (-e) or import (-i) when running the script. An example for each is shown below:

```
for exporting:> python cisco_vra_8_utils.py --url vra-setup.domain.com -a myAdmin -p admin123 -e
/home/user/Documents/exported_configurations
for importing:> python cisco_vra_8_utils.py --url vra-setup.domain.com -a myAdmin -p admin123 -i
/home/user/Documents/aci-vra-configs.zip -r myProject
```

Designing Cloud Templates

Use this procedure to design cloud templates using ACI custom resources.

Procedure

Step 1 Navigate to **Cloud Assembly**.

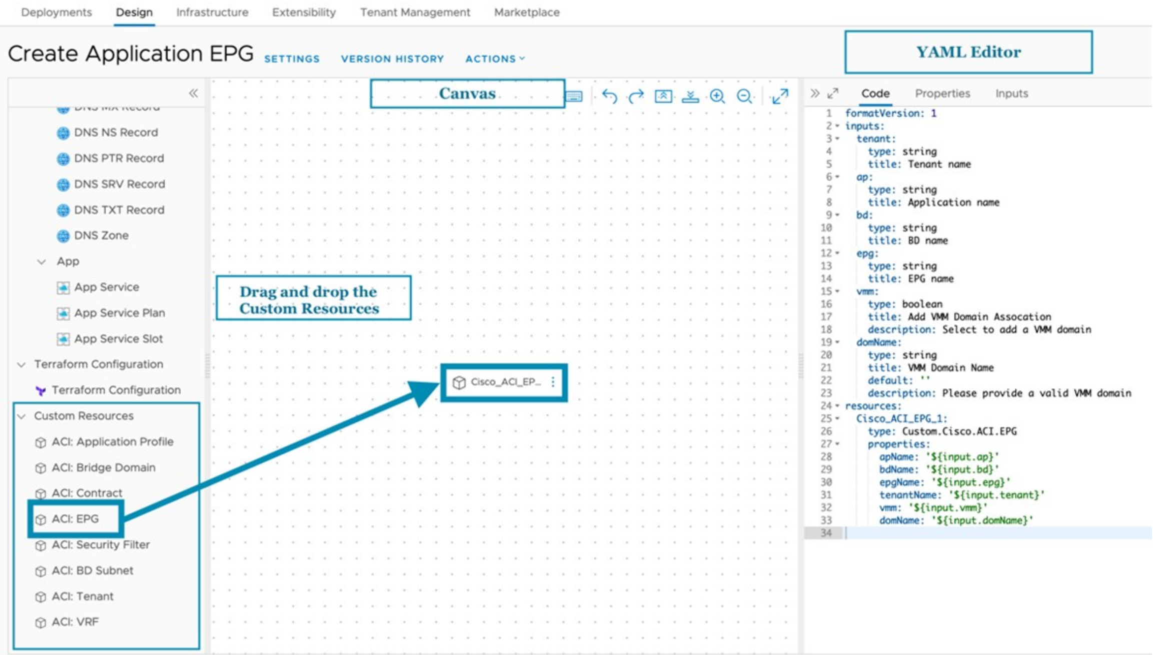
Step 2 In the **Design** tab, select **New** From Blank Canvas option.

Step 3 Enter the information needed to create a Cloud Template.

Step 4 Drag and drop from the available ACI Custom Resources.

Step 5 Use the YAML editor to complete the Cloud Template or enter the input values using the **Properties** tab.

Step 6 Click **Deploy**.



```
formatVersion: 1
inputs:
  tenant:
    type: string
    title: Tenant name
  ap:
    type: string
    title: Application name
  bd:
    type: string
    title: BD name
  epg:
    type: string
    title: EPG name
  vmm:
    type: boolean
    title: Add VMM Domain Assocation
    description: Select to add a VMM domain
  domName:
    type: string
    title: VMM Domain Name
    default: ''
    description: Please provide a valid VMM domain
resources:
  Cisco_ACI_EPG_1:
    type: Custom.Cisco.ACI.EPG
    properties:
      apName: '${input.ap}'
      bdName: '${input.bd}'
      epgName: '${input.epg}'
      tenantName: '${input.tenant}'
      vmm: '${input.vmm}'
      domName: '${input.domName}'
```

The ACI object(s) are displayed under **Topology** if the deployment is successful.

Click **History** for details of the deployment.

Cloud Templates and Custom Resources

A set of cloud templates are provided as a reference. Use these cloud templates to create a chained, automated deployment.

Table 1: Custom Resources

Custom Resource	APIC Resource	Description
ACI: Tenant	Tenant	Creates a tenant.
ACI: VRF	VRF (L3 Context)	Creates Layer 3 context (VRF) in a tenant.
ACI: Bridge Domain	Bridge Domain	Adds a bridge domain in a tenant.
ACI: Application Profile	Application Profile	Adds an application profile in a tenant.

Custom Resource	APIC Resource	Description
ACI: EPG	Application EPG	Creates an Application EPG. You can add a VMM domain association. Ensure that you have created a valid VMM domain on the APIC before using this workflow.
ACI: Security Filter	Filter with rule entry list	Creates a Security Policy Filter. You can add or remove access list rules associated with a Security Policy Filter. The access list rules are of the format <source-port, destination-port, protocol, ethertype>. **Note** The source and destination Ports are not allowed for arp, icmp, icmpv6 rules. Ports are valid only for tcp and udp protocols. The access list rules are deployed and enforced in ACI fabric and they are stateless in nature.
ACI: Contract	Contract (Policy)	Creates the security policy/contract between tenant networks. For example: APIC contracts between consumer EPG and provider EPG.

Table 2: Cloud Templates

Cloud Template	APIC Object
Create Tenant	Tenant
Create VRF	VRF (L3 Context)
Create Application Profile	Application Profile
Create Tenant and Application Profile	Tenant and Application Profile
Create Bridge Domain	Bridge Domain
Create Application EPG	Application EPG
Deploy ACI network resources	Tenant, VRF, Application Profile, BD, EPG
Create Security Filter	Filter with rule entry list
Create Contract	Contract (Policy)
Create Contract and Security Filter	Filter and Contract
Deploy EPGs, Contract and Security Filter	Provider, Consumer EPGs, Filter and Contract

Supplementary Workflows

The following workflows are provided, for updating the APIC Account in projects:

- Set Default APIC Account
- Display vRA Projects in APICs
- Updating an APIC Account

Note It is mandatory for vRO service administrator to use the Orchestrator to configure ACI connections so that the service users can request and deploy ACI resources without the knowledge of the login details for an APIC account. This information is not exposed to Cloud Assembly and Service Broker.

Changing a Default APIC Account

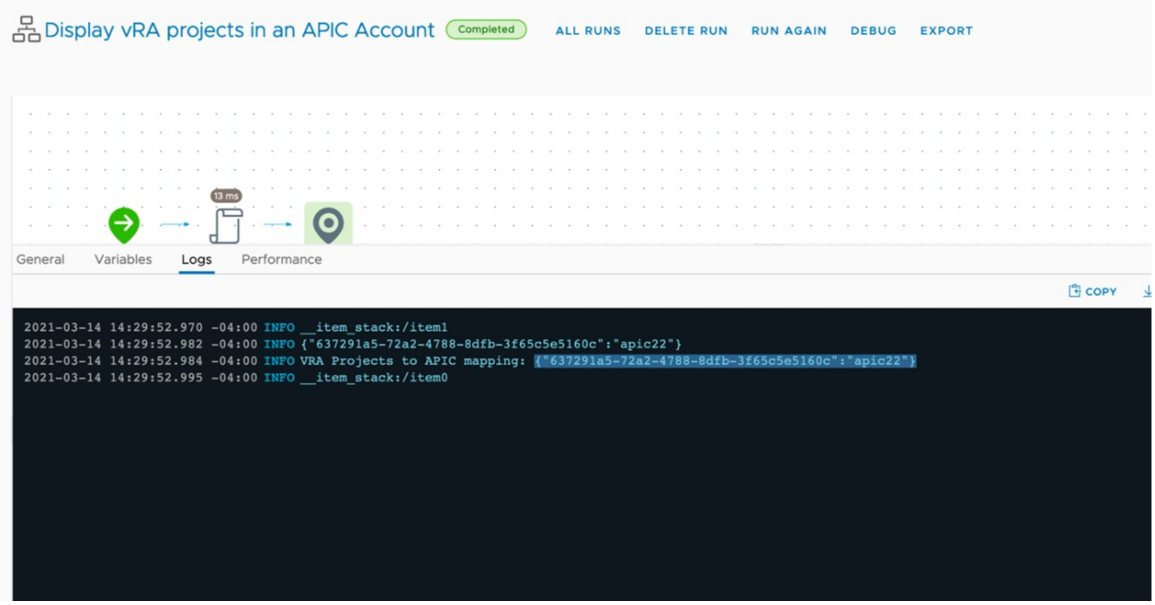
When a Cloud Template belonging to a vRA project is deployed, the Cisco ACI vRealize 8 plug-in finds the APIC associated to that project and creates the requested APIC objects on it. But if you choose to run Orchestrator workflows, there is no project information available. In this case, the Cisco ACI vRealize 8 plug-in creates objects on the default APIC account.

The very first APIC Account created will be used by default. To change the default account, use the *Set Default APIC Account* workflow.

Note To use the above workflow, ensure you have atleast two different APIC accounts.

Getting a list of all vRA Projects connected to APIC Accounts

Run *Display vRA projects in an APIC Account* workflow to get a list of all the project IDs associated to an APIC account. You can check the list of projects under the **Logs** tab (as displayed below).



```
2021-03-14 14:29:52.970 -04:00 INFO __item_stack:/item1
2021-03-14 14:29:52.982 -04:00 INFO {"637291a5-72a2-4788-8dfb-3f65c5e5160c":"apic22"}
2021-03-14 14:29:52.984 -04:00 INFO VRA Projects to APIC mapping: {"637291a5-72a2-4788-8dfb-3f65c5e5160c":"apic22"}
2021-03-14 14:29:52.995 -04:00 INFO __item_stack:/item0
```

Updating an APIC Account

Use this workflow to reconnect to an APIC account in case of a password change. Provide the valid APIC configurations again and execute this workflow. Ensure that the APIC acccount is disconnected from the Orchestrator, before reconnecting.

APIC Object Configurations

This section provides details for creating APIC objects using cloud templates and custom resources.

Operations on APIC Objects

The following CRUD (Create, Read, Update, Delete) operations can be performed on APIC objects.

> **Note** The **Update** operation can not be performed on all objects.

CRD operations on Tenant

- Parameters—*Name, aaaDomain*

CRD operations on Application Profile

- Parameters—*Name, Tenant Name*

CRD operations on VRF

- Parameters—*Name, Tenant Name*

CRUD operations on Bridge Domain

- Parameters— *Name, Tenant name, VRF name, Subnets*
- Option to set scope of the subnet. It is set to *private* by default. Use the *Update* operation to modify subnets and their scopes.

CRUD operations on EPGs

- Parameters—*Name, Tenant name, Application Profile name, Bridge Domain, VMM Domains.*
- VMM domain profiles can be attached to an EPG if it is already created on the APIC. They can be added/deleted as part of the update operation.

CRUD operations on Contracts

- Parameters—*Name, Tenant name, Consumers, Providers, Filters.*
- Default subject, `default_vra_subj` is created.
- Users cannot create subjects.
- Plug-in creates contracts only with a single subject.
- Consumer and provider contracts can be added to- applications EPGs and L3Out/ external EPGs. You have to provide the consumer and provider EPG DNs. An example is shown here:

```
App EPG Dn : uni/tn-<tenant_name>/ap-<ap_name>/epg-<epg_name>
```

```
External/L3 Out Dn: uni/tn-<tenant_name>/out<L3Out_name>/instP-<extEpg_name>
```

CRUD operations on Filters

- Parameters—*Name, Rules.*
- If you want to attach rule entries, create a valid rule entry list, using the values as indicated below (the available options are listed):
  - dstFormPort—Blank, Unspecified, 1-65535
  - dstToPort—Blank, Unspecified, 1-65535
  - protocol—icmp, icmpv6, tcp, udp, Blank
  - etherType—ip, arp

Note You can use APIC objects in tenant common.

Troubleshooting

This section describes troubleshooting techniques.

Collecting Logs

Use this procedure to collect the log files from the vRealize Appliance.

The Cisco ACI vRealize 8 plug-in for VMware vRealize 8 supports the following log levels:

- Info
- Debug
- Error
- Warn

You can collect logs from the following location on the vRA appliance - `/services-logs/prelude/vco-app/file-logs`

To collect logs explicitly for the Cisco ACI vRealize 8 plug-in, use the following steps:

Procedure

Step 1 Ssh to the vRA appliance as root using - `$ssh root@vra_ip`.

Step 2 Cd to `/data/vco/usr/lib/vco/app-server/conf`

Step 3 Modify `log4j2.xml` file and add a file appender and logger for storing the plug-in logs.

```
<Appenders>
   <RollingFile name="APICPLUGIN_FILE"
         fileName="/usr/lib/vco/app-server/logs/apic_plugin.log"
         filePattern="/usr/lib/vco/app-server/logs/apic_plugin.log%i" >
        <PatternLayout pattern="%d{yyyy-MM-dd HH:mm:sss} %-5p {|%X{tenantId}|%X{username}:%X{tokenctx}}
 [%c{1}] %m%n"/>
         <Policies>
             <SizeBasedTriggeringPolicy size="20MB"/>
         </Policies>
         <DefaultRolloverStrategy max="5"/>
     </RollingFile>
</Appenders>

<Loggers>
    <Logger name="com.cisco.apic" additivity="true" level="ALL">
        <AppenderRef ref="APICPLUGIN_FILE"/>
        <AppenderRef ref="CONSOLE"/>
    </Logger>
</Loggers>
```

Step 4 Restart the service for changes to take effect.

Step 5 Run `Docker ps | grep vco-server-app`, to find the docker container for Orchestrator.

Step 6 Run `Docker container restart` *`container`*, to restart the container. See example, below:

```
Docker container restart
k8s_vco-server-app_vco-app-c95cd9d49-v2xbg_prelude_6661b80c-30bb-42b6-b73d-b3a4aa03a9a8_116
```

Step 7 Wait for 5-10 mins for the Orchestrator to restart.

The Cisco ACI vRealize 8 plug-in logs are here - `/data/vco/usr/lib/vco/app-server/logs/apicplugin_out.log`.

Uninstalling the Cisco ACI vRealize 8 Plug-in

Use this procedure for deleting/ uninstalling the Cisco ACI vRealize 8 plug-in.

Note To upgrade to a new version, uninstall the plugin completely and then install the plugin afresh.

Procedure

Step 1 Login to the vRealize Orchestrator as administrator.

Step 2 Delete all the APIC Accounts by running the *Delete APIC Account* workflow.

Step 3 Login to the vRO Control center as root using *https://<vraURL>/vco-controlcenter.*

Step 4 Navigate to **Manage Plug-Ins**.

Step 5 Locate the Cisco ACI vRealize 8 plug-in, and disable it before deleting it.

Step 6 Verify that the Cisco ACI vRealize 8 plug-in is no longer listed under Plug-Ins.

Plug-in Classes

The following table lists the mapping between plug-in objects and APIC managed objects.

vRA Cloud templates input parameters	**vRO Javascript Object Name**	**APIC Managed Object Name**
Tenant	ApicTenant	com.cisco.apic.mo.fvTenant
Bridge Domain	ApicBridgeDomain	com.cisco.apic.mo.fvBD
VRF	ApicL3Context	com.cisco.apic.mo.fvCtx
Tenant Network (EPG)	ApicEPG	com.cisco.apic.mo.fvAEPg
Security Policy (Contracts)	ApicSecurityPolicy	com.cisco.apic.mo.vzBrCP
Security Filters	ApicSecurityFilter	com.cisco.apic.mo.vzFilter
Security Rules	ApicSecurityRule	com.cisco.apic.mo.vzEntry
VMM Domain	ApicVmmDomain	com.cisco.apic.mo.vmmDomP

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