



# Managing Tenants

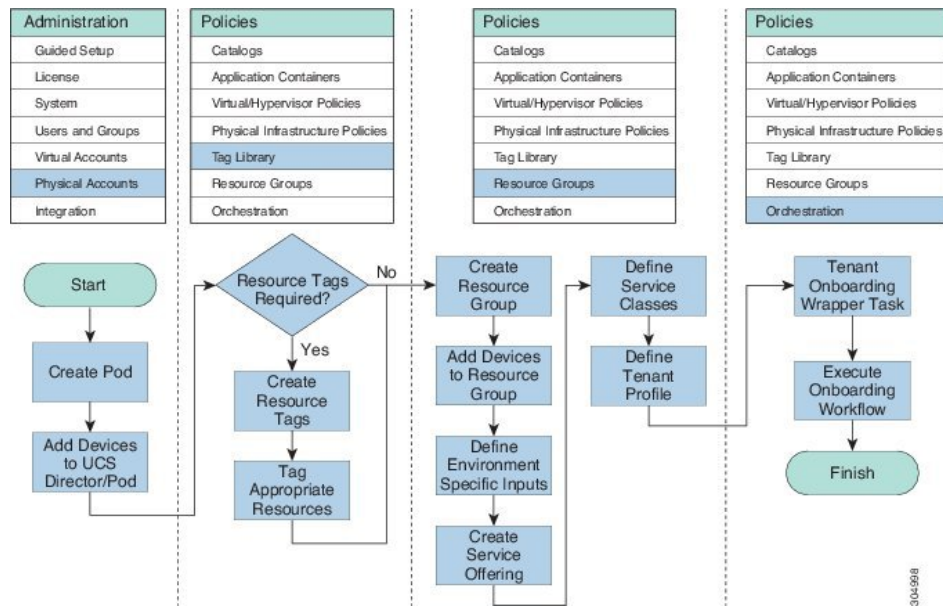
This chapter contains the following sections:

- [Onboarding a Cisco UCS Director Tenant, page 1](#)
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## Onboarding a Cisco UCS Director Tenant

Cisco UCS Director tenants are essentially customers who share the compute, network, and storage resources that are configured for ACI in Cisco UCS Director. The following image explains the end-to-end process flow of the Cisco UCS Director tenant onboarding process.

**Figure 1: APIC Tenant Onboarding Process Flow**



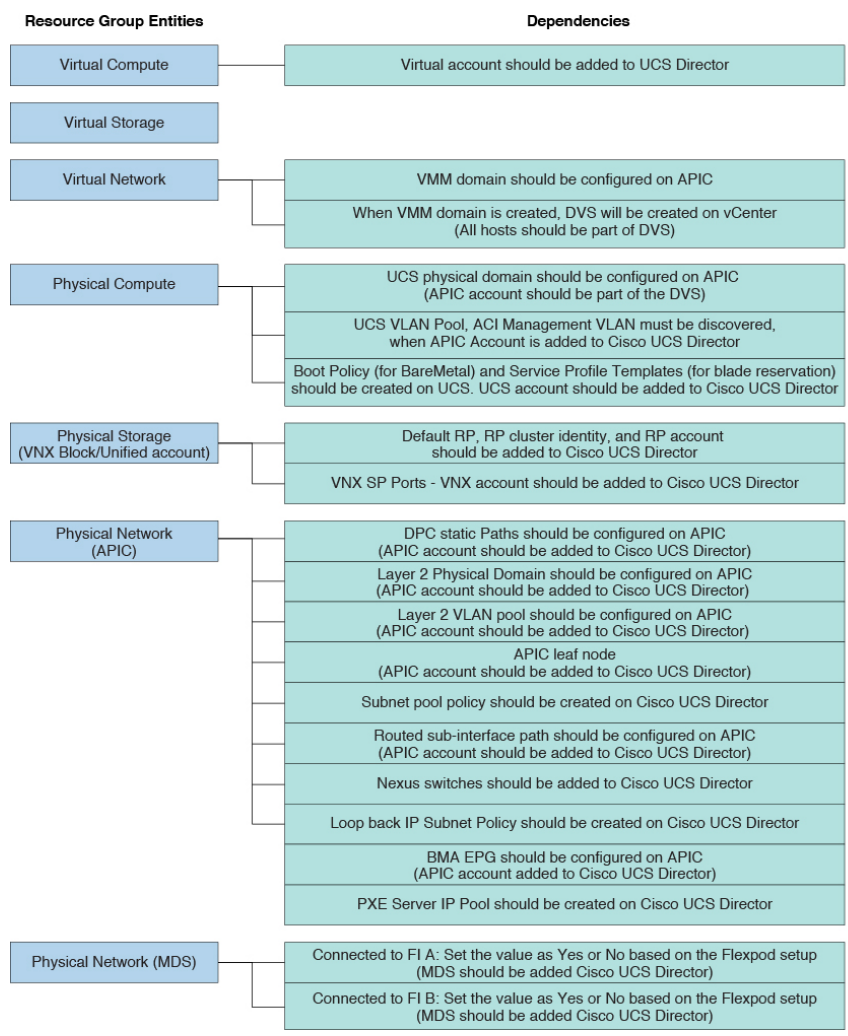
You can also execute the preconfigured tenant onboarding workflow to onboard a tenant. To view the tenant onboarding workflows, choose **Policies > Orchestration** and click the **Workflows** tab. In the **Workflows** tab, choose one of the following paths:

- **APIC Usecases > Tenant Usecases > VNX Storage Tenant Usecases**
- **APIC Usecases > Tenant Usecases > NetApp Storage Tenant Usecases**

For more information on how to execute a workflow, see the [Cisco UCS Director Orchestration Guide](#).

Ensure that the environment variables are defined for the physical and virtual infrastructure resources in a resource group that is used for onboarding a tenant. The following image explains the dependencies of the physical and virtual infrastructure resources.

**Figure 2: Resource Group Entities - Dependency**



**Workflows for Onboarding a Tenant**

Cisco UCS Director provides the following preconfigured orchestration workflows for secure tenant onboarding:

- NetApp workflows:

- FlexPod ACI - Tenant Infrastructure Configuration—Use this workflow to create an APIC tenant, configure the tenant-dedicated NetApp storage, configure the ACI fabric for NFS data store connectivity, and provide a tenant-dedicated NFS data store to an ESXi cluster. For more information on how to deploy Cisco UCS Director on FlexPod with Cisco Application Centric Infrastructure using the FlexPod ACI - Tenant Infrastructure Configuration workflow, see the [Deployment Guide for FlexPod with VMware vSphere 5.5 Update 1, Cisco UCS Director and Cisco Nexus 9000 Cisco Application Centric Infrastructure \(ACI\)](#).




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**Note** If the NetApp device uses ONTAP 8.3 operating system, ensure that the following tasks are added before the Create Failover Group tasks:

- custom BroadcastDomain\_CLI
  - SSH command
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This workflow includes the following child workflows:

- Tenant Onboarding - L2 Out—Use this workflow to configure the Layer 2 out configuration for the APIC tenant.
- Tenant Onboarding - L3 Out—Use this workflow to configure the Layer 3 out configuration for the APIC tenant. When executing this workflow, set the Ethernet interfaces, BGP ID, and subnet IP addresses. In the **Workflow Designer** dialog box, double-click the **SSH Command** task and navigate to **Task Inputs** screen by clicking **Next**. The administrator has to define the sub interface for the configuration by editing the values of the following task inputs:
  - interface ethernet 1/49. \${GenerateVLANfrompool\_820.OUTPUT\_VLAN\_ID}
  - interface ethernet 1/50. \${GenerateVLANfrompool\_820.OUTPUT\_VLAN\_ID}
  - router bgp 10
  - neighbor \${GetIPAddressFromIPSubnet\_7135.IPAddress} remote-as 100
  - neighbor \${GetIPAddressFromIPSubnet\_7136.IPAddress} remote-as 100
- FlexPod ACI - Enable Tenant Infrastructure Support For Guest Attached iSCSI—Use this workflow to configure iSCSI support on the NetApp storage, and configure iSCSI-A and iSCSI-B paths from the storage virtual machine to the ESXi cluster through the ACI fabric.




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**Note** If the NetApp device uses ONTAP 8.3 operating system, ensure that the following tasks are added before the Create Failover Group tasks:

- custom BroadcastDomain\_CLI
  - SSH command
- 

- FlexPod ACI - Enable Connectivity for VM Application Consistent Snapshots—Use this workflow to configure an ACI contract between the tenant-dedicated VMNET EPG and the tenant storage

virtual machine management EPG to meet the connectivity requirements defined by the NetApp SnapDrive software.

- VNX Workflows:

- Tenant Onboarding with MSP - VNX—Use this workflow to onboard a tenant for Managed Service Provider (MSP) organization on the VNX storage device.




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**Note** If you have not enabled the service provider feature in Cisco UCS Director, the Tenant Onboarding with MSP - VNX workflow will be in the validation failed state. To enable a service provider, choose **Administration > System > Service Provider Feature**, and check the **Enable Service Provider Feature (Requires System Restart)** check box. Restart the service and validate the Tenant Onboarding with MSP workflow.

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This workflow includes the following child workflows:

- Tenant Onboarding - L2 Out—Use this workflow to configure the Layer 2 out configuration for the APIC tenant.
- Tenant Onboarding - L3 Out—Use this workflow to configure the Layer 3 out configuration for the APIC tenant.
- DR Cluster with RP support—Use this workflow to create replica of data cluster with the RP support in a tenant. Provide the following RP-related information in addition to the cluster information: RP account identity, RP cluster identity, and tenant CG identity.  
When updating a tenant, provide the primary and secondary CG copy identities. To handle a failover scenario for a tenant with the disaster recovery (DR) support, same LUN ID and host LUN (HLU) ID are needed in the primary and secondary sites. During tenant onboarding, the same LUN ID and HLU ID are reserved on the primary and secondary sites, based on the availability of the selected VNX account and VMware host.
- DR Tenant Onboarding with MSP - VNX—Use this workflow to onboard a tenant with the DR support for MSP organization on the VNX storage device.
- Tenant Onboarding - Datastore Cluster Creation - VNX—Use this workflow to create data store cluster for a tenant.
- Reserve Blade on UCSM—Use this workflow to reserve half- or full-width blades on Cisco UCS Manager for the tenant.
- Tenant Onboarding - VNX—Use this workflow to onboard a tenant for a user group on the VNX storage device.

This workflow includes the following child workflows:

- Tenant Onboarding - L2 Out—Use this workflow to configure the Layer 2 out configuration for the APIC tenant.
- Tenant Onboarding - L3 Out—Use this workflow to configure the Layer 3 out configuration for the APIC tenant.
- DR Cluster with RP support—Use this workflow to create a replica of a data cluster with RP support in a tenant.

Provide the following RP-related information in addition to the cluster information: RP account identity, RP cluster identity, and tenant CG identity. When updating a tenant, provide the primary and secondary consistency group (CG) copy identities.

To handle a failover scenario for a tenant with the disaster recovery (DR) support, the same LUN ID and host LUN (HLU) ID are needed in the primary and secondary sites. During tenant onboarding, the same LUN ID and HLU ID are reserved on the primary and secondary sites, based on the availability of the selected VNX account and VMware host.

- DR Tenant Onboarding with MSP - VNX—Use this workflow to onboard a tenant with the DR support for MSP organization on the VNX storage device.
  - Reserve Blade on UCSM—Use this workflow to reserve half- or full-width blades on Cisco UCS Manager for the tenant.
- Update Tenant:
    - Update Tenant - Datastore Cluster Creation - VNX—Use this workflow to add VNX data store to the tenant data store cluster.
    - Update Tenant - VNX—Use this workflow to update the physical and virtual resources of the tenant, such as memory, number of CPUs, number of VDCs, and number of full-width and half-width blades.
    - DR Update Tenant - VNX—Use this workflow to update the physical and virtual resources of the tenant, such as memory, number of CPUs, number of VDCs, number of full-width and half-width blades, and reserved space of the physical server.
  - Tenant Onboarding with Private Network(s)—Use this workflow to onboard a tenant with one or more private networks.
  - Update Tenant vPOD with Existing Resources—Use this workflow to update the vPOD information with multiple data stores and multiple data store clusters, for a tenant. Choose the tenant that you want to update, and the service offering with which the tenant is onboarded. The data stores and data store clusters must be part of VMware generic cluster that has been selected during tenant onboarding.

## Example: VNX Tenant Onboarding

This section describes the step-by-step process involved in onboarding a tenant on the VNX storage device for Managed Service Provider (MSP) organization through the user interface.

**Step 1** Add a pod. For more information, see the [Cisco UCS Director Administration Guide](#).

**Step 2** Add the following types of accounts to the pod:

- Physical Compute—Cisco UCS Manager
- Physical Storage—EMC VNX Unified
- Physical Network—APIC account. For more information, see [Adding an APIC Account](#).
- Virtual Account—VMware

For more information on how to create physical and virtual accounts, see the [Cisco UCS Director Administration Guide](#).

**Step 3** Add the pod to a resource group using the **Add Pod to Resource Group** option, to associate the accounts in the pod to the resource group. For more information, see [Adding a Pod to a Resource Group](#).

**Step 4** Choose the resource group and click **Edit** to define the environment variable for each account. For more information, see [Editing a Resource Group](#).

The environment variables that you want to define for the VNX tenant onboarding are:

- Virtual Compute
  - Container Parent Folder—The folder to which you want to add the newly created container.
- Virtual Storage—None.
- Virtual Network
  - VMM domain for VMware—This environment variable is used for onboarding a tenant. vCenter is configured with the Virtual Machine Manager (VMM) domain. When vCenter is associated with the APIC, the distributed virtual switch (DVS) with the same name is created in vCenter.  
Cisco UCS Director offers AVS support in both VLAN and VXLAN mode. The VM gets the VLAN ID or VXLAN ID from the pool assigned to the VMM domain. Choose a VMM domain with the Cisco AV switch to support AVS in the VXLAN mode.
  - DV Switch—This environment variable is used for onboarding a tenant. The DV Switch is used to connect the selected host during tenant onboarding.
- Physical Compute
  - Service Profile Template for Full Width blade—This environment variable is used for the VNX tenant onboarding. The service profile template is used to create a service profile. When a service profile is created, the service profile chooses the free servers from the server pool that is associated with the service profile template.
  - Service Profile Template for Half Width blade—This environment variable is used for the VNX tenant onboarding. The service profile template is used to create a service profile. When a service profile is created, the service profile chooses the free servers from the server pool that is associated with the service profile template.
- Physical Storage
  - SP Port—The storage processor (SP) port for the physical storage account.

If the disaster recovery support is enabled for the onboarding a tenant, define the following environment variables for the physical storage:

- Default Recovery Point—The recovery point attached to the VNX account.
- Recovery Point Cluster Identity—The identity of the recovery point attached to the VNX account.
- Physical Network
  - DPC Static path 1—The static path of the first Direct Port Channel (DPC).
  - DPC Static path 2—The static path of the second DPC.

- L2 Physical Domain—The physical domain of layer 2.

**Note** To onboard a tenant with Layer 2 configuration, set the value for the DPC Static Paths and L2 Physical Domain.

- Step 5** Add a service offering and define the service class for each resource type (physical compute, physical storage, physical network, virtual compute, virtual storage, and virtual network). The service offering defines the resource requirements of the tenant. For more information on how to add a service offering, see [Adding a Service Offering](#).
- Step 6** Add a tenant profile. In the **Add Tenant Profile** dialog box, choose the service offering that you added in [Step 5](#) and add the resource group to the service offering. For more information on how to add a tenant profile, see [Adding a Tenant Profile](#).
- Step 7** Enable the service provider feature in Cisco UCS Director as follows:
- a) On the menu bar, choose **Administration > System > Service Provider Feature**.
  - b) Check the **Enable Service Provider Feature (Requires System Restart)** check box. The first level and second-level organization names appear.
  - c) Click **Submit**.
- Step 8** Restart the service to enable the service provider.
- Step 9** Validate the Tenant Onboarding with MSP workflow to move the workflow from the validation failed state to valid state.
- Step 10** Edit the VNX Tenant Onboarding workflow to enter the mandatory input values as follows:
- a) Choose **Policies > Orchestration** and click the **Workflow** tab.
  - b) Choose **APIC Usecases > Tenant Usecases > VNX Storage Tenant Usecases**.
  - c) Choose the Tenant Onboarding with MSP - VNX workflow and click **Edit Workflow**.
  - d) In the **Edit Workflow Details** screen, do the necessary changes.
  - e) Click **Next**.
  - f) In the **Edit User Inputs** screen, do the following:
    - Set the values for data store size limit, VM over subscription, CPU reservation, maximum number of subnets, and maximum number of tiers per VDC. For instance, you can set the values as:
      - Datastore Size Limit (GB)—75 GB
      - VM Over Subscription—5
      - CPU Reservation (MHz)—2000
      - Maximum number of Subnets—32
      - Maximum number of Tiers per VDC—8
  - g) Click **Next**.
  - h) Click **Submit**.
- Step 11** Choose the VNX Tenant Onboarding workflow and click **Validate Workflow** to validate the workflow.
- Step 12** Double-click the VNX Tenant Onboarding workflow.
- Step 13** In the **Workflow Designer** dialog box, click **Edit Workflow Properties** to view the tasks and to edit user inputs that are used for task input mapping for this workflow, if necessary.
- Step 14** (Optional) Add an advanced type catalog for onboarding a tenant and publish the catalog as follows:
- a) On the menu bar, choose **Policies > Catalogs**.



- b) Click **Add**.
- c) From the **Catalog Type** drop-down list, choose **Advanced**.
- d) In the **Add Catalog** dialog box, enter the basic information for the catalog.
- e) Click **Next**.
- f) In the **vApp Workflow** screen, click **Select** and choose the VNX Tenant Onboarding workflow.
- g) Click **Submit**.

**Step 15** Onboard a tenant in one of the following ways:

- Executing the Tenant Onboarding with MSP - VNX workflow.
  - 1 Choose **Policies > Orchestration** and click the **Workflow** tab.
  - 2 Choose **APIC Usecases > Tenant Usecases**.
  - 3 Choose the Tenant Onboarding with MSP - VNX workflow and click **Execute Now**.
  - 4 In the **Executing Workflow: Tenant Onboarding with MSP - VNX** screen, complete the following fields:

Field	Description
<b>Tenant Profile</b> field	Click <b>Select</b> and choose a tenant profile that was added in <a href="#">Step 6</a> .
<b>Service Offering</b> field	Click <b>Select</b> and choose a service offering that was added in <a href="#">Step 5</a> .
<b>Tenant Name</b> field	The name of the tenant.
<b>Tenant Description</b> field	The description of the tenant.
<b>MSP Admin Username</b> field	The username of the MSP who can access the tenant.
<b>MSP Admin Password</b> field	The password to access the tenant.
<b>MSP Admin Email</b> field	The email address of the MSP who can access the tenant.
<b>Datastore Size (GB)</b> field	The datastore size of the tenant in GB.
<b>Memory Reservation (MB)</b> field	The maximum limit of memory reserved for the tenant in MB.
<b>No of CPU</b> field	The number of CPUs needed for the tenant.
<b>No of VDCs</b> field	The number of virtual data centers (VDCs) needed for the tenant. <b>Note</b> The number of VDCs determine the subnet size for the supernets provided (while tenant onboarding) for each tier of the application container.
<b>No of Half Width Blades</b> field	The number of half width blades needed for the tenant.



Field	Description
No of Full Width Blades field	The number of full width blades needed for the tenant.
Replication Required drop-down list	By default, <b>No</b> is displayed. If you choose <b>Yes</b> , the DR Tenant Onboarding with MSP - VNX workflow is invoked. A tenant with the DR support is onboarded for MSP organization on the VNX storage device.
L2 Or L3 External Network Configuration drop-down list	Choose one of the following to perform Layer 2 out or Layer 3 out configuration during tenant onboarding: <ul style="list-style-type: none"> <li>• <b>None</b>—To use only the normal network configuration for the tenant.</li> <li>• <b>L2 out</b>—To configure the Layer 2 out configuration for the tenant.</li> <li>• <b>L3 out</b>—To configure the Layer 3 out configuration for the tenant.</li> </ul>
L2 VLAN ID field	The VLAN ID to be assigned for the layer 2 port.
L2 IP Subnet (x.x.x.x/n) field	The IP subnet pool from which the IP address need to be assigned to layer 2 ports.
Tenant IP Subnet (x.x.x.x/n) field	The IP subnet pool from which the IP address need to be assigned to tenant.
Create Shared IP Subnet Pool check box	Check the check box to share the IP address among tiers in the tenant.
Private IP Subnet Pool Policy field	Click <b>Select</b> and choose a subnet pool policy from which the private IP address is assigned to tenants
Resource Selection For Network Device (ND) drop-down list	Choose one of the following: <ul style="list-style-type: none"> <li>• <b>Use Tenant Resources</b>—To use the resources allocated for the tenant.</li> <li>• <b>Use Existing Resources</b>—To use the common resources available in the vCenter.</li> <li>• <b>Provision New Resources</b>—To define new resources by providing input in the <b>Datastore Size (GB) (For ND)</b>, <b>No of CPU (For ND)</b>, and <b>Memory Reservation (MB) (For ND)</b> fields.</li> </ul>
Provide input in the following fields only when <b>Provision New Resources</b> is chosen from the <b>Resource Selection For Network Device (ND)</b> drop-down list.	

Field	Description
<b>Datastore Size (GB) (For ND)</b> field	The maximum size of the data store in GB that can be allotted for the network devices.
<b>No of CPU (For ND)</b> field	The maximum number of CPU allotted for the network devices.
<b>Memory Reservation (MB) (For ND)</b> field	The maximum memory reservation for the network devices in MB.

**Note** During provisioning of container VM, Cisco UCS Director uses the tenant resource pool and data store. During provisioning of network related VM, Cisco UCS Director uses the network device resource pool and data store.

- 5 Click **Submit**.
- Creating a service request.
    - 1 On the menu bar, choose **Organizations > Service Requests**.
    - 2 Click the **Service Requests** tab.
    - 3 Click **Create Request**.
    - 4 In the **Create Service Request** dialog box, choose the **Group**, **Catalog Type** (Advanced), and the **Catalog** (which is created in [Step 14](#)).
    - 5 Click **Next**.
    - 6 In the **Custom Workflow** screen, provide the custom workflow input values.
      - From the **Replication Required** drop-down list, choose **Yes** to invoke the **DR Tenant Onboarding with MSP - VNX** workflow is invoked. A tenant with the DR support is onboarded for MSP organization on the VNX storage device.
      - Provide the IP range for the IP subnet pool. Each container gets a unique subnet address from the IP subnet pool. By default, the overlapping of the IP addresses is not allowed. If you want to enable the IP address overlapping for the tiers, check the **Create Shared IP Subnet Pool** check box.
    - 7 Review the summary for the service request.
    - 8 Click **Submit**.
  - Using the userAPISubmitVAppServiceRequest REST API.
    - 1 On the menu bar, choose **Policies > Orchestration**.
    - 2 Click the **REST API Browser** tab.
    - 3 Enter **userAPISubmitVAppServiceRequest** in the **Search** field at the top right corner of the **Rest API Browser** tab.

- 4 Double-click **userAPISubmitVAppServiceRequest**. The REST API browser displays the following tabs: API Examples, Details, and Summary.
  - 5 In the **API Examples** tab, click **Generate URL**.
  - 6 In the param0 variable, pass the catalog name.
  - 7 In the param1 variable, pass such tenant details as tenant name, tenant description, MSP admin details, data store size, memory reservation, number of CPUs, number of VDCs, number of half-width blades, number of full-width blades, L2 or L3 external network configuration, L2 VLAN ID, L2 IP subnet, and replication required.  
**Note** For onboarding a tenant without Layer 2 configuration, pass **none** as the value for the following variables: L2 or L3 external network configuration, L2 VLAN ID, and L2 IP subnet.
  - 8 Click **Execute REST API**. The REST API browser displays the service request ID in the **Response** field.
  - 9 Choose **Organizations > Service Requests**. In the **Service Request** tab, choose the service request and click **View Details** to view the workflow status and log details of the service request.
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## Example: Flexpod ACI – Tenant Infrastructure Configuration

This section describes the step-by-step process involved in onboarding a tenant on the NetApp storage device using the Flexpod ACI – Tenant Infrastructure Configuration workflow.

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**Step 1** Add a pod. For more information, see the [Cisco UCS Director Administration Guide](#).

**Step 2** Add the following types of accounts to the pod:

- Physical Compute—Cisco UCS Manager
- Physical Storage—NetApp Cluster-Mode
- Physical Network—APIC account. For more information, see [Adding an APIC Account](#).
- Virtual Account—VMware

For more information on how to create physical and virtual accounts, see the [Cisco UCS Director Administration Guide](#).

**Step 3** Add the pod to a resource group using the **Add Pod to Resource Group** option, to associate the accounts in the pod with the resource group. For more information, see [Adding a Pod to a Resource Group](#).

**Step 4** Choose the resource group and click **Edit** to define the environment variable for each account. For more information, see [Editing a Resource Group](#).

The environment variables that you want to define for the NetApp tenant onboarding are:

- Virtual Compute
  - Container Parent Folder—The folder to which you want to add the newly created container.
- Virtual Storage—None.

- Virtual Network
  - VMM domain for VMware—This environment variable is used for onboarding a tenant. vCenter is configured with the Virtual Machine Manager (VMM) domain. When vCenter is associated with the APIC, the distributed virtual switch (DVS) with the same name is created in vCenter.
  - Cisco UCS Director offers AVS support in both VLAN and VXLAN mode. The VM gets the VLAN ID or VXLAN ID from the pool assigned to the VMM domain. Choose VMM domain with Cisco AV switch to support AVS in VXLAN mode.
  - DV Switch—This environment variable is used for onboarding a tenant. The DV Switch is used to connect the selected host during tenant onboarding.
- Physical Compute
  - Physical Domain for UCS—This environment variable is used for baremetal provisioning. The physical domain for Cisco UCS.
  - Vlan Pool—The VLAN pool from which you want to assign a VLAN ID for the account.
- Physical Storage
  - Physical Domain for NetApp—The physical domain that is used to connect the NetApp account to the APIC.
  - Vlan pool—The VLAN pool that is used to create the cluster vServer.
  - SP Port—This environment variable is used for VNX-type accounts. The storage processor (SP) port for the physical storage account.
  - NFS Vlan Pool—This environment variable is used to define a VLAN pool. Individual VLANs are then assigned to physical storage account dynamically from the pool.
  - SVM mgmt Vlan Pool—The VLAN pool for management of a Storage Virtual Machine (SVM).
  - iSCSI\_A VLAN Pool—The VLAN pool from which a VLAN is chosen as iSCSI\_A VLAN.
  - iSCSI\_B VLAN Pool—The VLAN pool from which a VLAN is chosen as iSCSI\_B VLAN.
  - APIC vPC Static Path for Node 1—The static path of virtual port channel (vPC) for node 1.
  - APIC vPC Static Path for Node 2—The static path of virtual port channel (vPC) for node 2.
  - NFS IP Subnet Pool Policy—The subnet IP pool policy for NFS.
  - iSCSI\_A IP Subnet Pool Policy—The IP subnet pool policy to be used for the first iSCSI VLAN.
  - iSCSI\_B IP Subnet Pool Policy—The IP subnet pool policy to be used for the second iSCSI VLAN.
  - SVM mgmt IP Subnet Pool Policy—The subnet IP pool policy for SVM management.
  - VMNet IP Subnet Pool Policy—The subnet IP pool policy for VM network.
  - APIC Vlan Pool for Node 1—The APIC VLAN pool from which the VLAN ID must be assigned for node 1.
  - APIC Vlan Pool for Node 2—The APIC VLAN pool from which the VLAN ID must be assigned for node 2.
  - Cluster Node 1 Identity—The identity of the first Netapp C-mode account node.

- Cluster Node 2 Identity—The identity of the second Netapp C-mode account node.

- Physical Network

- IP Pool—The IP pool that is used to assign the IP addresses between the NetApp data store and host vmkernel.
- DPC Static path 2—The static path of the second DPC.
- L2 Physical Domain—The physical domain of Layer 2.

**Note** To onboard a tenant with Layer 2 configuration, set the value for the DPC Static Paths and L2 Physical Domain.

**Step 5** Add a service offering and define the service class for each resource type (physical compute, physical storage, physical network, virtual compute, virtual storage, and virtual network). The service offering defines the resource requirements of tenant. For more information on how to add a service offering, see [Adding a Service Offering](#).

**Step 6** Add a tenant profile. In the **Add Tenant Profile** dialog box, choose the service offering that you have added in Step 5 and add the resource group to the service offering. For more information on how to add a tenant profile, see [Adding a Tenant Profile](#).

**Step 7** Edit the Flexpod ACI – Tenant Infrastructure Configuration workflow to enter the mandatory input values as follows:

- a) Choose **Policies > Orchestration** and click the **Workflow** tab.
- b) Choose **APIC Usecases > Tenant Usecases > NetApp Storage Tenant Usecases**.
- c) Choose the Flexpod ACI – Tenant Infrastructure Configuration and click **Edit Workflow**.
- d) In the **Edit Workflow Details** screen, do the necessary changes.
- e) Click **Next**.
- f) In the **Edit User Inputs** screen, set the values for mandatory parameters.

- Set the values for VM over subscription, CPU reservation, maximum number of subnets, and maximum number of tiers per VDC. For instance, you can set the values as:

- Maximum number of Subnets—32
- Maximum number of Tiers per VDC—8
- VM Over Subscription—5
- CPU Reservation (MHz)—2000

- g) Click **Next**.
- h) Click **Submit**.

**Step 8** Choose the Flexpod ACI – Tenant Infrastructure Configuration workflow and click **Validate Workflow** to validate the workflow.

**Step 9** Double-click the Flexpod ACI – Tenant Infrastructure Configuration workflow.

**Step 10** In the **Workflow Designer** dialog box, click **Edit Workflow Properties** to view the tasks and edit user inputs that are used for task-input mapping for this workflow, if necessary.

**Step 11** Add an advanced type catalog for onboarding a tenant and publish the catalog as follows:

- a) On the menu bar, choose **Policies > Catalogs**.
- b) Click **Add**.
- c) From the **Catalog Type** drop-down list, choose **Advanced**. Click **Submit**.

- d) In the **Add Catalog** dialog box, enter the basic information for the catalog.
- e) Click **Next**.
- f) In the **vApp Workflow** screen, click **Select** and choose the Flexpod ACI – Tenant Infrastructure Configuration workflow.
- g) Click **Submit**.

**Step 12** After publishing a catalog, you can onboard a tenant in one of the following ways:

- Creating a service request.
    - 1 On the menu bar, choose **Organizations > Service Requests**.
    - 2 Click the **Service Requests** tab.
    - 3 Click **Create Request**.
    - 4 In the **Create Service Request** dialog box, choose the **Group**, **Catalog Type** (Advanced), and the **Catalog** (that is created in Step [Step 11](#)).
    - 5 Click **Next**.
    - 6 In the **Custom Workflow** screen, provide the custom workflow input values. You have to provide the IP range for the IP subnet pool. Each container gets a unique subnet address from the IP subnet pool. By default, the overlapping of the IP addresses is not allowed. If you want to enable the IP address overlapping for the tiers, check the **Create Shared IP Subnet Pool** check box.
    - 7 Review the summary for the service request.
    - 8 Click **Submit**.
  - Using the userAPISubmitVAppServiceRequest REST API.
    - 1 On the menu bar, choose **Policies > Orchestration**.
    - 2 Click the **REST API Browser** tab.
    - 3 Enter **userAPISubmitVAppServiceRequest** in the **Search** field at the top right corner of the **Rest API Browser** tab.
    - 4 Double-click **userAPISubmitVAppServiceRequest**. The REST API browser displays the following tabs: API Examples, Details, and Summary.
    - 5 In the **API Examples** tab, click **Generate URL**.
    - 6 In the param0 variable, pass the catalog name.
    - 7 In the param1 variable, pass such tenant details as tenant name, tenant description, tenant profile, tenant service offering, tenant contact email address, tenant SVM admin password, data store capacity, data store capacity unit, data store storage snapshot policy, SVM root volume load sharing (LS) snapmirror schedule, memory reservation in MB, number of CPUs, number of VDCs, L2 or L3 external network configuration, L2 VLAN ID, and L2 IP Subnet address.
    - 8 Click **Execute REST API**. The REST API browser displays the service request ID in the **Response** field.
    - 9 Choose **Organizations > Service Requests**. In the **Service Request** tab, choose the service request and click **View Details** to view the workflow status and log details of the service request.
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## Example: Tenant Onboarding with Private Network(s)

This workflow is used to onboard a tenant using only the APIC account and VMware account. This section describes the step-by-step process involved in onboarding a tenant with multiple private networks, using the APIC account and VMware account.



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**Note** This example is validated using SDX with VPX instances in one-arm mode.

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### Before You Begin

- Ensure that appropriate tags are created for VMware cluster, data store cluster, and data stores. Also ensure that these tags are used to tag the VMware cluster, data stores cluster, and data stores in virtual compute and virtual storage, manually.
- Ensure that the ESXi clusters and hosts are defined.
- Ensure that the data store and data store clusters are defined.

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**Step 1** Add a pod. For more information, see the [Cisco UCS Director Administration Guide](#).

**Step 2** Add the following types of accounts to the pod:

- Physical Network—APIC account. For more information, see [Adding an APIC Account](#).
- Virtual Account—VMware

For more information on how to create physical and virtual accounts, see the [Cisco UCS Director Administration Guide](#).

**Step 3** Add the pod to a resource group using the **Add Pod to Resource Group** option, to associate the accounts in the pod with the resource group. For more information, see [Adding a Pod to a Resource Group](#).

**Step 4** Choose the resource group and click **Edit** to define the environment variable for each account. For more information, see [Editing a Resource Group](#).

The environment variables that you need to define for the tenant onboarding are:

- Virtual Compute
  - Container Parent Folder—The folder to which you want to add the newly created container.
  - IP Subnet Pool Policy—This environment variable is used for provisioning a container. The APIC container uses the IP subnet pool policy that is defined in Cisco UCS Director. Each tier inside the container gets a unique subnet address from the IP subnet pool policy.
- Virtual Storage—None.
- Virtual Network



- **VMM domain for VMware**—This environment variable is used for onboarding a tenant. vCenter is configured with the Virtual Machine Manager (VMM) domain. When vCenter is associated with the APIC, the distributed virtual switch (DVS) with the same name is created in vCenter.

Cisco UCS Director offers AVS support in both VLAN and VXLAN mode. The VM gets the VLAN ID or VXLAN ID from the pool assigned to the VMM domain. Choose a VMM domain with the Cisco AV switch to support AVS in the VXLAN mode.

- **DV Switch**—This environment variable is used for onboarding a tenant. The DV Switch is used to connect the selected host during tenant onboarding.
- **Physical Network**
  - **L3 Domain**—This environment variable is used to configure the external routed network. The Layer 3 domain of the APIC account.
  - **Path 1 to L3Out**—The first transit path from the ACI Leaf to external router.
  - **Path 2 to L3Out**—The second transit path from the ACI Leaf to external router.
  - **L3 Vlan Pool**—This environment variable is used to configure the external routed network. The pool to be used to get the VLAN ID that is used to communicate between the router and Nexus.
  - **Router IP Pool**—This environment variable is used to configure the external routed network. The IP pool to configure a router ID for any routers on an external Layer 3 network.
  - **SVI IP Pool**—This environment variable is used to configure the external routed network. The subnet for configuring a switch virtual interface (SVI) on APIC leaves.
  - **Node**—This environment variable is used for creating transit EPG. The leaf nodes of the APIC account.
  - **SVI Path**—This environment variable is used to configure the external routed network. The interface connecting APIC to a router on an external Layer 3 network.
  - **L2 Physical Domain**—This environment variable is used for configuring transit EPG. The physical domain for Layer 2.
  - **L2 Transit Vlan Pool**—This environment variable is used for creating transit EPG. The pool to be used to get the VLAN ID for the transit EPG.
  - **LB Cluster IP Pool**—The IP pool to provide the cluster management IP address for the load balancer device cluster.

**Step 5** Add a service offering. During addition of the service offering, ensure that you check the **Override Mandatory Service Class Requirement** check box and define the service class for each resource type (physical network, virtual compute, virtual storage, and virtual network). The service offering defines the resource requirements for the tenant. For more information on how to add a service offering, see [Adding a Service Offering](#).

**Step 6** Add a tenant profile. In the **Add Tenant Profile** dialog box, choose the service offering that you added in [Step 5](#) and add the resource group to the service offering. For more information on how to add a tenant profile, see [Adding a Tenant Profile](#).

**Step 7** To onboard a tenant with multiple private networks, execute the tenant onboarding workflow as follows:

- Choose **Policies > Orchestration** and click the **Workflow** tab.
- Choose **APIC Usecases > Tenant Usecases**.
- Choose the Tenant Onboarding with Private Network(s) workflow and click **Execute Now**.

d) In the **Executing Workflow: Tenant Onboarding with Private Network(s)** screen, complete the following fields:

Field	Description
Tenant Profile field	Click <b>Select</b> and choose a tenant profile that was added in <a href="#">Step 6</a> .
Service Offering field	Click <b>Select</b> and choose a service offering that was added in <a href="#">Step 5</a> .
Tenant Name field	The name of the tenant.
Tenant Description field	The description of the tenant.
Group Admin Username field	The username of the group administrator who can access the tenant.
Group Admin Password field	The password to access the tenant.
Group Admin Email field	The email address of the group administrator who can access the tenant.
No of VDCs field	Number of virtual data centers (VDCs) that are needed for the tenant. <b>Note</b> The number of VDCs determines the subnet size for the supernets provided (while tenant onboarding) for each tier of the application container.
Automatic Datastore Selection check box	Check this check box to choose data stores and data store clusters based on the selected generic VMware cluster.
VMWare ESXi Cluster field	Click <b>Select</b> and choose a VMware ESXi cluster based on the VMware account available in the resource group.
VMWare Datastore Clusters field	This field is optional if the <b>Automatic Datastore Selection</b> check box is checked. Click <b>Select</b> and choose one or more VMware data store clusters which have the matching data stores, from the selected VMware ESXi cluster. The selected data store clusters are added to the vPOD.
VMWare Datastores field	This field is optional if the <b>Automatic Datastore Selection</b> check box is checked. Click <b>Select</b> and choose one or more VMware data stores from the selected VMware ESXi cluster based on the application tier tag value mapping and the data store size requirement during the onboarding. The selected data stores are added to the vPOD.

Field	Description
Area ID field	The identification (ID) of an area that is a logical collection of networks, routers, and links which have the same area identification.
Private Network Profile field	<p>Click the add icon to add a private network to the tenant. In the <b>Add Entry to</b> dialog box, complete the following fields:</p> <ul style="list-style-type: none"> <li>• Private Network—The name of the private network.</li> <li>• Subnets—The subnetwork pool that is used for load-balancer configuration during the container deployment. At least two subnetworks must be defined for the load-balancer configuration. For example, subnetwork for load balancer 1 is 10.1.1.0/24 and subnetwork for load balancer 2 is 10.1.2.0/24.</li> <li>• Supernets—The supernetwork for the tiers. Add supernetwork for tier 1, tier 2, and tier 3. For example, supernetwork for tier 1 is 10.1.3.0/24, supernetwork for tier 2 is 10.1.4.0/24, and supernetwork for tier 3 is 10.1.5.0/24.</li> <li>• Click <b>Submit</b>.</li> </ul>

e) Click **Submit**.

**Note** If the resources are not available in accordance with the container-tier tag mapping, the container provisioning fails.

## Offboarding a Cisco UCS Director Tenant

**Step 1** On the menu bar, choose **Policies > Resource Groups**.

**Step 2** Click the **Tenant Profile** tab.

**Step 3** Choose a tenant profile and click **View Details**.  
The tenants that are onboarded using the tenant profile appear.

**Step 4** Choose the tenant that you want to offboard and click **Delete**.

**Step 5** In the **Tenant** dialog box, click **Delete** to confirm deletion of the tenant.  
The service request that was created related to the tenant is rolled back.

**Note** Alternately, you can delete a tenant from the **Tenant** tab (**Policies > Resource Groups**). In the **Tenant** tab, choose the tenant and click **Delete**.

If the tenant is associated with a container, an error message is displayed. Roll back the service request to completely clean up the resources and container associated with the tenant. You can roll back the service request by using the **Archive** action (**Organizations > Service Requests**) or by using the `userAPIRollbackWorkflow` API.

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