Cisco Application Policy Infrastructure Controller 3.0 with UCS Director 6.5 v1

Last Updated: 03-OCTOBER-2017

About This Demonstration

This guide for the preconfigured Cisco UCS Director demonstration includes:

The following scenarios are included:

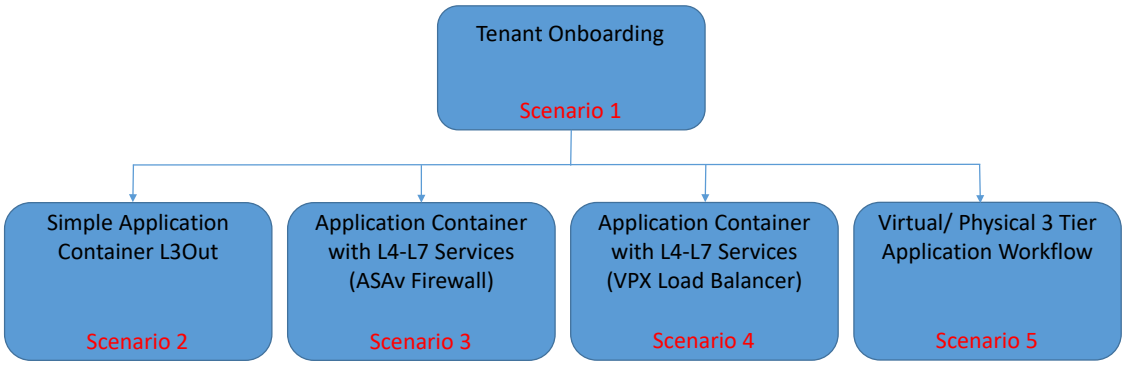
Table 1. Demonstration Workflows

Icon in Catalog	Scenario/ Workflow Name	Workflow Description	Configured Systems	Approximate Workflow Duration
	Tenant Onboarding	This workflow creates a new tenant in UCS Director, allocating infrastructure resources from VMware, and creating a new tenant in ACI.	APIC	30 seconds
	Deploy a Simple 3-Tier Application Container with L3Out	This workflow creates all the APIC objects including EPG, Contracts, Application Profiles, etc for the three tiers (Web, App and DB) of an application. It then creates the VMs and associates them with the APIC-generated Port Profiles.	APIC vSphere	20 minutes*
	Deploy an Application Container with L4-L7 Services (ASAv)	This workflow creates all the APIC objects including EPG, Contracts, and Application Profile for the three tiers (Web, App and DB) of an application. It then creates the VMs and associates them with the APIC-generated port profiles. A Cisco ASAv is deployed to provide additional security between the Web and App tiers, which is integrated with the Application Profile in ACI via a L4-L7 Service Graph, which controls its configuration.	APIC vSphere ASA	25 minutes*

Icon in Catalog	Scenario/ Workflow Name	Workflow Description	Configured Systems	Approximate Workflow Duration
	Deploy an Application Container with L4-L7 Services (Load Balancer)	This workflow creates all the APIC objects including EPG, Contracts, and Application Profile for the three tiers (Web, App and DB) of an application. It then creates the VMs and associates them with the APIC-generated port profiles. Two App servers are deployed, and a Citrix Netscaler VPX Load Balancer is used via a L4-L7 Service Graph to provide additional resilience between the Web and App tiers.	APIC vSphere Citrix Netscaler	20 minutes*
	Deploy a 3-Tier Application with a Physical Server (Emulated)	This workflow, which does not make use of the Application Container constructs, creates the Tenant, EPG, Contracts etc in APIC and clones the VMs needed in the new application (Web and App tiers), then joins the VMs to the newly created port profiles in VC. It also creates the UCS Service Profile for the DB tier in USCM and attaches the VLAN selected in APIC EPG to the new SPs.	APIC vSphere UCSM	20 minutes*
After Each Scenario	Rollback of a UCS Director-Provisioned Configuration	This workflow automatically rolls back any configuration that was initiated via UCS Director.	UCS Director and whichever systems were involved in the original configuration	30 seconds to 15 minutes, depending on which scenario is being rolled back
Troubleshooting	Fix My Demo	Troubleshooting script fixes many common session issues.	Whichever system is having issues	30 seconds to 15 minutes

*** Workflow Durations** are based on an application with 1 Web, 1 App and 1 DB Tier selected. Each additional server increases the time by approximately 5 minutes.

Once Scenario 1 is completed, the other scenarios can be run independently of each other, in any order. As they are quite similar it is recommended to choose one or two scenarios once Tenant Onboarding has been completed.



Requirements

The table below outlines the requirements for this preconfigured demonstration.

Table 2. Requirements

Required	Optional
• Laptop	• Cisco AnyConnect®

About This Solution

This demonstration uses UCS Director to automate the deployment of a 3-Tier Application environment into ACI, UCS, VMware and creates an ASA L4-L7 Device with Service Graph.

The **Cisco Application Policy Infrastructure Controller** (Cisco APIC) is the unifying point of automation and management for the **Application Centric Infrastructure** (ACI) fabric. The Cisco APIC provides centralized access to all fabric information, optimizes the application lifecycle for scale and performance, supporting flexible application provisioning across physical and virtual resources.

Cisco UCS Director (UCSD) improves business agility and increases efficiency by improving infrastructure management and services delivery. It provides unified infrastructure provisioning and automation across computing, networking, and storage resources to reduce complexity for IT operators and administrators.

Application Containers are an object in UCS Director that represent an application instance and it's underlying resources, such as virtual machines, networks, L4L7 services, contracts, etc... Think of it as a correlation between all the application resources that exist across multiple infrastructure components. Once provisioned, an Application Container instance can be managed as a single entity, rather than disparate resources. Lifecycle managed includes, but is not limited to

- Power On/Off entire Application Container (all application VMs)
- Power On/Off individual Application Container VM (individual VMs)
- Delete/De--provision entire Application Container
- Connect to Application Container VM consoles
- Add additional Application Container VMs
- Managed/Edit Application Container Contracts

In UCS Director, in order to provision an Application Container instance, a couple pre-requisites must be fulfilled. First, there must be a tenant that has been onboarded into UCS Director, this tenant must have been allocated the appropriate resources for Application Container provisioning. Second, the admin must create Application Profiles or "blueprints" of what each Application Container offering should look like. These Application Profiles are then configured as templates from which users can requests an Application Container instance or instances and UCS Director will provision based on the template chosen.

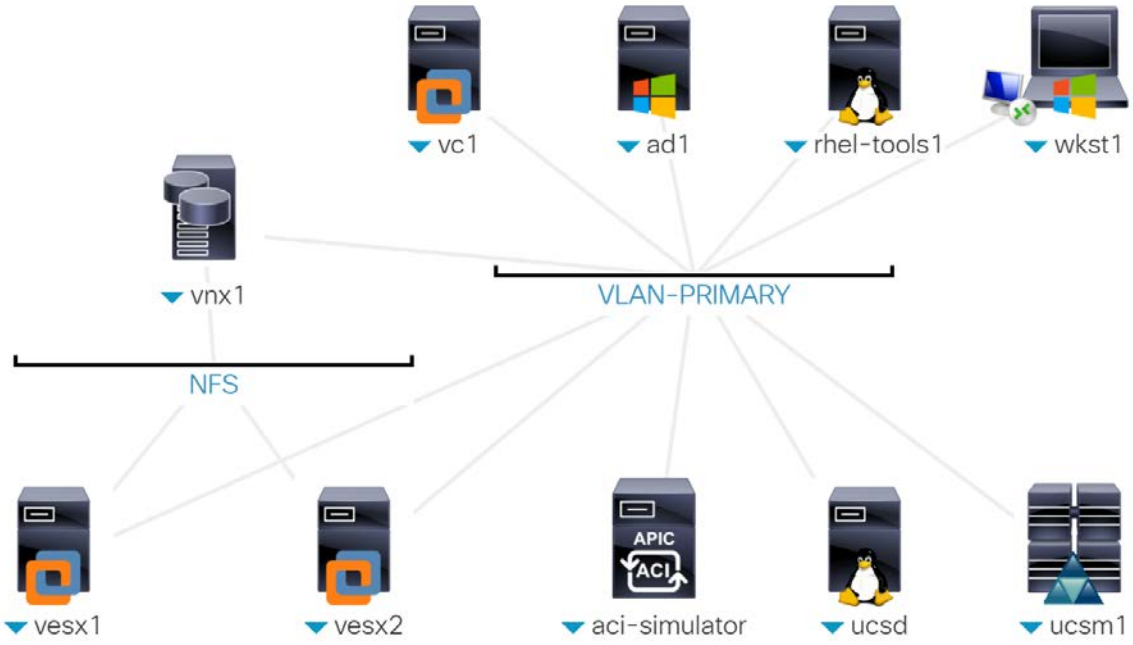
For more information about **Application Policy Infrastructure Controller (APIC)**, visit www.cisco.com/go/apic.

For more information about **Cisco UCS Director**, visit http://www.cisco.com/go/ucsdirector.

Topology

This content includes preconfigured users and components to illustrate the scripted scenarios and features of the solution. Most components are fully configurable with predefined administrative user accounts.

Figure 1. dCloud Topology



Get Started

BEFORE PRESENTING

Cisco dCloud strongly recommends that you perform the tasks in this document with an active session before presenting in front of a live audience. This will allow you to become familiar with the structure of the document and content.

It may be necessary to schedule a new session after following this guide in order to reset the environment to its original configuration.

PREPARATION IS KEY TO A SUCCESSFUL PRESENTATION.

Follow the steps to schedule a session of the content and configure your presentation environment.

1. Initiate your **dCloud** session. [Show Me How]

NOTE: It may take up to 10 minutes for your session to become active.

2. Connect to the demonstration environment via one of the following methods:
   - **Cisco AnyConnect VPN** [Show Me How] and the **local RDP client on your laptop** [Show Me How]. (Workstation 1: **198.18.133.36**, Username: **DCLOUD\demouser**, Password: **C1sco12345)**
   - **Cisco dCloud Remote Desktop** client [Show Me How].

Scenario 1. Tenant Onboarding

In Cisco UCS Director, tenants enable you to securely control and allocate the virtual and physical infrastructure of your data center to the different user groups, organizations, and customers. Your IT teams no longer need to manually provision infrastructure for users to deploy virtual machines (VMs) to run end user applications. Instead, you can configure tenant onboarding through Cisco UCS Director to define the infrastructure boundaries and resource limits that are applied automatically when a user makes a service request to provision a VM or an application.

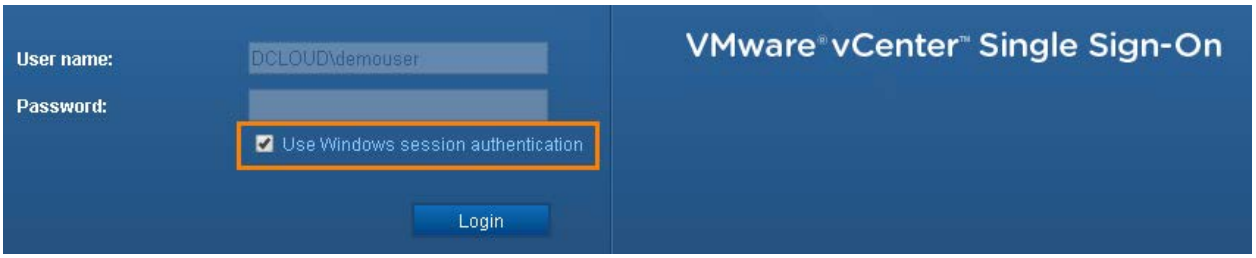
Depending upon the infrastructure in your data center, you can use one of the following configurations for tenant onboarding:

- Resource groups for systems that include an integration with Cisco Application Centric Infrastructure (Cisco ACI) and Cisco Application Policy Infrastructure Controller (Cisco APIC)
- Virtual data centers for systems that does not include Cisco ACI or Cisco APIC

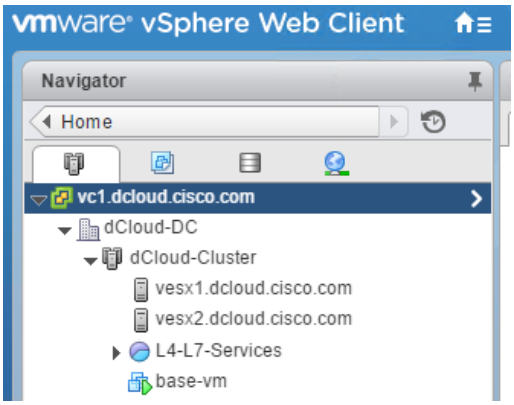
Cisco UCS Director tenants are essentially customers that share the compute, network, and storage resources that is configured for ACI in Cisco UCS Director.

Steps

1. Double-click the **vSphere Web Client** icon  on the desktop.
2. Check the **Use Windows session authentication** checkbox and click **Login**.



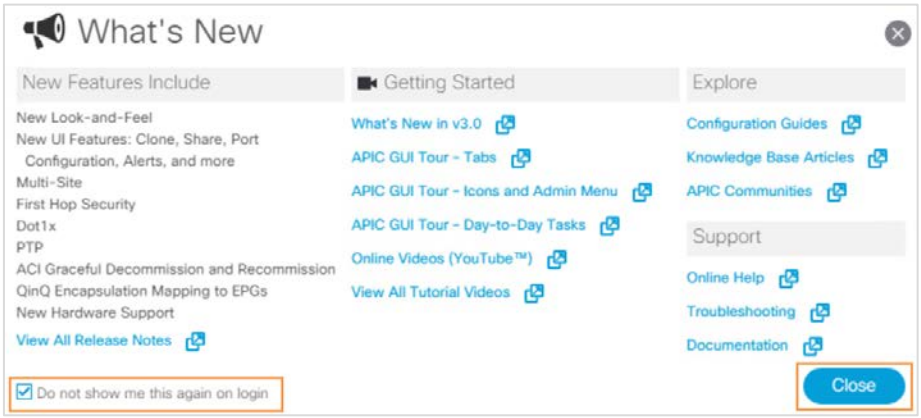
3. On the landing page (**Hosts and Clusters**), expand **vc1.dcloud.cisco.com > dCloud-DC > dCloud-Cluster** and note that the only Resource Group is L4-L7 Services.



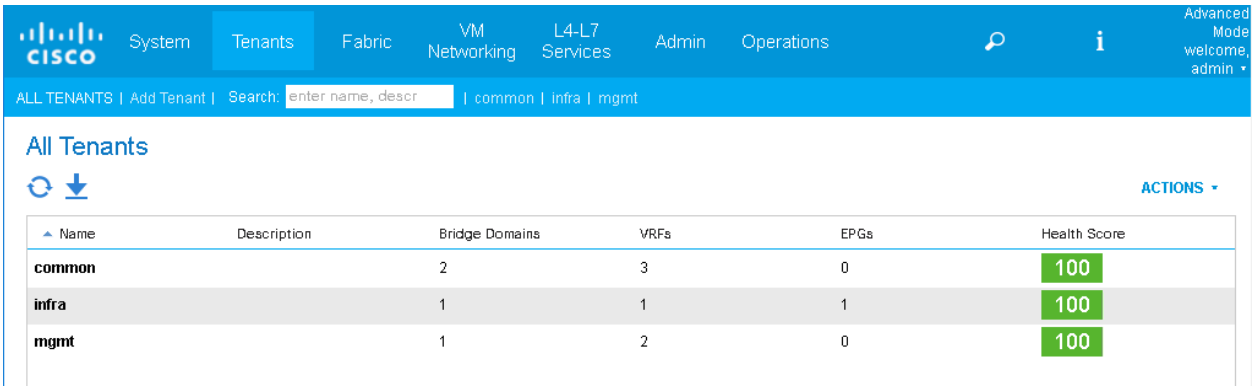
4. On the wkst1 desktop, double-click the **APIC Login** shortcut 

and log in to APIC (**admin/C1sco12345**).

5. Click **Do not show me this again on login** in the **What's New** pop-up and click **Close**.

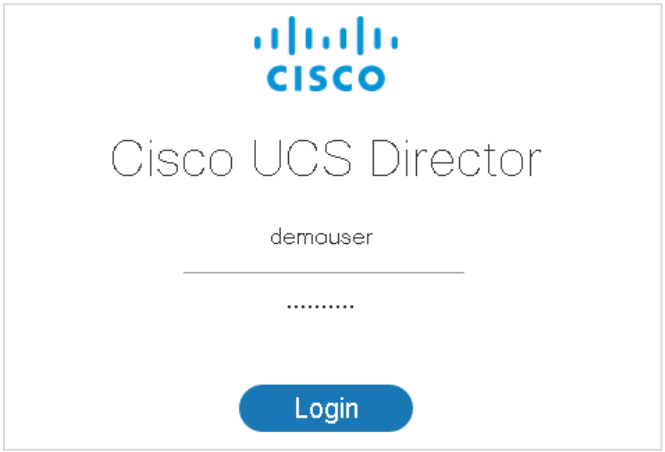


6. Click **Tenants** in the top menu to view all of the existing tenants.

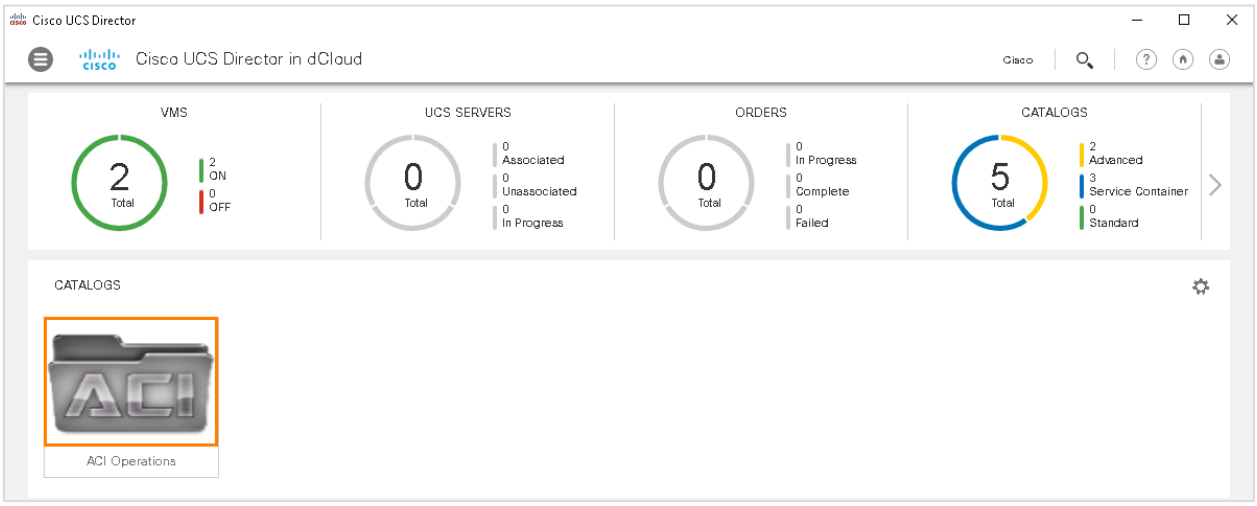


7. On the wkst1 desktop, double-click the **UCS Director** icon 

and log in to Cisco UCS Director (**demouser/C1sco12345**).



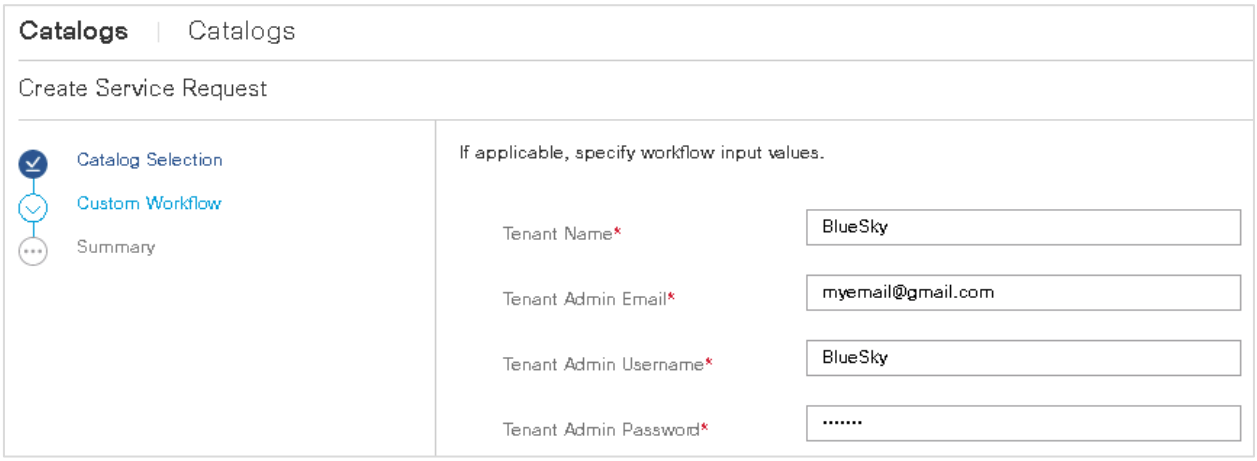
8. Click the **ACI Operations** catalog folder to see the workflows.



9. Double-click the **Tenant Onboarding** workflow.

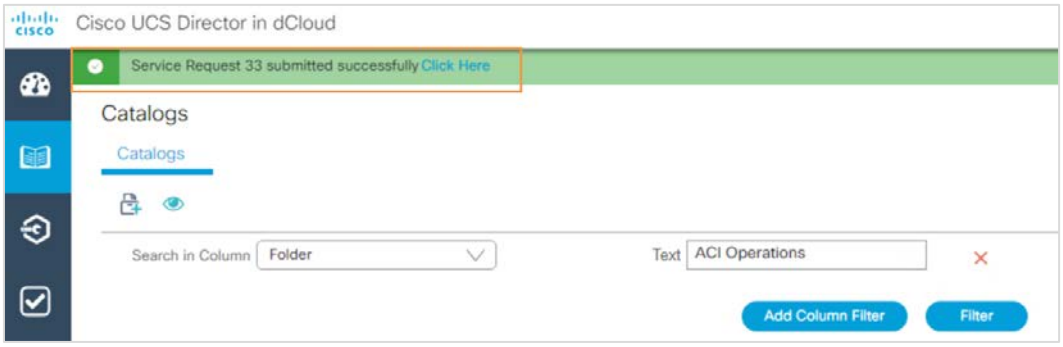
10. In the resulting workflow wizard, perform the following steps:
    - Click **Next** through the **Catalog** window – no changes are required.
    - In the Custom Workflow window, fill in each field:
        - **Tenant Name:** BlueSky *or if you choose your own name, it must not start with a number, contain special characters or a space.*
        - **Tenant Admin Email:** *any email address that can receive notifications – personal email that can be accessed from the demo environment is suggested*
        - **Tenant Admin Username:** BlueSky *again if you choose your own username, it must not start with a number, contain special characters or a space.*
        - **Tenant Admin Password:** any password

Note: The Tenant and credentials created here are used throughout the following scenarios.

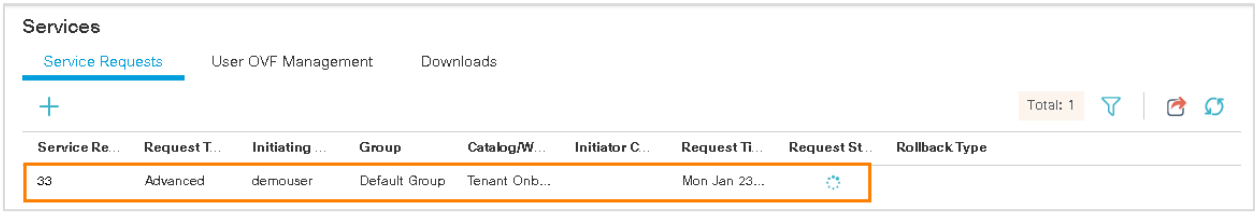


- Click **Next**, then click **Submit** in the Summary window.

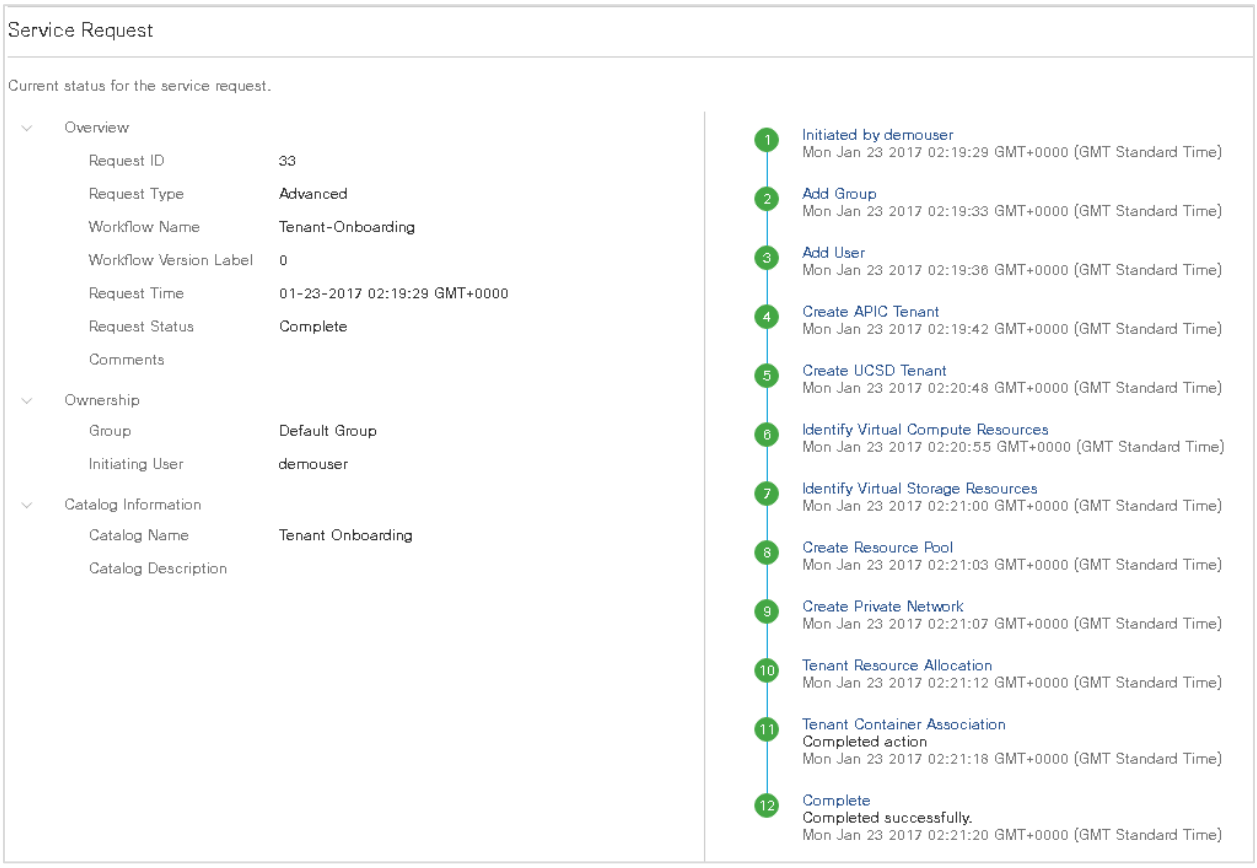
11. Click the **Click Here** link to monitor the Service Request.



12. Double-click the Service Request to view the details.



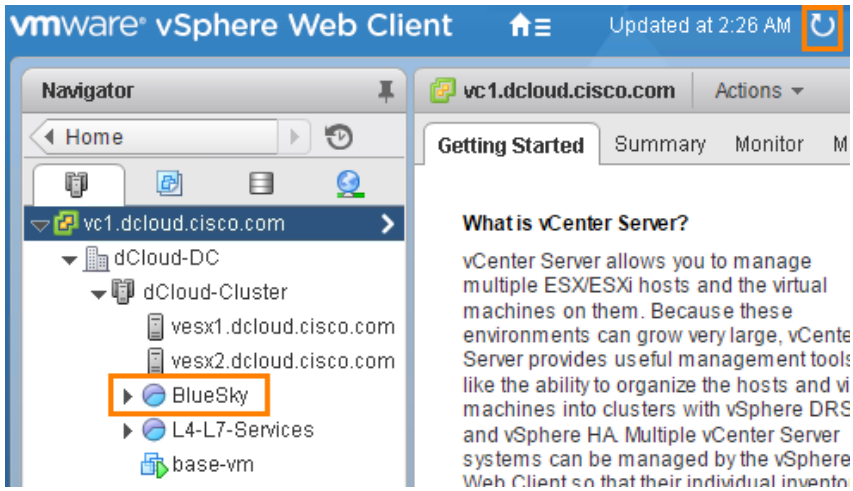
13. Review the steps of the Tenant Onboarding workflow:



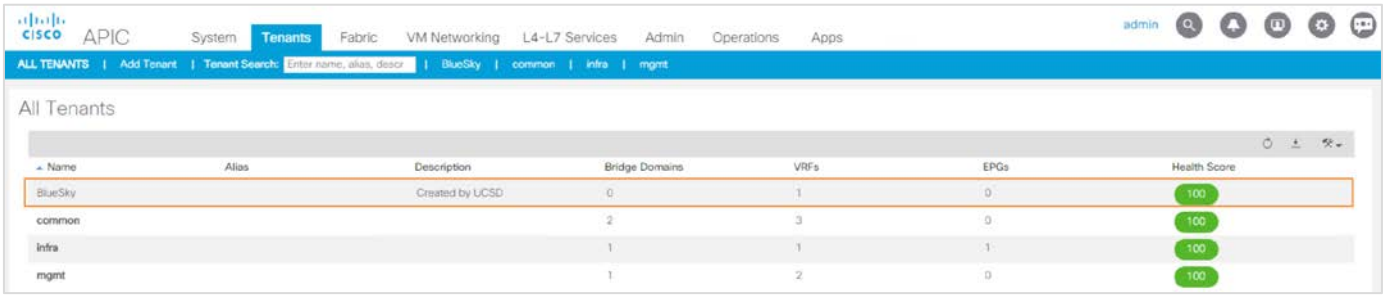
The Tenant Onboarding workflow performs the following steps:

- Creates a new security group and user in UCS Director for the Tenant
- Interfaces with Cisco APIC and creates the tenant specified in the workflow wizard, and creates the corresponding tenant in UCS Director.
- Identify Virtual Compute Resources: Identifies the compute & storage resources that are available to the tenant in VMware, and creates the VMware resource pool.
- Creates a private network for the tenant in APIC (VRF) and associates the identified infrastructure resources to the UCS Director tenant
- Sets up the Tenant for UCS Director Application Container Services.

14. Once the workflow has completed, return to the **vSphere Web Client** and refresh the **Hosts and Clusters** screen. The Resource Group has been created for the new Tenant.

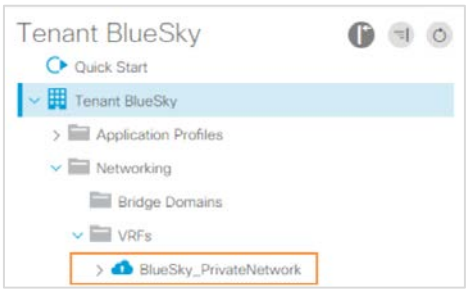


15. Return to the **APIC** client. Click **Refresh** if necessary and note that a new tenant (BlueSky) has been created.



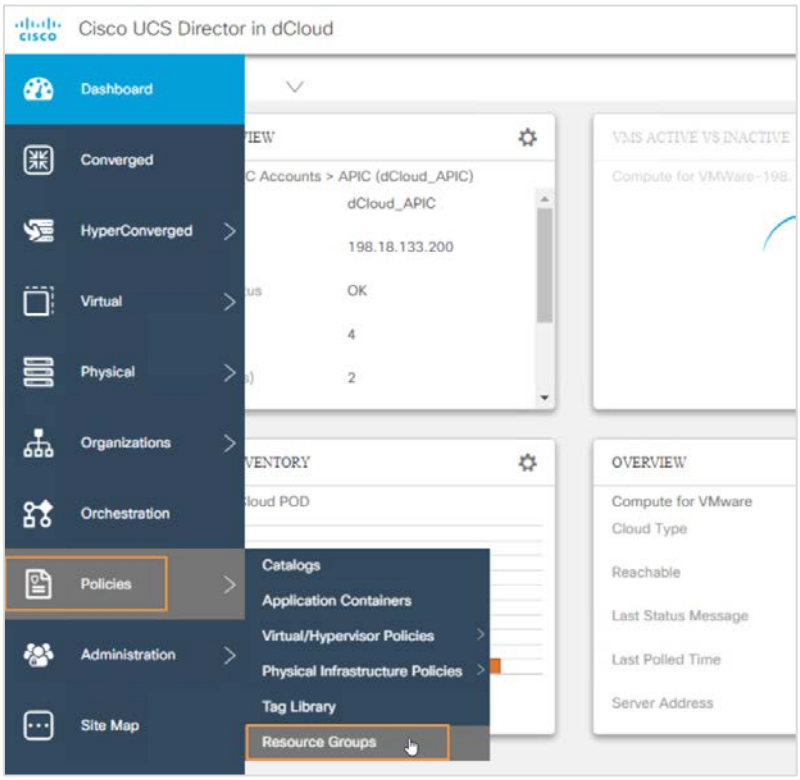
16. Double-click the **BlueSky** tenant.

17. Expand **Tenant BlueSky > Networking > VRFs** to see the **BlueSky_PrivateNetwork** that was created by the UCSD workflow.



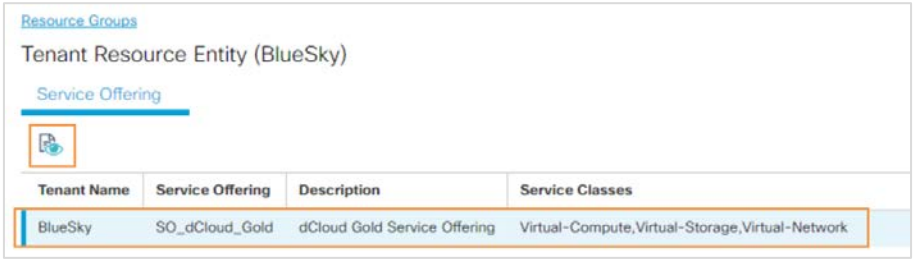
18. Return to the UCSD window. Log out of the **demouser** account and log back in with the admin account (**admin/C1sco12345**).

19. From the side menu, select **Policies > Resource Groups**.



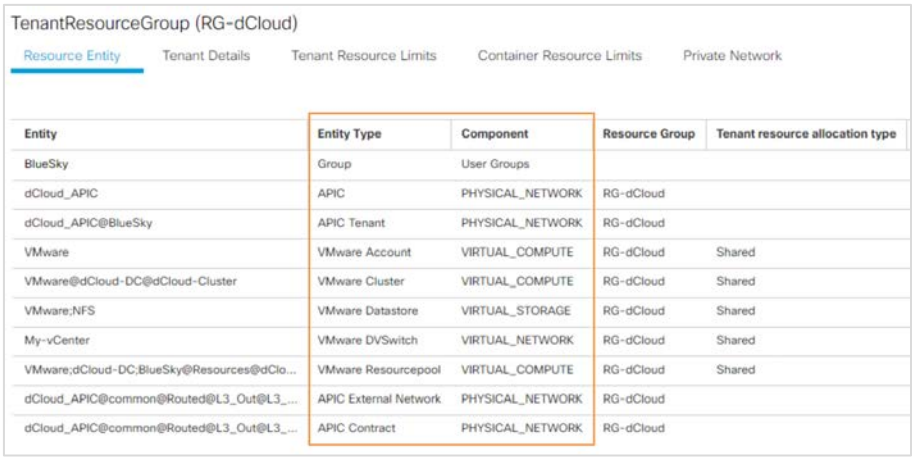
20. In the **Resource Groups** window, click the **BlueSky** tenant and then click **View Details**.

21. In the **Tenant Resource Entity (BlueSky)** window, click the **BlueSky** tenant and then click **View Details**.



22. In the resulting **Tenant Resource Entity (BlueSky) > ServiceOfferingtenant (SO_dCloud_Gold)** window, click the **BlueSky** tenant again and click **View Details**.

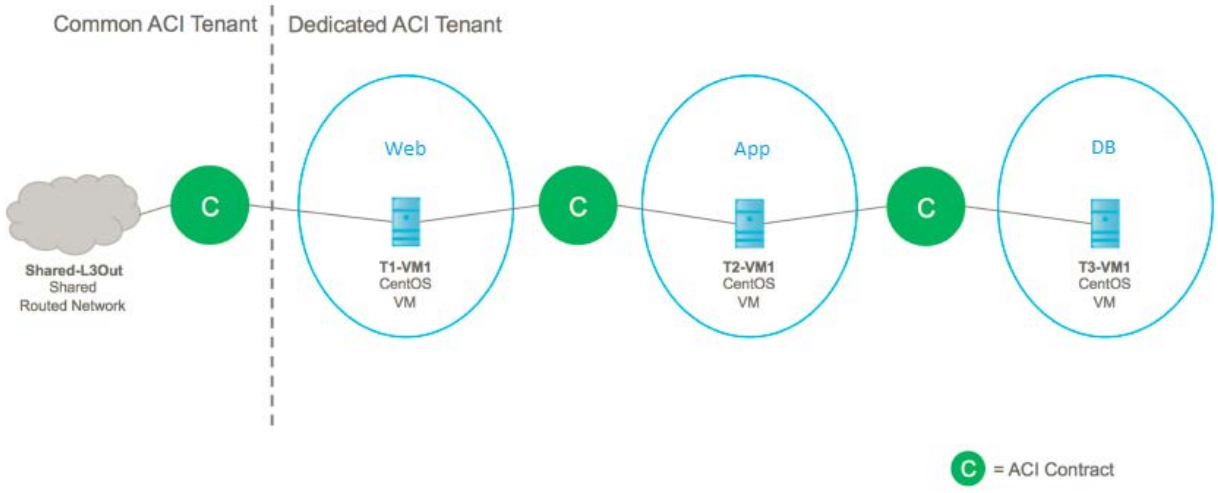
23. In the resulting window, view the Resource Entities list, which shows the infrastructure resources that have been allocated by UCS Director from APIC and VMware.



Scenario 2. Deploy a Simple 3 Tier Application Container with L3Out

The following diagram depicts the logical topology of the Application Container with Shared L3Out that will be deployed in this scenario. In this use case, there are three “tiers” or networks, with a VM being deployed into each tier. Between each tier will be a contract that can control/restrict what communication (if any) is allowed between the VMs in each tier.

In addition, the first tier in the Application Container will also have connectivity to an external (to the ACI fabric) routed (Layer 3) network. In this use case, the external routed network is configured within the “common” tenant in ACI and is available across other dedicated tenants in ACI for L3Out access. Even though multiple tenants are sharing the same L3Out network, individual tenants are only allowed to access the L3Out network, they are not allowed to access each other’s application through this connection by design.



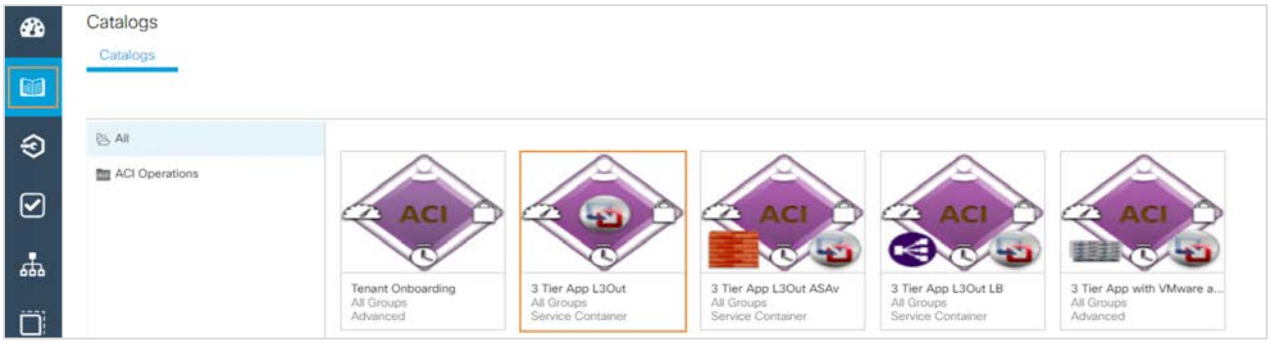
The purpose of this scenario is to deploy a Simple 3-Tier Application Container into the new Tenant with Shared L3Out access.

The applications that should still be open from Scenario 1 are:

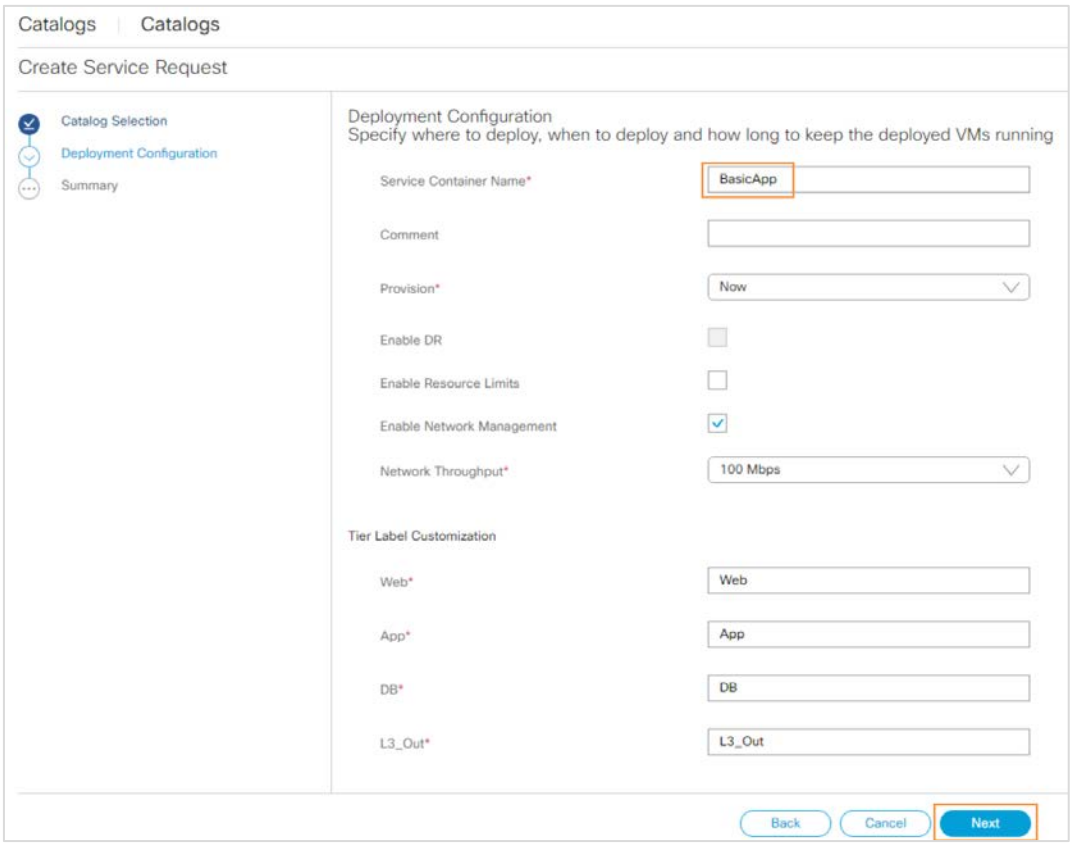
- UCS Director – admin window and demouser window
- APIC 2.1
- vSphere Web Client

Steps

1. Log out of the **UCS Director admin** window and log back in with the **Admin Name** and **Password** created in Scenario 1 (**BlueSky/C1sco12345**).
2. Select **Catalogs** in the side menu, and double-click the **3-Tier App L3Out** workflow.

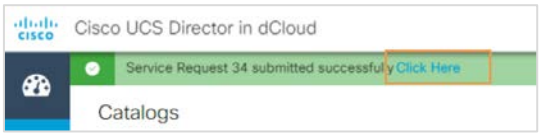


3. In the resulting window, perform the following steps:
    - Click **Next** through the **Catalog** window – no changes are necessary.
    - In the **Service Container Name** field, enter **BasicApp** or any other name (the name cannot start with a number).
    - If desired, customize the names of the tiers (Tier Labels), but this is not required.
    - Click **Next**.



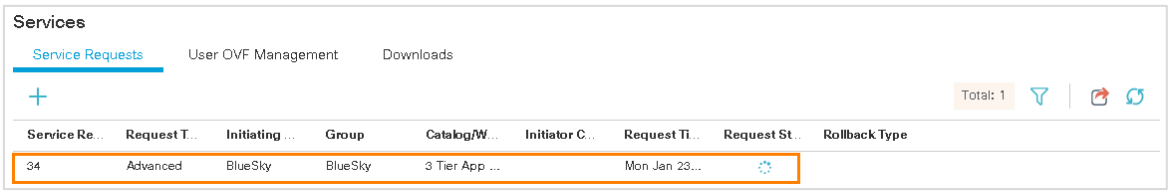
    - Click **Submit**.

4. Click **Click Here** to review the Service Request.



5. In the resulting window, double-click the Service Request to view the details.

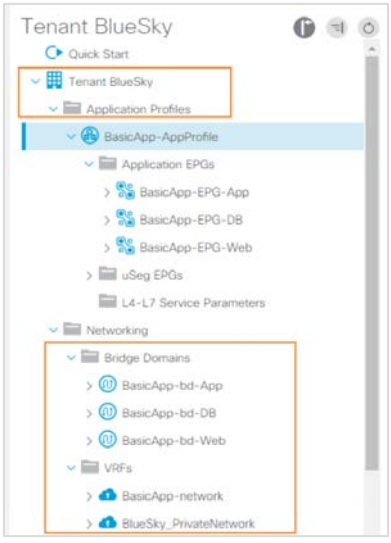
NOTE: The workflow will take approximately 15 minutes to complete.



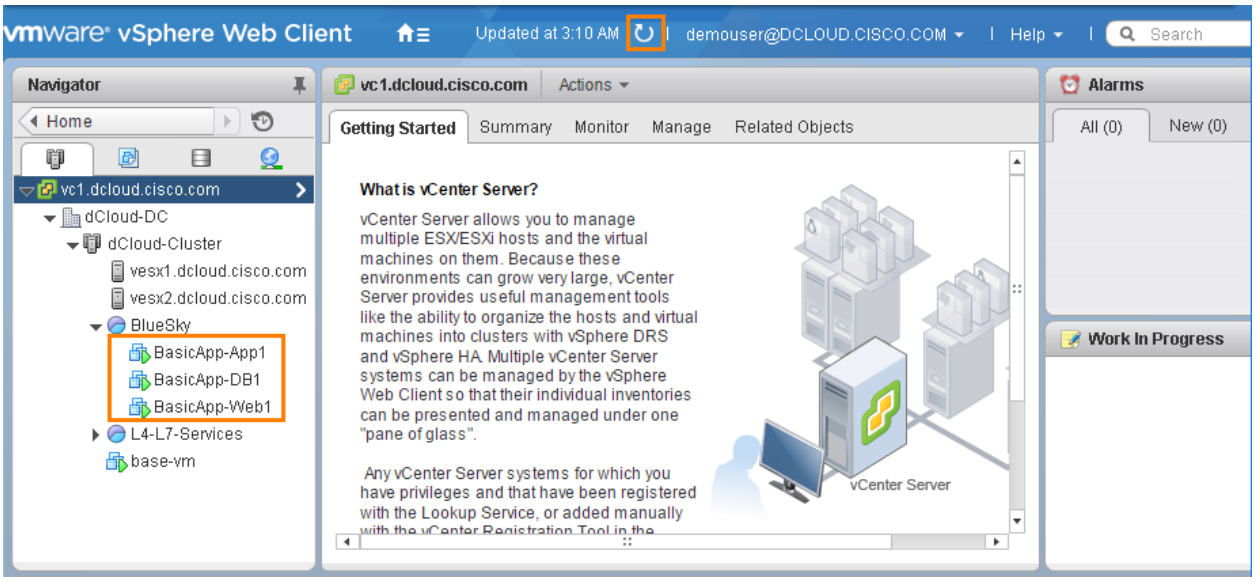
The 3 Tier App L3Out workflow performs the following steps:

- Creates a container in UCS Director and allocates resources.
- Creates the APIC objects – Application profile, Private network, Bridge Domains and Contracts. New Port Profiles are automatically propagated to VMware Distributed Switch..
- Creates the VM for each application in VMware, connecting them to the relevant EPGs for their tier.
- Sends confirmation email to Tenant Admin Email Address (from Scenario 1).

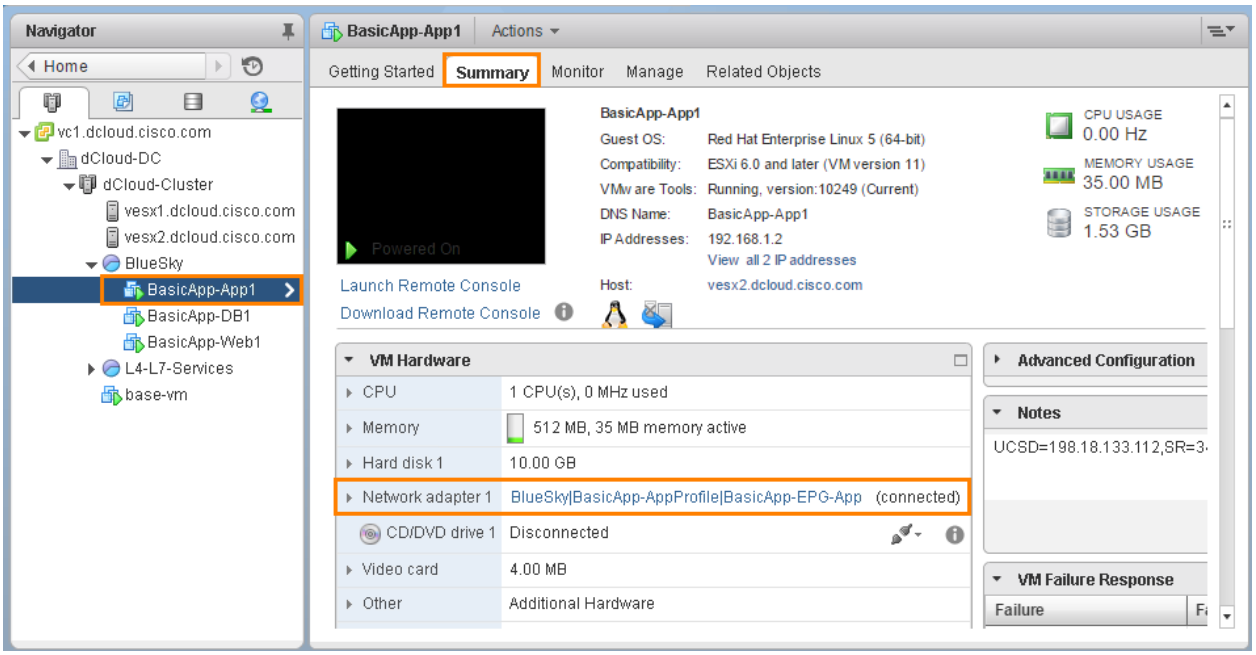
6. As the workflow executes, open the **APIC** window. Expand **Tenant BlueSky > Networking > Bridge Domains**, **Tenant BlueSky > Networking > VRFs,** and **Tenant BlueSky > Application Profiles** to view the configuration as it is created by the workflow.



7. In the **vSphere Web Client** window, expand **vc1.dcloud.cisco.com > dCloud-DC > BlueSky** and click the Refresh icon to see the new application servers.

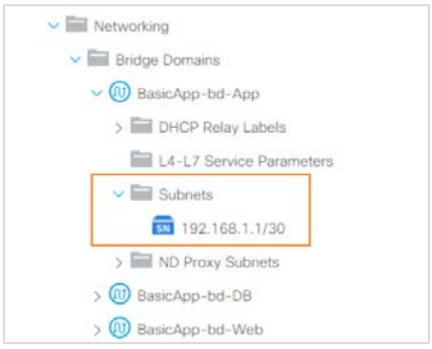


8. Click any of the new VMs, then click the **Summary** tab and expand **VM Hardware** to show that the VM is connected to a new Port Profile created for its tier in the Application Container. Each type of VM will be connected to a different Port Profile based on its tier.

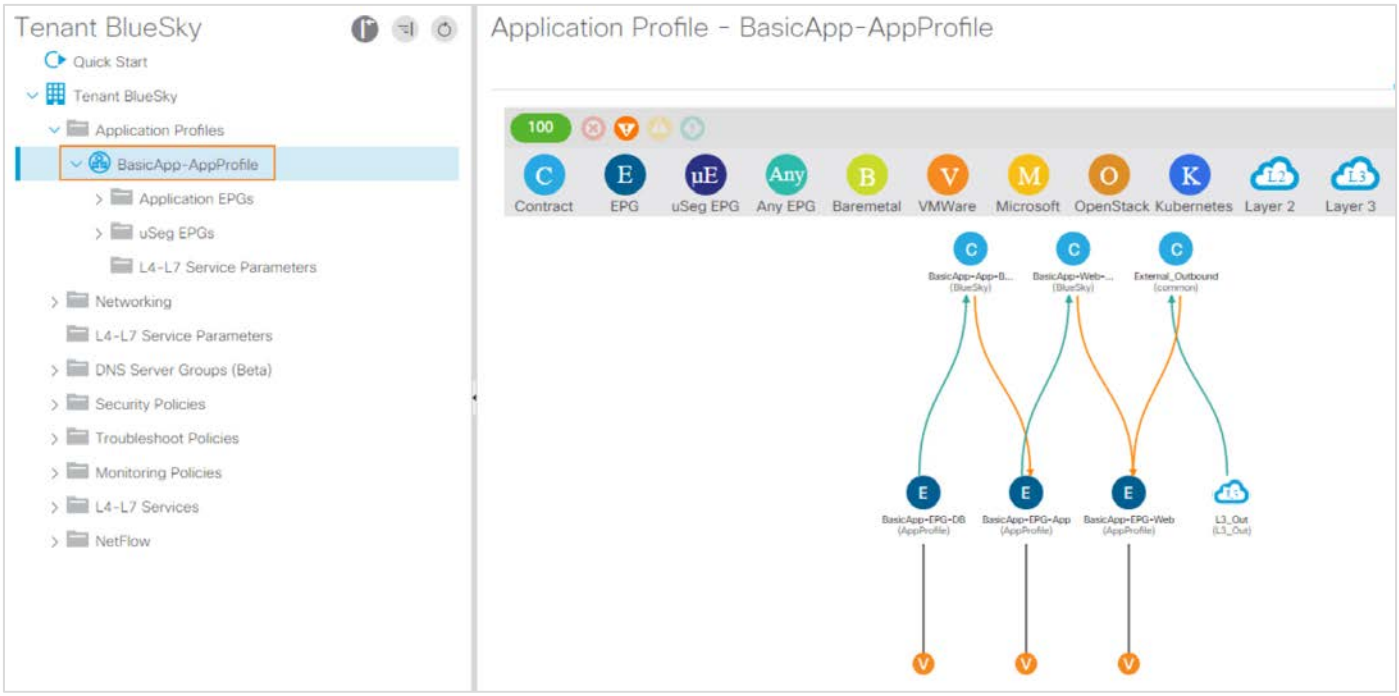


9. Return to the **APIC** window, which is still open to the Tenants window, showing the **BlueSky** tenant.

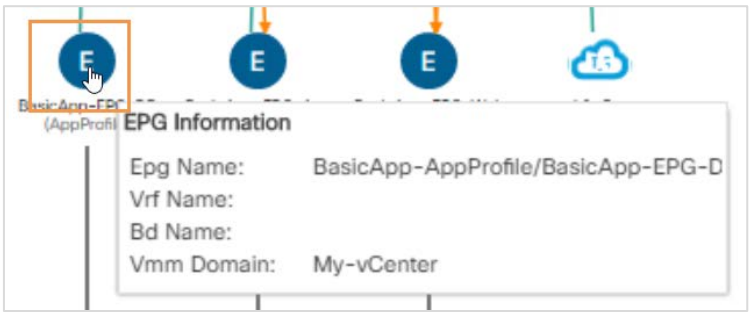
10. Expand **Tenant BlueSky > Networking > Bridge Domains** and expand the **Subnets** folder under each bridge domain, to show that a subnet was also created for the bridge domain.



11. Expand the **Tenant BlueSky > Application Profiles** folder and click **BasicApp-AppProfile** to see the application topology in the work window.

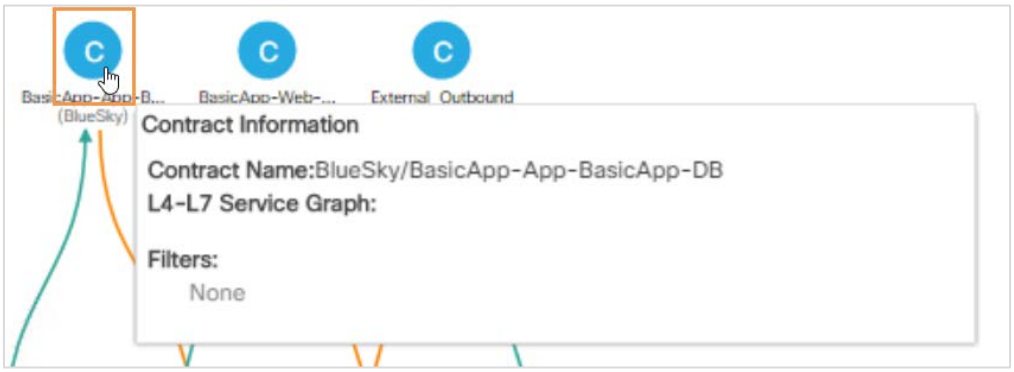


12. Hover over any EPG to see detailed information about the EPG.

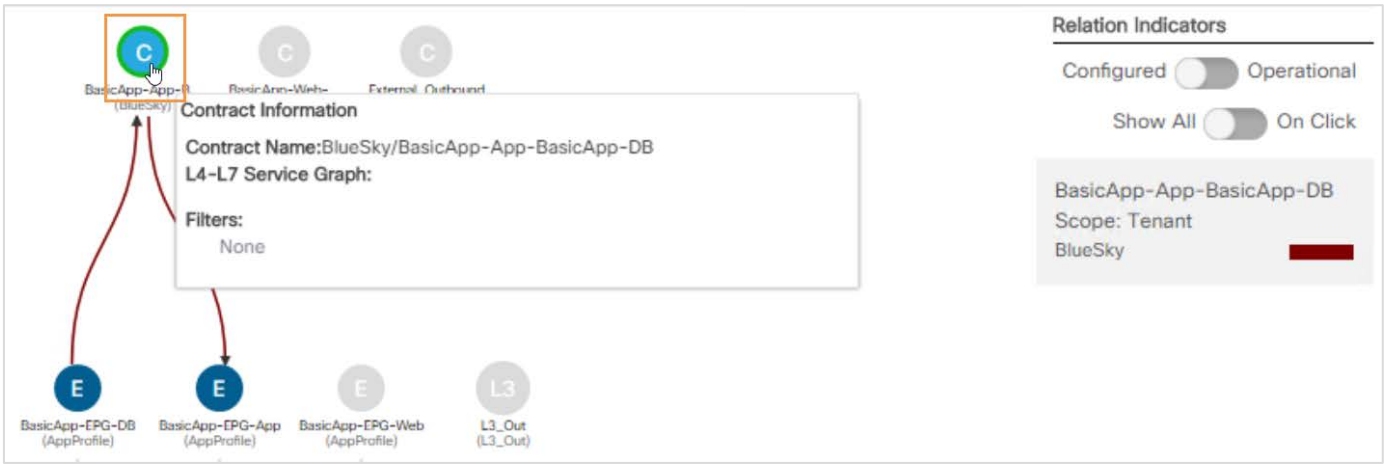


NOTE: The L3 Out for the 3-Tier Application is provided by the common tenant.

13. Hover over any Contract to see detailed information about the Contract.



14. Click the contract to isolate the network objects that are related to it. The Filter Entry identifies the EPGs to which the contract is related and the ports to which it is restricted.

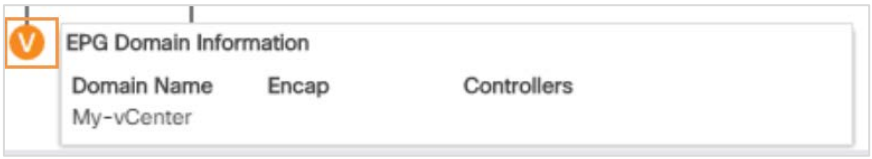


15. Click the contract again to return to the previous view.

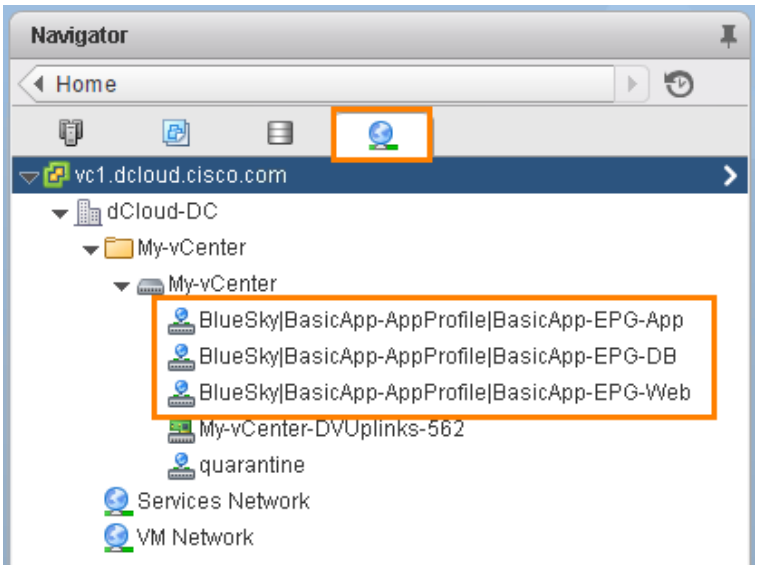
THINGS TO UNDERSTAND BEFORE LEAVING THIS SECTION:

- The App-DB Contract allows tcp traffic from the DB tier to the App tier using Port 3306.
- The Web-App Contract allows http traffic from the App tier to the DB tier.
- The External_Outbound Contract allows external traffic, to flow out of ACI over http.

16. The **V** icons show that the EPGs have associated Virtual Port Groups in vCenter.



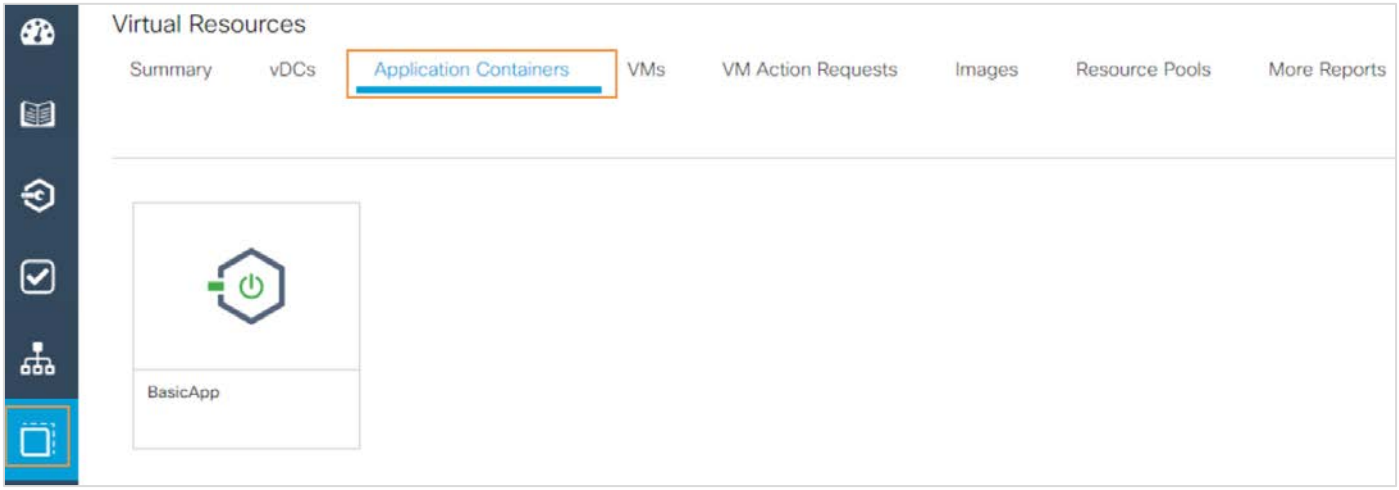
17. In the **vCenter vSphere Web Client**, click the **Networking** tab and expand **vc1.dcloud.cisco.com > dCloud-Dc > My-vCenter > My-vCenter** to show the three port groups that are associated with the EPGs.



NOTE: Because the APIC Emulator has no data plane, the demonstration cannot communicate with 3-Tier Application.

18. Return to the UCS Director window and click **Virtual Resources** in the side menu.

19. Click **Application Containers** in the top menu to see the newly created **BasicApp**. The green status tile means the application is active.

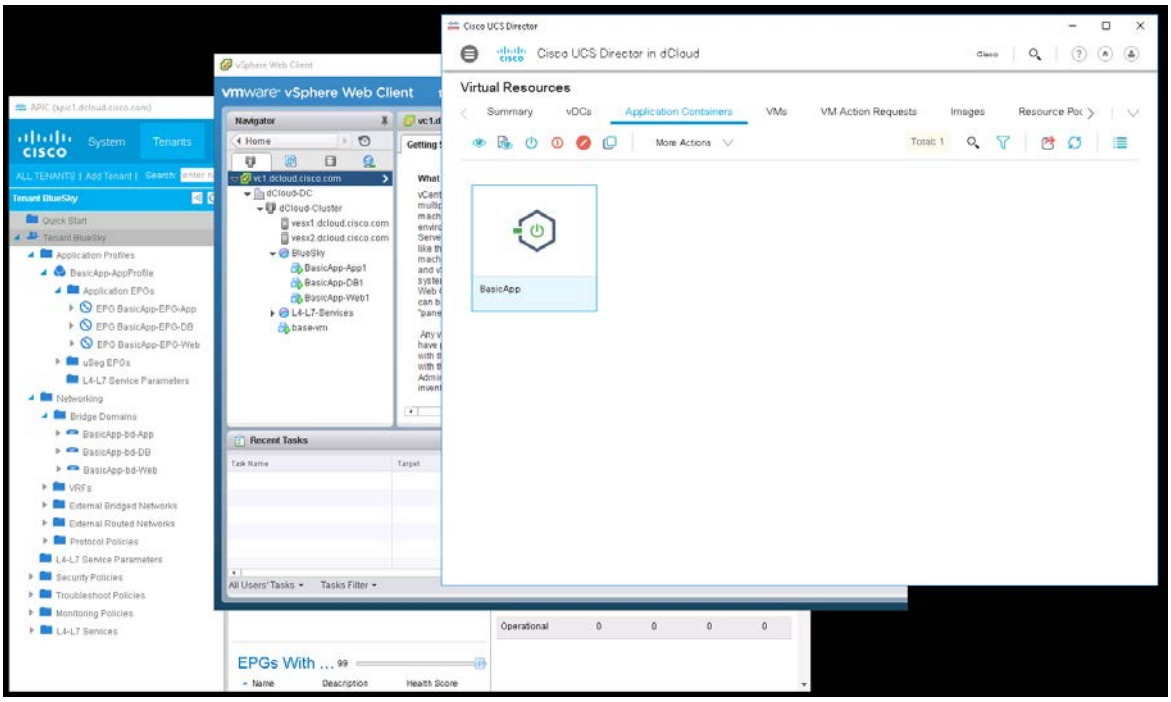


NOTE: Review the available actions to managing the Application Container:

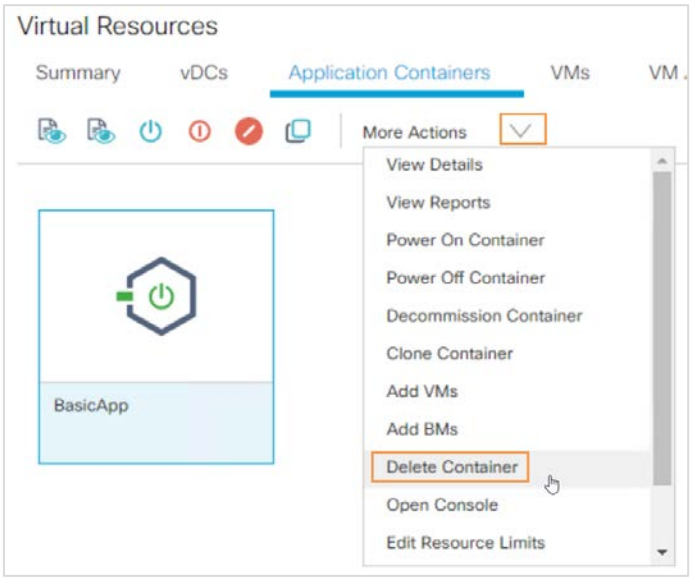
20. Once the application is fully deployed, the Admin email will receive an email containing all the configuration details for the application. Scroll through the email, showing the configuration information.

Delete Container

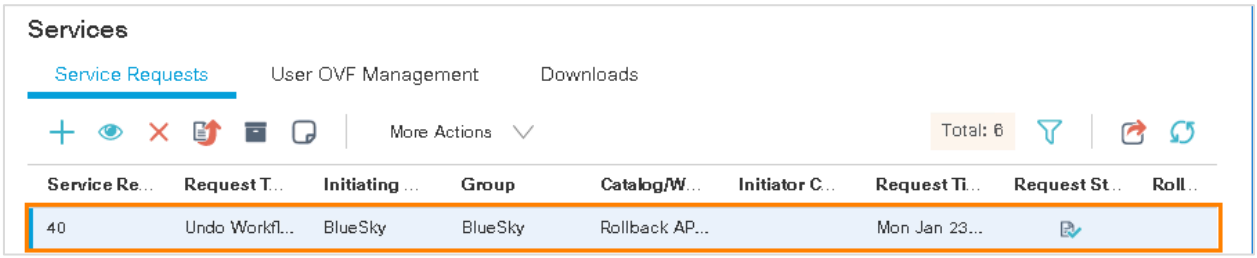
1. Return to the **APIC** window and expand the **Application Profiles** folder completely to show the EPGs.
2. Return to the **vSphere Web Client** window, and open the **Hosts and Clusters** window. Expand the **BlueSky** Resource Pool to show the running VMs.
3. Return to the **UCS Director** window, which is still open to the **Application Containers** window.



4. Click the application. When the **More Actions** bar becomes live, click it and choose **Delete Container** from the menu. This will delete the **BasicApp** application and set the environment up for the next scenario.



5. Click **Submit**.
6. To see the Service Request for the container deletion, return to the Services view, and double-click the latest Service Request.

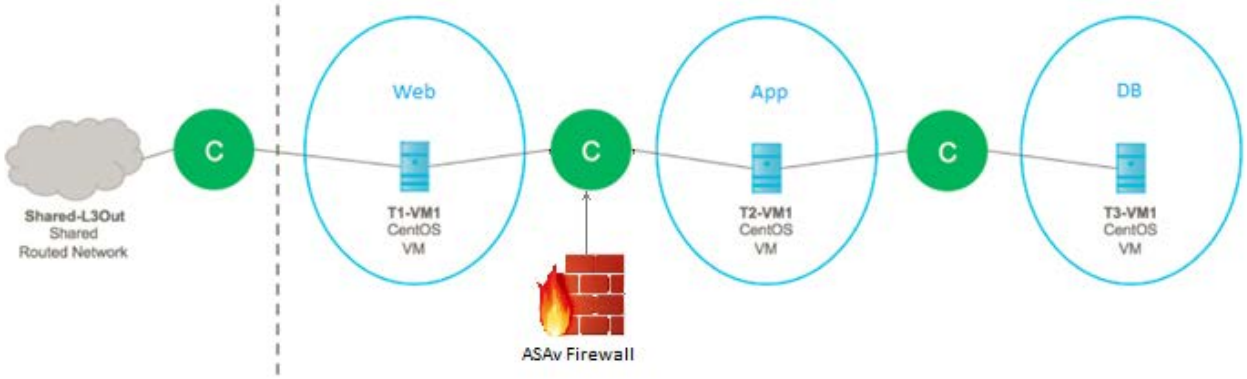


7. Click between the APIC and vSphere windows, refreshing to watch as the objects in the BasicApp application are rolled back and disappear.

Scenario 3. Deploy an Application Container with L4-L7 Services (ASAv)

The purpose of this scenario is to use UCS Director to deploy a 3-Tier application in APIC with an ASAv virtual firewall.

The following diagram depicts the logical topology of the Application Container with L4-L7 services that will be deployed as part of this scenario. In this use case, there are three “tiers” or networks, with a VM being deployed into each tier. Between the Web and App tiers, an L4-L7 firewall (ASAv VM) is deployed and configured to control/limit the connectivity between the Web and App application tiers.

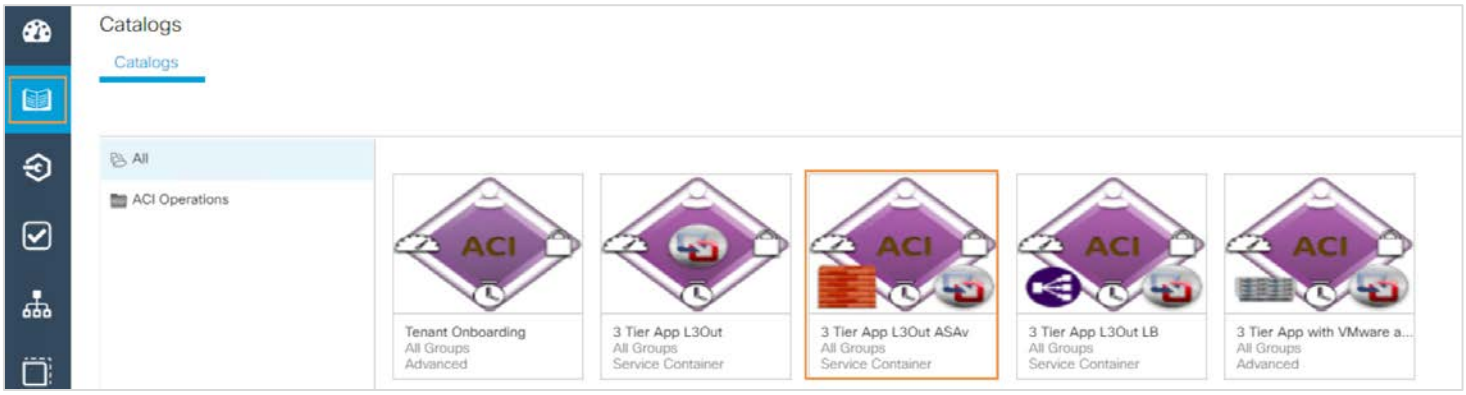


Steps

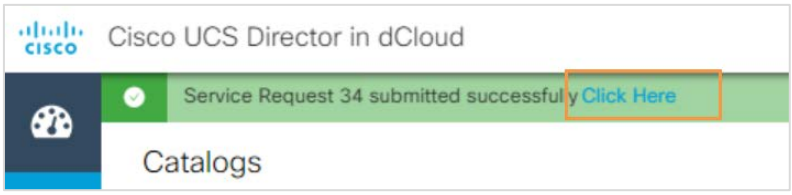
1. On the wkst1 desktop, double-click the **UCS Director** icon and log in to Cisco UCS Director (**BlueSky/C1sco12345**) if it is not already open.

OR

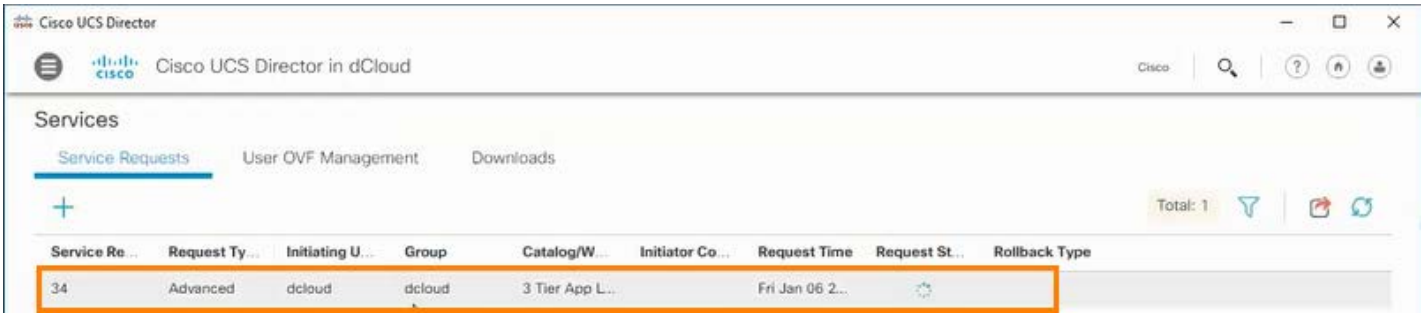
2. If **UCS Director** is already open, click **Catalogs** in the side menu.
3. Double-click the **3 Tier App L3Out ASAv** workflow.



4. In the resulting workflow wizard, perform the following steps:
    - Click **Next** through the **Catalog** window – no changes are required.
    - In the **Deployment Configuration** window, enter **CoolApp** in the **Service Container Name** field and click **Next**.
    - Click **Submit**.
5. Click the **Click Here** link to view the newly submitted Service Request.



6. Double-click the **Service Request** to review the details of the workflow deployment.

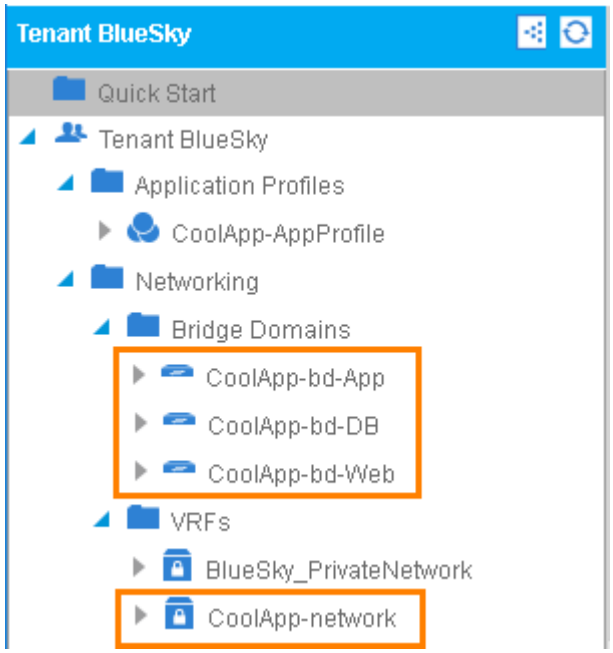


The 3 Tier App L3Out ASAv workflow performs the following steps:

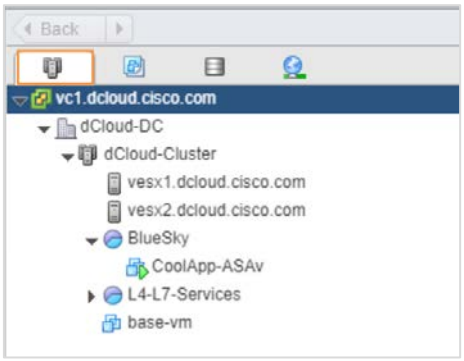
- Creates a container in UCS Director and allocates resources.
- Creates the APIC objects – Application Profile, private network, Bridge Domains and Contracts. New Port Profiles are automatically propagated to the VMware Distributed Switch.
- Creates the VM for each application in VMware, connecting each to the relevant Port Profile for its tier.
- Creates a child workflow that deploys a new ASAv virtual appliance to VMware.
- Another child workflow sets up the L4-L7 Service Graph configuration (ASAv)
- Sends confirmation email to Tenant Admin Email Address (from Scenario 1).

NOTE: It will take approximately 30 minutes for the workflow to complete. Proceed with the following steps while it is running.

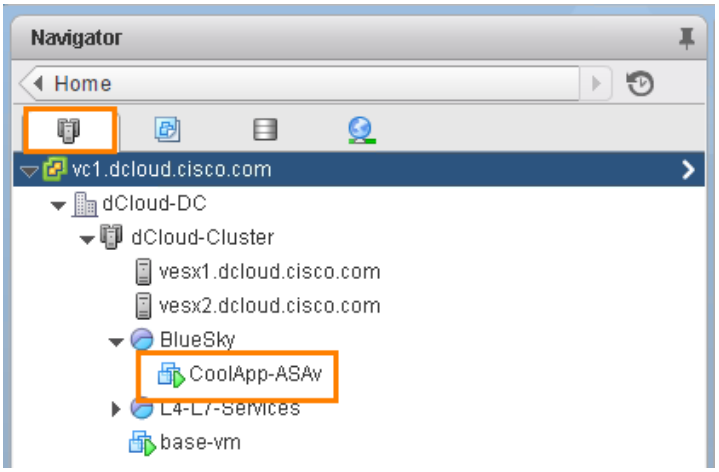
7. Open the **vSphere Web Client** and **APIC** applications if they are not already open:
    - On the wkst1 desktop, double-click the **vSphere Web Client** icon.
    - Check the **Use Windows session authentication** checkbox and click **Login**.
    - On the wkst1 desktop, double-click the **APIC Login** icon.
    - Log in (**admin/C1sco12345/Advanced**).
8. In the **APIC** window, click **Tenants** in the top menu and select the **BlueSky** tenant in the sub-menu.
9. Expand **Tenant BlueSky > Networking > Bridge Domains** and show the three bridge domains that were created by the UCS Director workflow – one bridge domain for each application tier. If these items do not exist yet, wait a few minutes and then refresh.
10. Expand the **VRFs** folder and show the CoolApp-network **VRF** that was created for the new application.



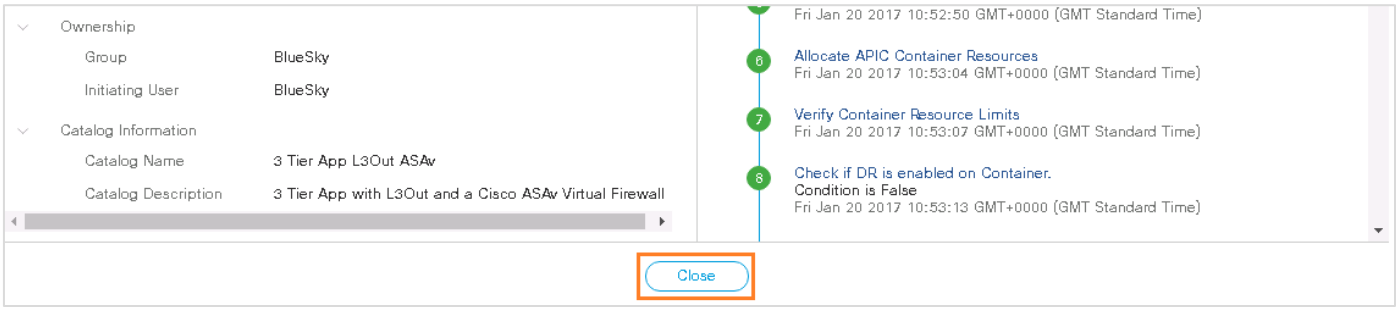
11. Continue monitoring the workflow in the UCS Director window. When **Step 15 – Child Workflow (APIC Container Attached L4L7 Configuration)** has completed, go to the vSphere window.
12. In the **vSphere Web Client** window, click Hosts and Clusters either in the side menu or on the Home tab. (If vSphere was already open, click the Hosts and Clusters tab in the navigation window.)



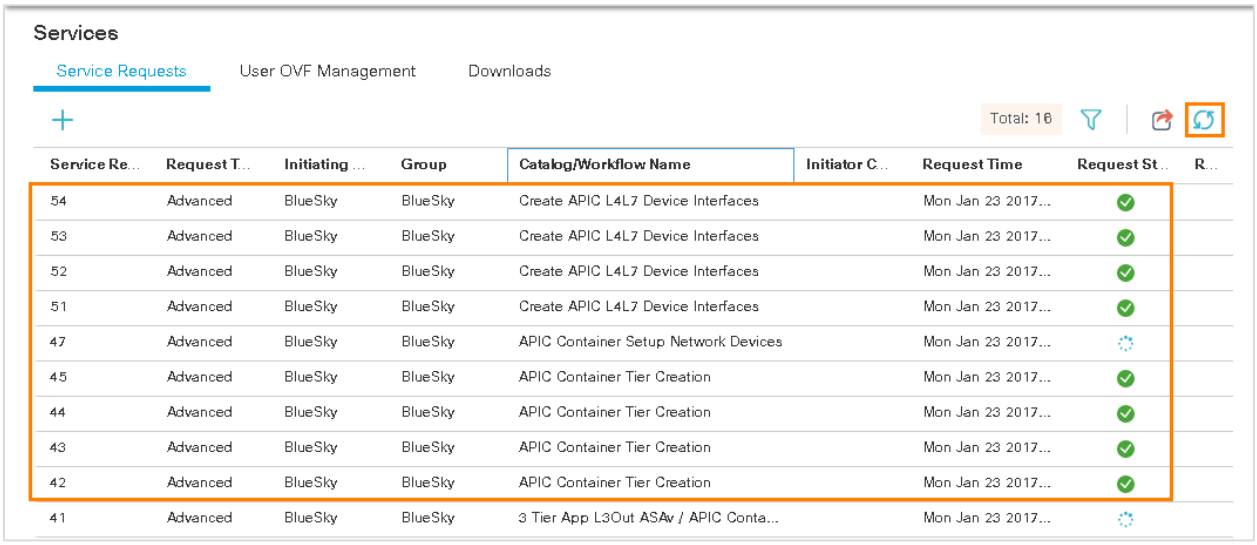
13. Expand **vc1.dcloud.cisco.com > dCloud-DC > BlueSky** to see the ASAv virtual machine, which has been deployed and is dedicated to the CoolApp application container.



14. Return to the UCS Director window and close workflow screen.

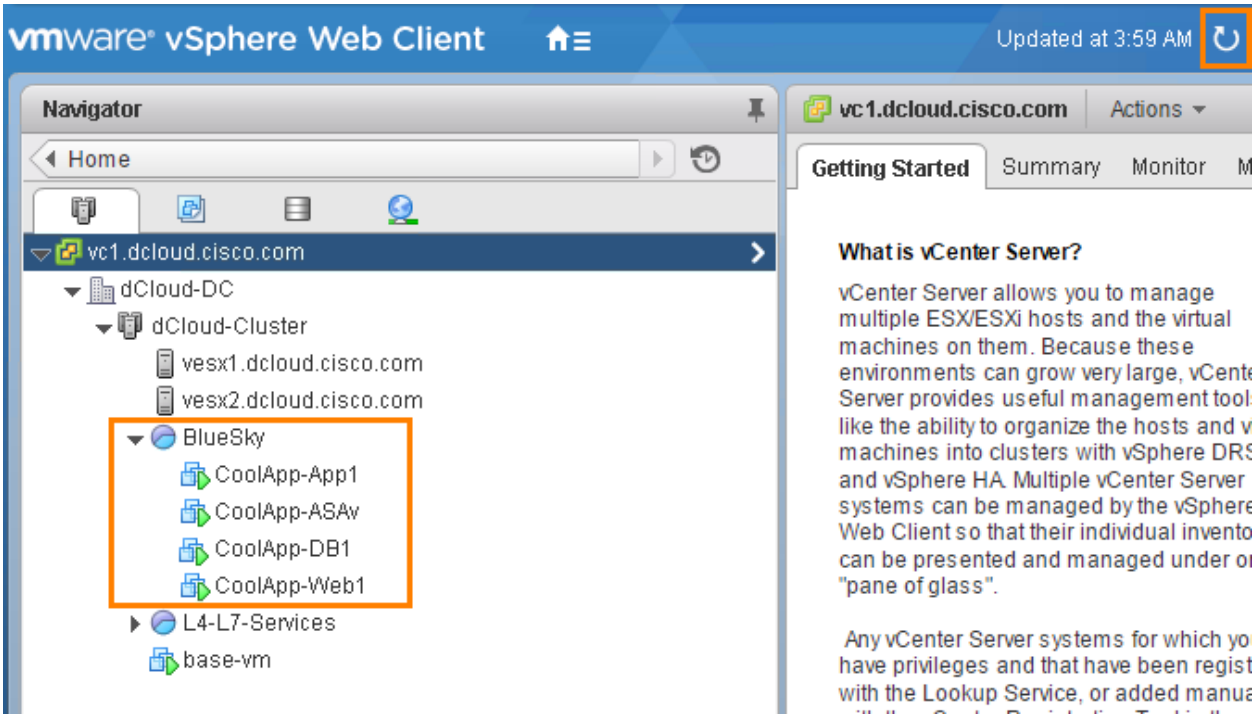


15. Refresh to show that the workflow kicks off a number of other child processes that are required to complete the workflow.



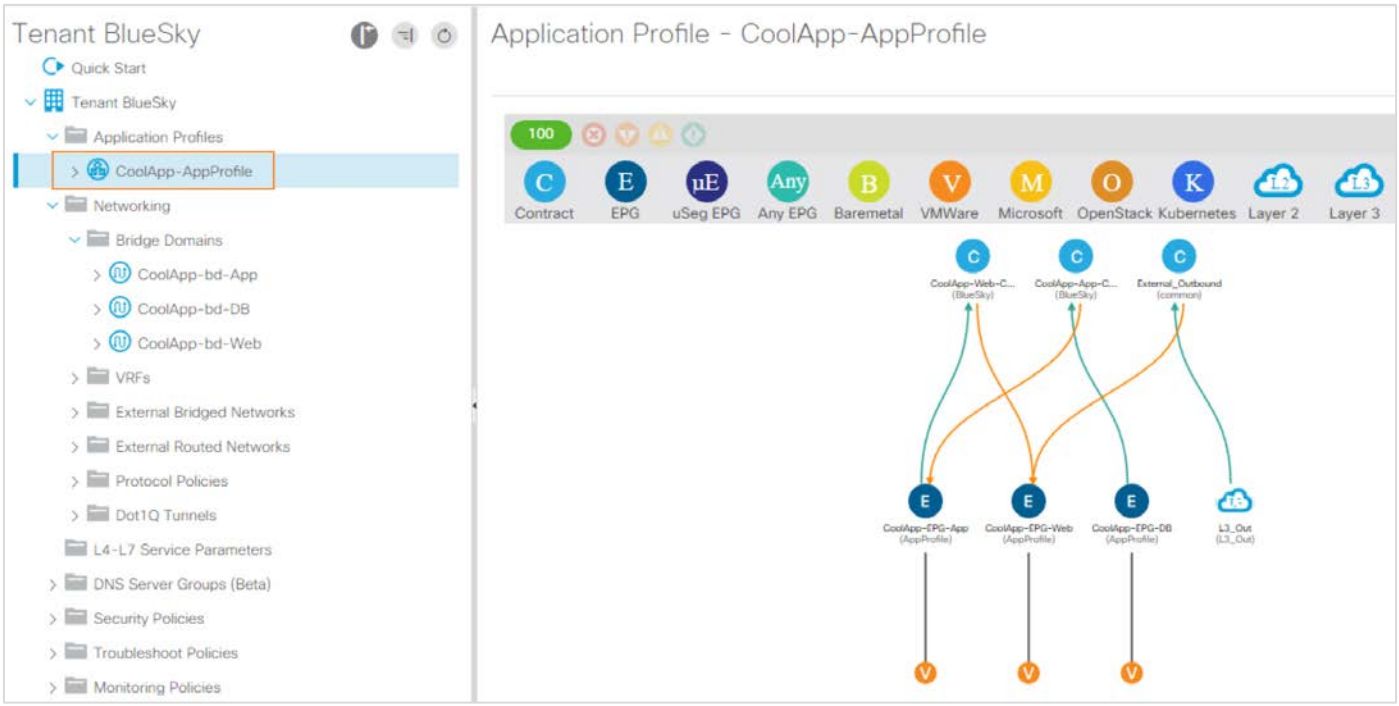
Service Re...	Request T...	Initiating ...	Group	Catalog/Workflow Name	Initiator C...	Request Time	Request St...	R...
54	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
53	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
52	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
51	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
47	Advanced	BlueSky	BlueSky	APIC Container Setup Network Devices		Mon Jan 23 2017...		
45	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
44	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
43	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
42	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
41	Advanced	BlueSky	BlueSky	3 Tier App L3Out ASAv / APIC Conta...		Mon Jan 23 2017...		

16. If desired, double-click on any of the child workflows to review the steps that are being completed. (several tasks are required to configure L4-L7 services.)
17. Check the status of the **3 Tier App L3Out ASAv** workflow task. Wait for the workflow to complete, which usually takes approximately 30 minutes.
18. Return to the **vSphere Web Client** window and refresh.
19. Point out the three newly created application servers – one for each tier of the application (Web, App, and DB).

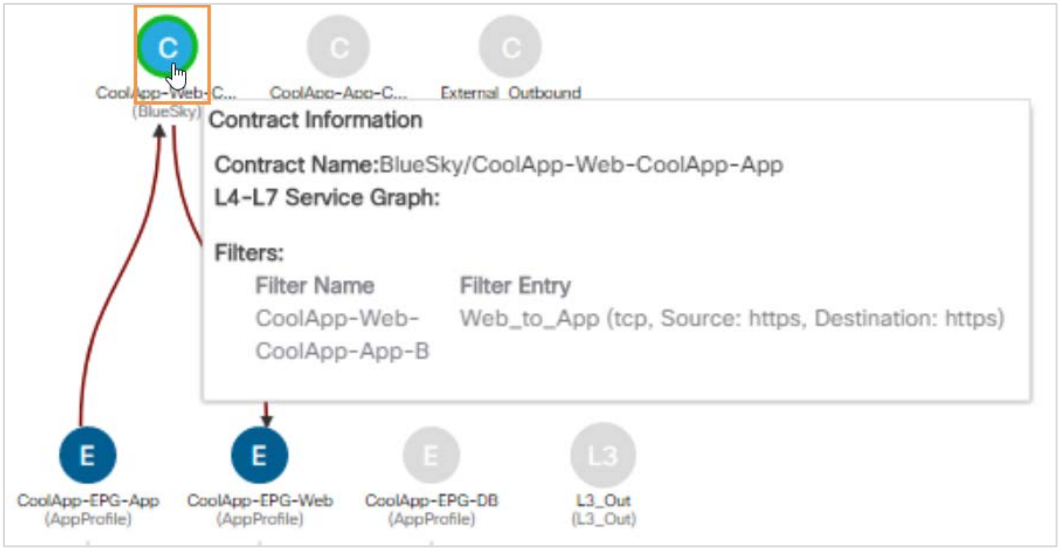


20. Return to the **APIC** window.

21. Expand the **Tenant BlueSky > Application Profiles** folder and click **CoolApp-AppProfile** to see the application topology in the work window.

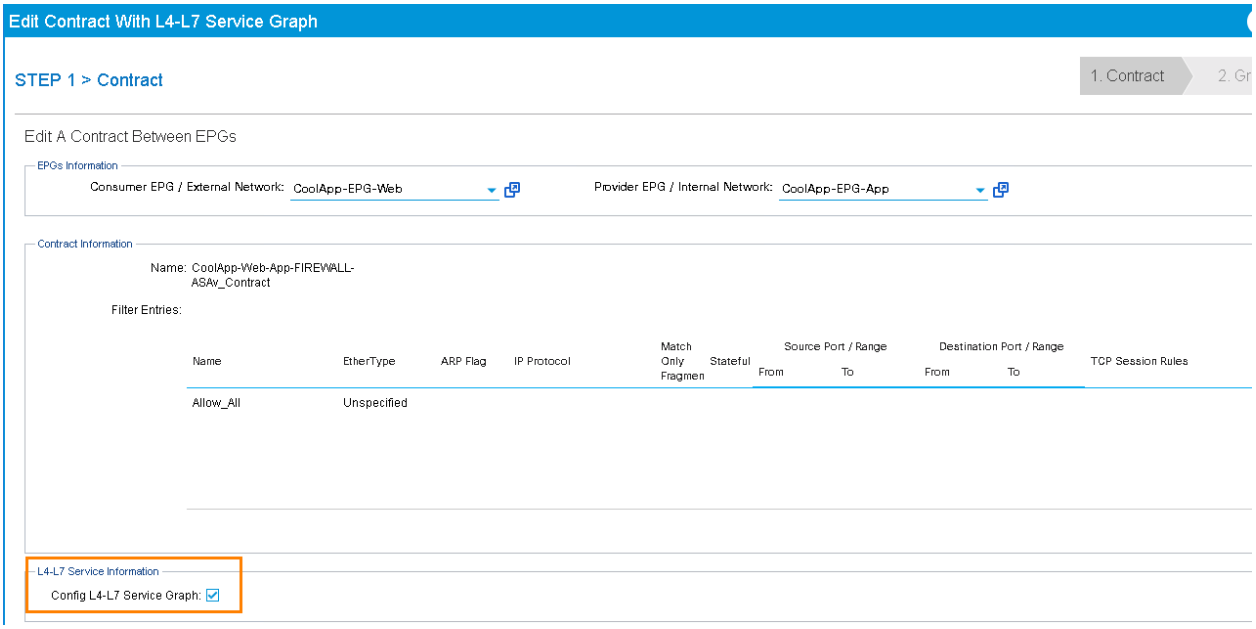


22. This application setup is very similar to the BasicApp created in Scenario 2, except that the Web – App Contract now has an L4-L7 Service Graph configured. The **CoolApp-Web-App-FIREWALL-ASAv_Contract** is tied to the firewall. Click the **CoolApp-Web-App** contract to show the details.

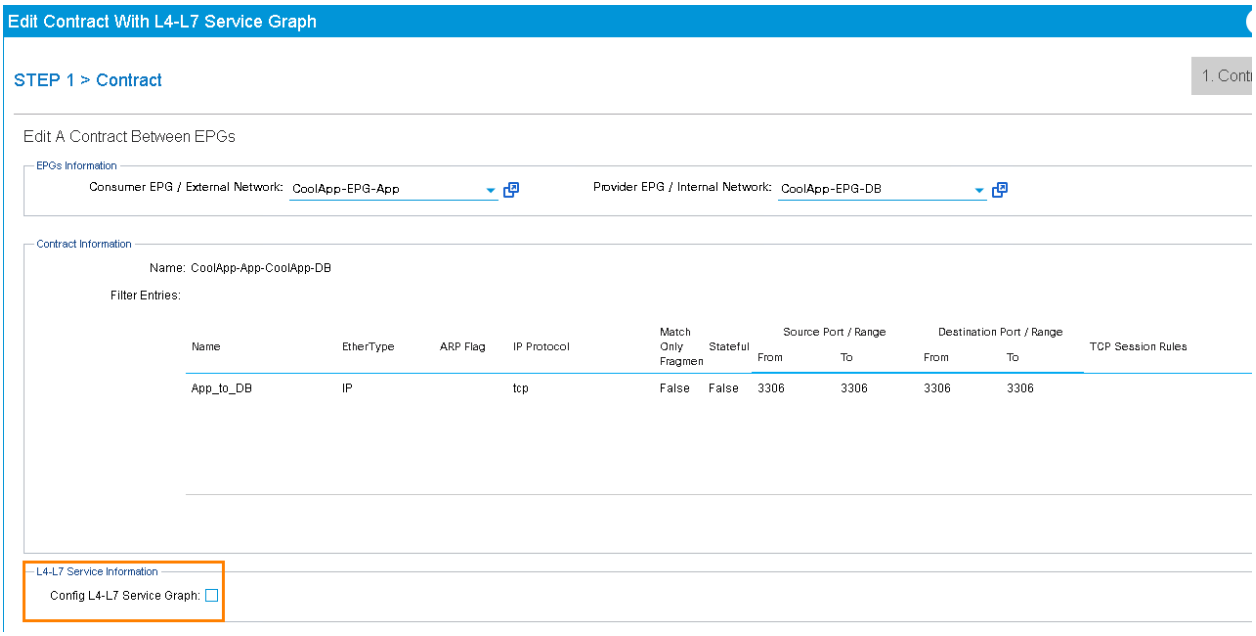


NOTE: The L3 Out for the 3-Tier Application is provided by the common tenant.

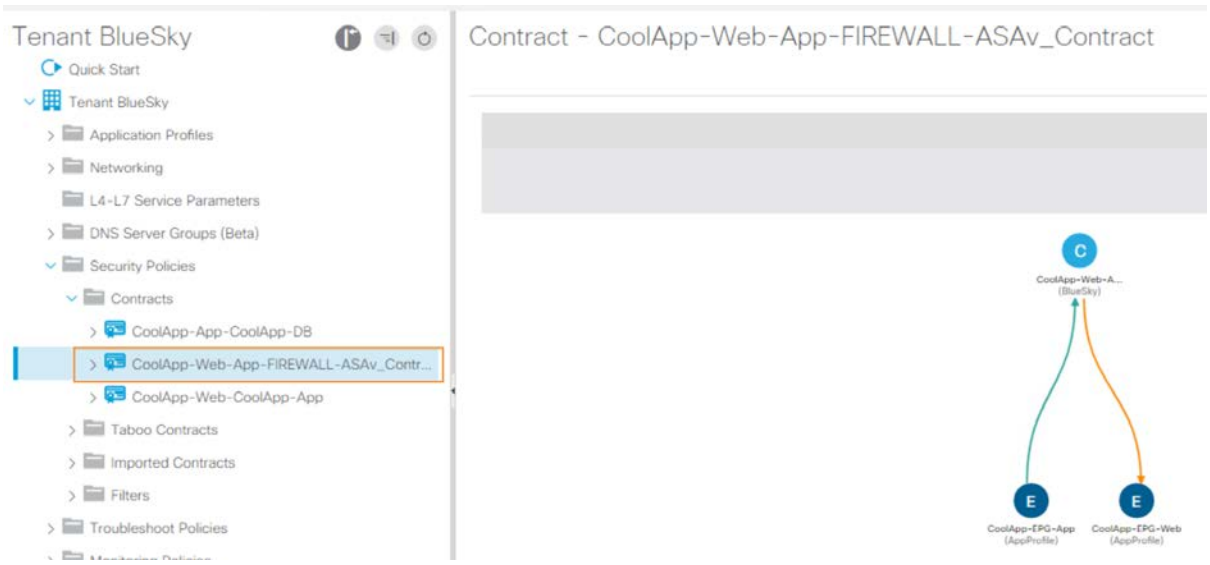
23. Double-click the Contract between Web and App tiers to show the **Edit Contract with L4-L7 Service Graph** window that shows the L4-L7 Service Graph has been configured. As editing the contract is outside the scope of this demonstration, close the window without making any changes. If the L4-L7 Service Graph has not been configured, return to UCS Director and wait for the work flow to finish before trying again.



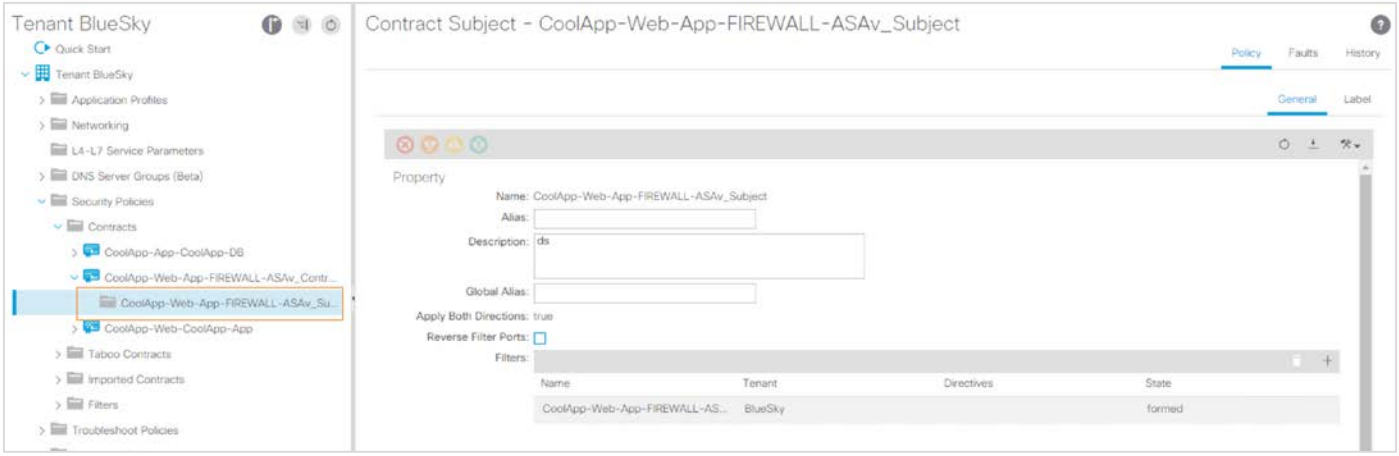
24. For comparison, click the App-DB contract, and show that an L4-L7 Service Graph has not been configured.



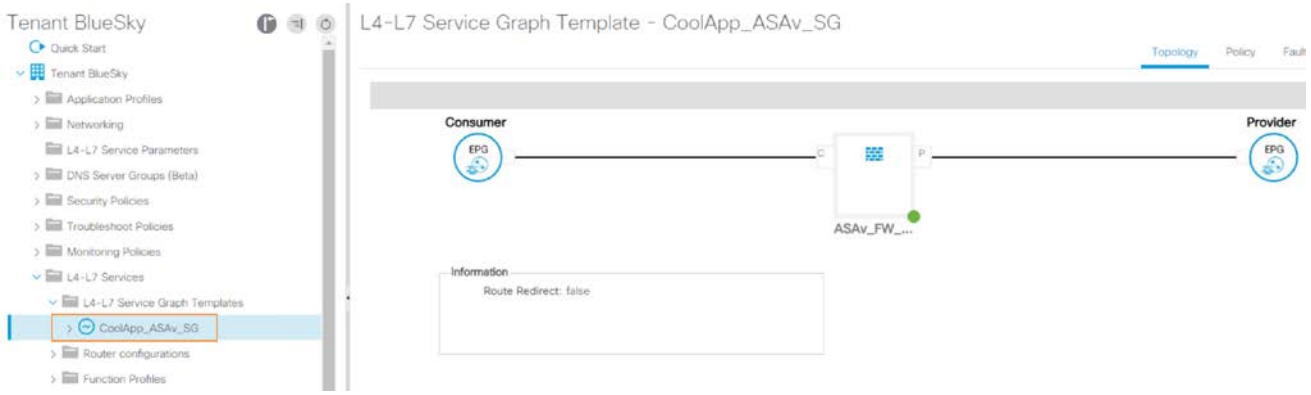
25. In the side menu, expand **Tenant BlueSky > Security Policies > Contracts > CoolApp-Web-App-FIREWALL-ASAv_Contract**, then click **CoolApp-Web-App-FIREWALL-ASAv_Contract** to show the topology of the contract.



26. Expand the folder and click **CoolApp-Web-App-FIREWALL-ASAv_Subject** to see information about the Contract Subject, including the Service Graph.



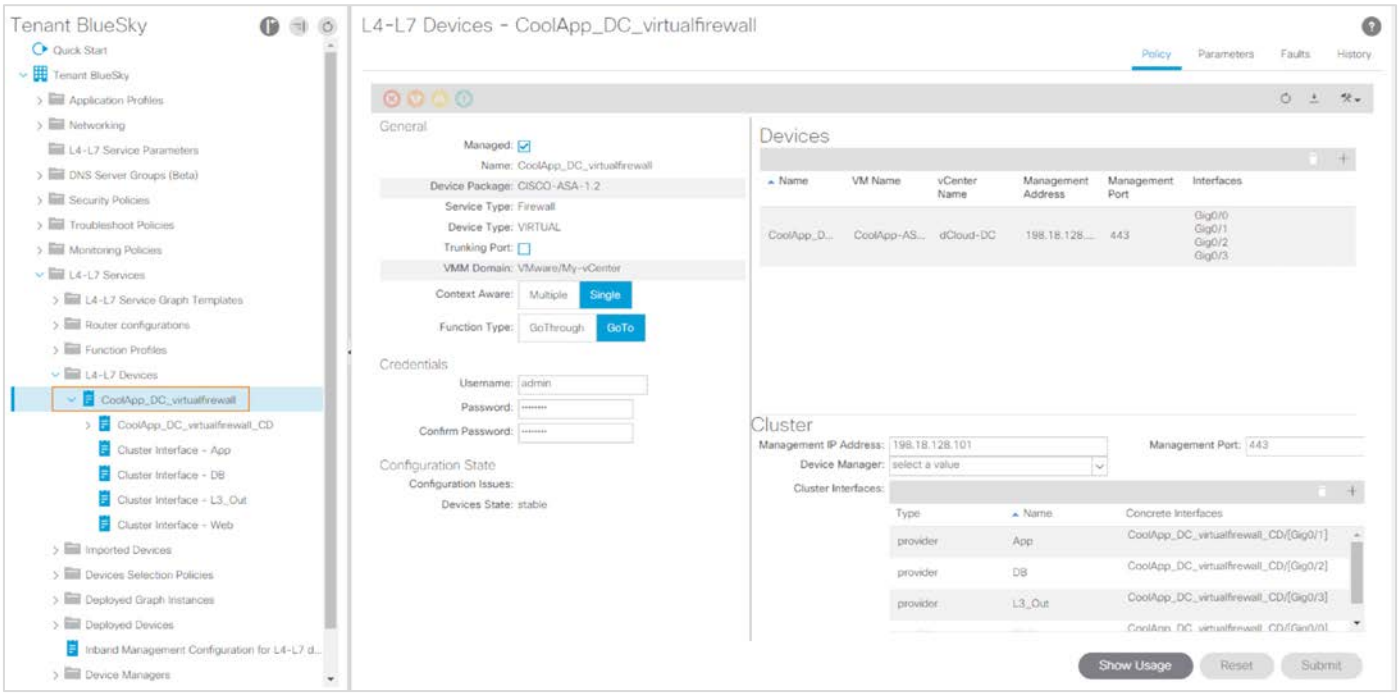
27. Expand **Tenant BlueSky > L4-L7 Services > L4-L7 Service Graph Templates** and click **CoolApp_ASAv_SG** to show the service graph template, which is used to create a service graph.



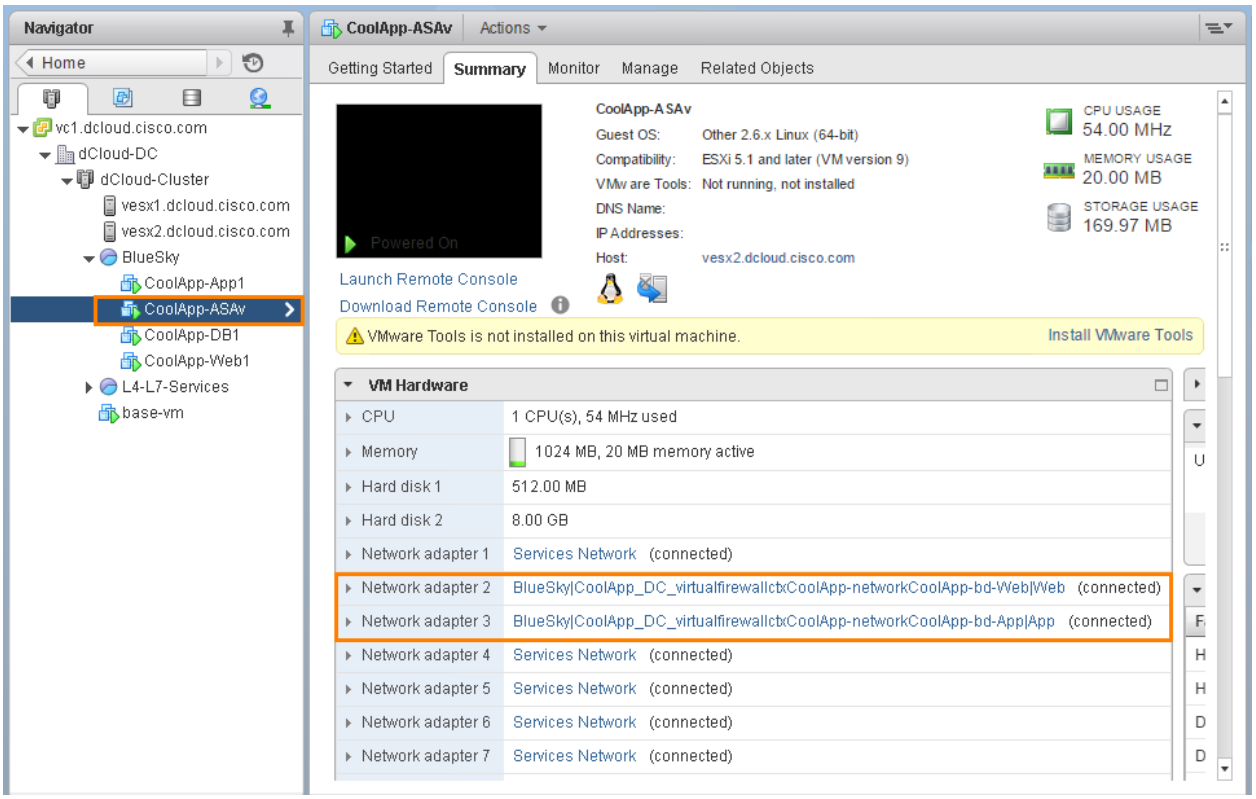
28. Expand **Tenant BlueSky > L4-L7 Services > Deployed Graph Instances** and click **CoolApp-Web-App-FIREWALL-ASAv_Contract-CoolApp_ASAv_SG-dcloud** to see the service graph topology.

29. To show the interfaces that are connected to the firewall, expand **Tenant BlueSky > L4-L7 Services > L4-L7 Devices** and expand the **CoolApp_DC_virtualfirewall** folder. The application has been deployed with four interfaces – one for each application tier, one for the L3_Out, and one for the ASAv firewall. The ASAv firewall is connected to four Gig0 interfaces.

30. Click **CoolApp_DC_virtualfirewall** to show the Management address and other information about the interfaces.



31. Return to the vSphere Web Client and refresh the **Hosts and Clusters** window.
32. Click the **CoolApp-ASAv** VM to show the five network adapters that correspond to the APIC interfaces. Note the presence of one interface into the Web tier and one interface into the App tier – the ASAv sits between the Web and App tiers and filters traffic, the firewall isn't actually physically connected to the other tiers.

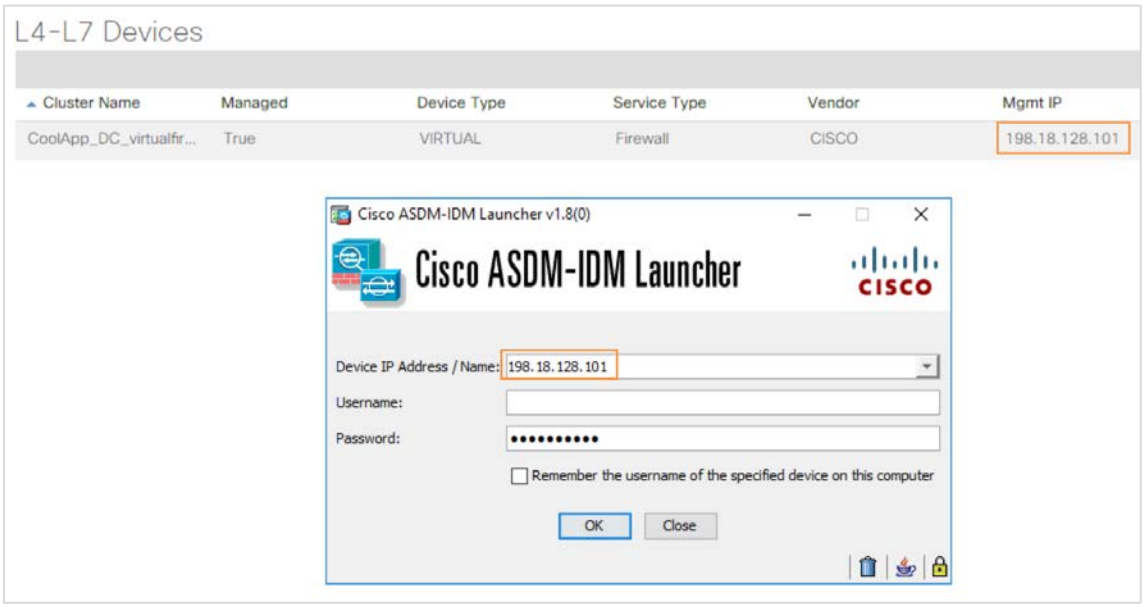


33. To show that the L4-L7 device has been configured, return to the APIC window and click **L4-L7 Devices** again.
34. Make a note of the **Mgmt IP** address.

35. On the wkst1 desktop, click the **Cisco ASDM-IDM** icon 

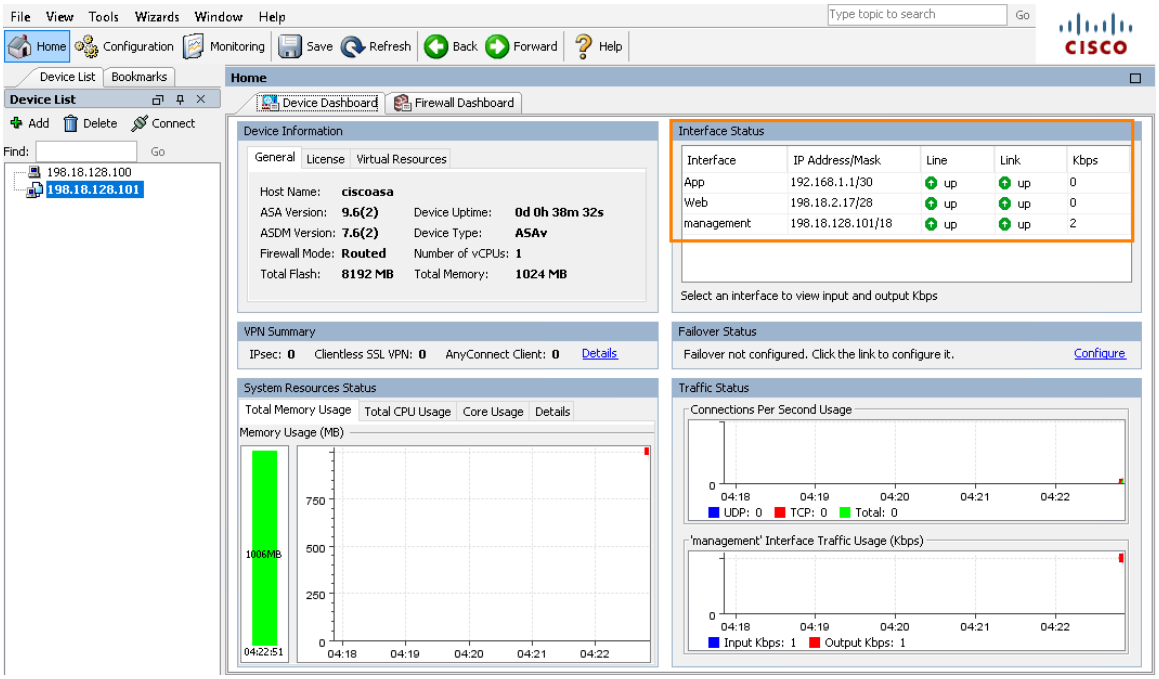
to open ASDM.

36. Copy the Mgmt IP into the **Device IP Address / Name** field and log in (**admin/C1sco12345**).

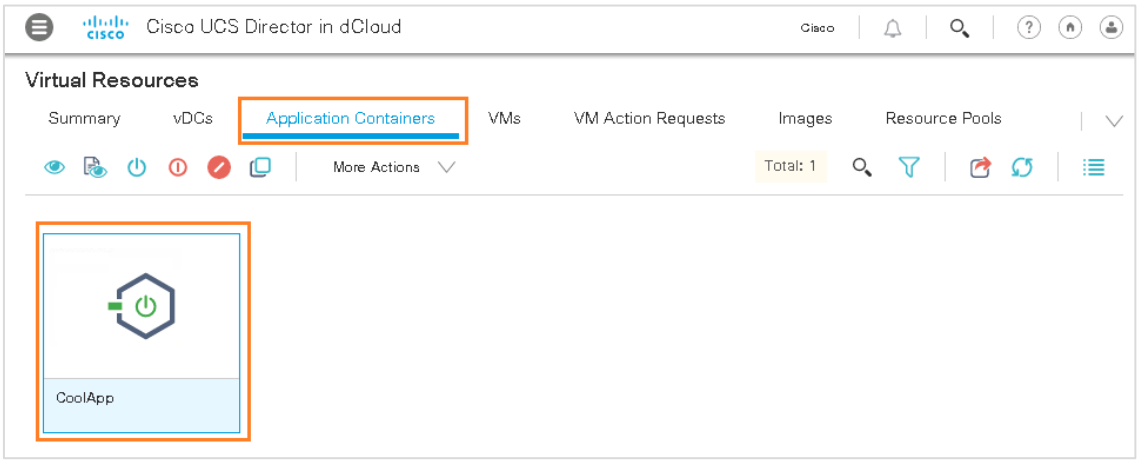


37. Click **Continue** on the pop-up. If a **Smart Call Home** pop-up is generated, click **Remind Me Later**.

38. Show the Web, App, and Management interfaces for the ASAv firewall.



39. Close the **ASDM** window.
40. Return to the **UCS Director** window and select **Virtual Resources** from the side menu.
41. Click **Application Containers** in the top menu to see the newly created **CoolApp**. The green status tile means the application is active.

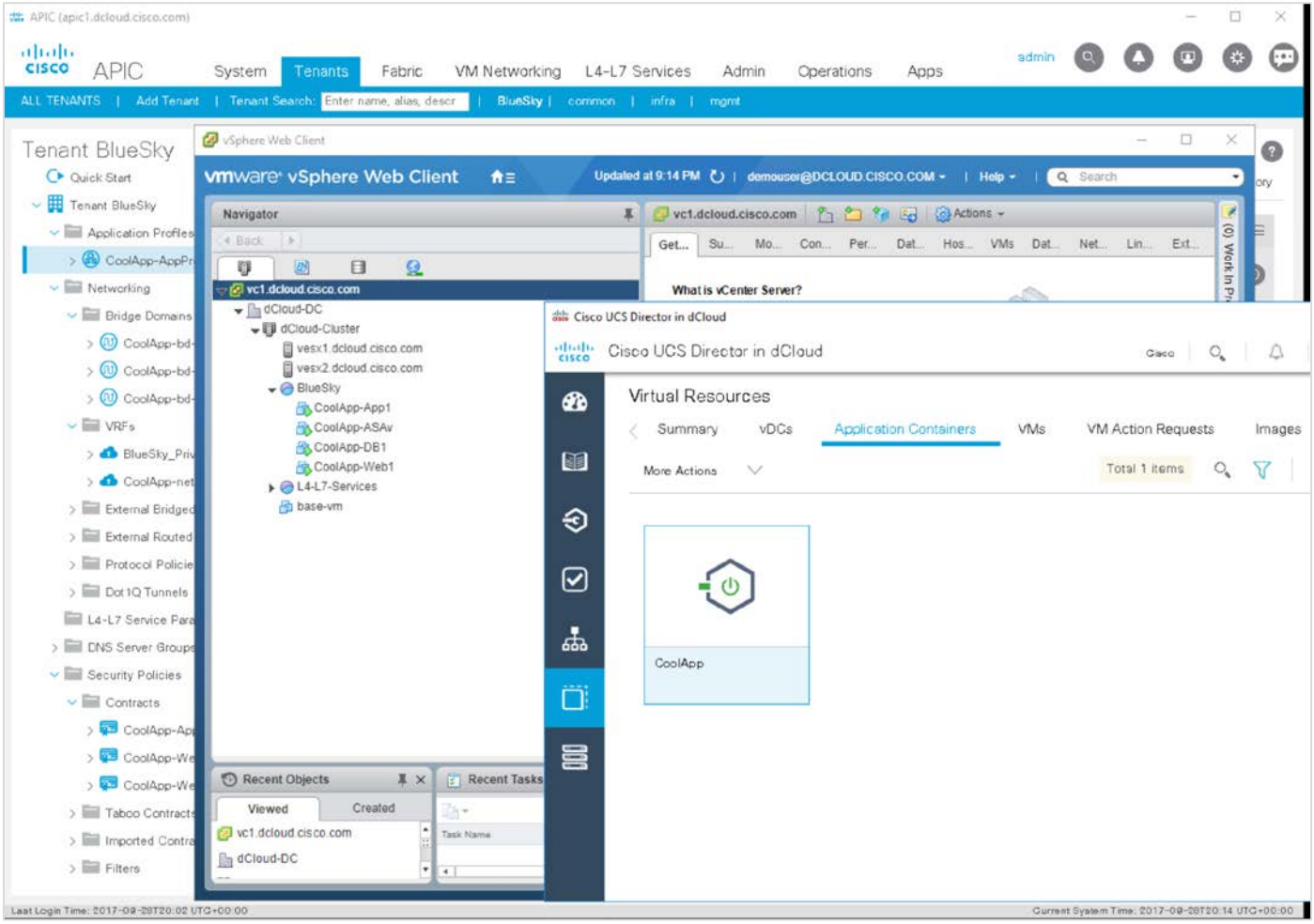


NOTE: Review the available actions to managing the Application Container.

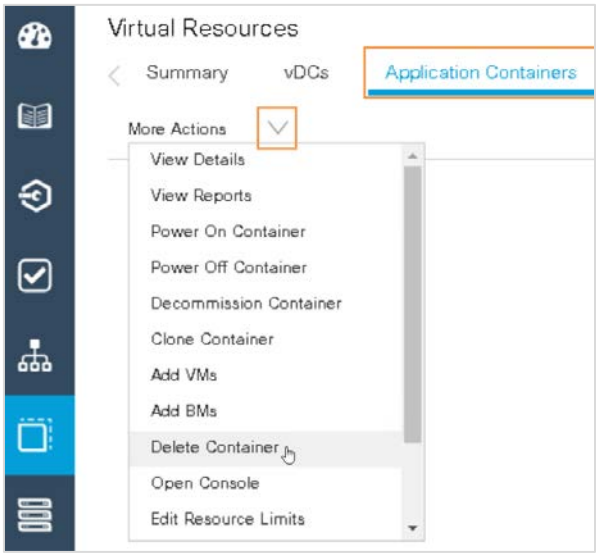
42. Once the application is fully deployed, the Admin email will receive an email containing all the configuration details for the application. Scroll through the email, showing the configuration information.

Delete Container

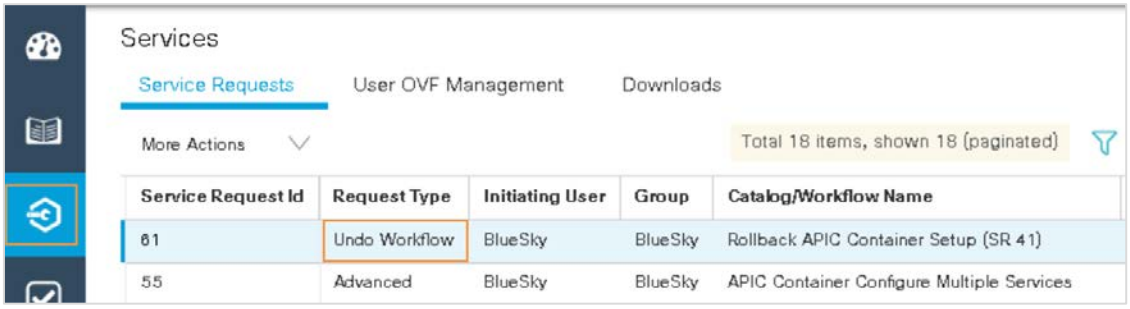
1. Return to the APIC window and expand the **Application Profiles** folder completely to show the EPGs.
2. Return to the VM window, which is still open to the **Hosts and Clusters** window. Expand the **BlueSky** folder to show the portgroups.
3. Return to the UCS Director window, which is still open to the **Application Containers** window.



4. Click the **3 Tier App L3Out ASAv** application container. When the **More Actions** bar becomes live, click it and choose **Delete Container** from the menu. This will delete the LBApp application and set the environment up for the next scenario.



5. Click **Submit**.
6. To see the Service Request for the container deletion, select **Services** from the side menu.
7. In the Service Requests list, locate the **Undo Workflow** request.

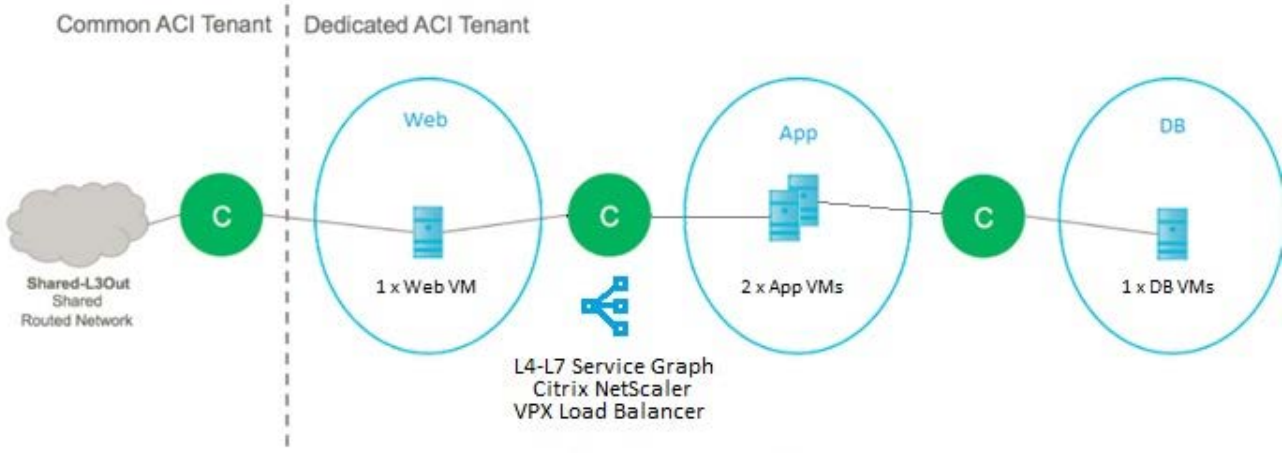


8. Double-click the service request to see the steps as the workflow is rolled back. This will take approximately five minutes.
9. Click between the **APIC** and **vSphere** windows, refreshing to watch as the CoolApp Application Container objects are rolled back and disappear.

Scenario 4. Deploy an Application Container with L4-L7 Services (Load Balancer)

The purpose of this scenario is to use a UCS Director workflow to deploy an application container in the BlueSky tenant with a Citrix Netscaler VPX load balancer.

The following diagram depicts the logical topology of the Application Container with L4-L7 services that will be deployed as part of this scenario. In this use case, there are three “tiers” or networks, with one Web and DB VMs, and a pair of App VMs. Between the Web and App tiers, an L4-L7 Load Balancer (Citrix Netscaler VPX VM) is configured to provide Load Balancing services to the App tier.

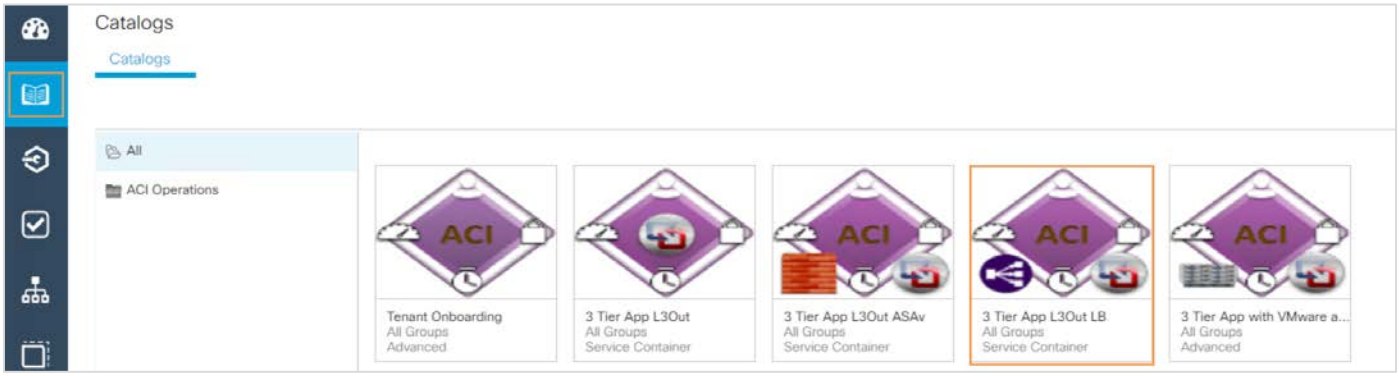


Steps

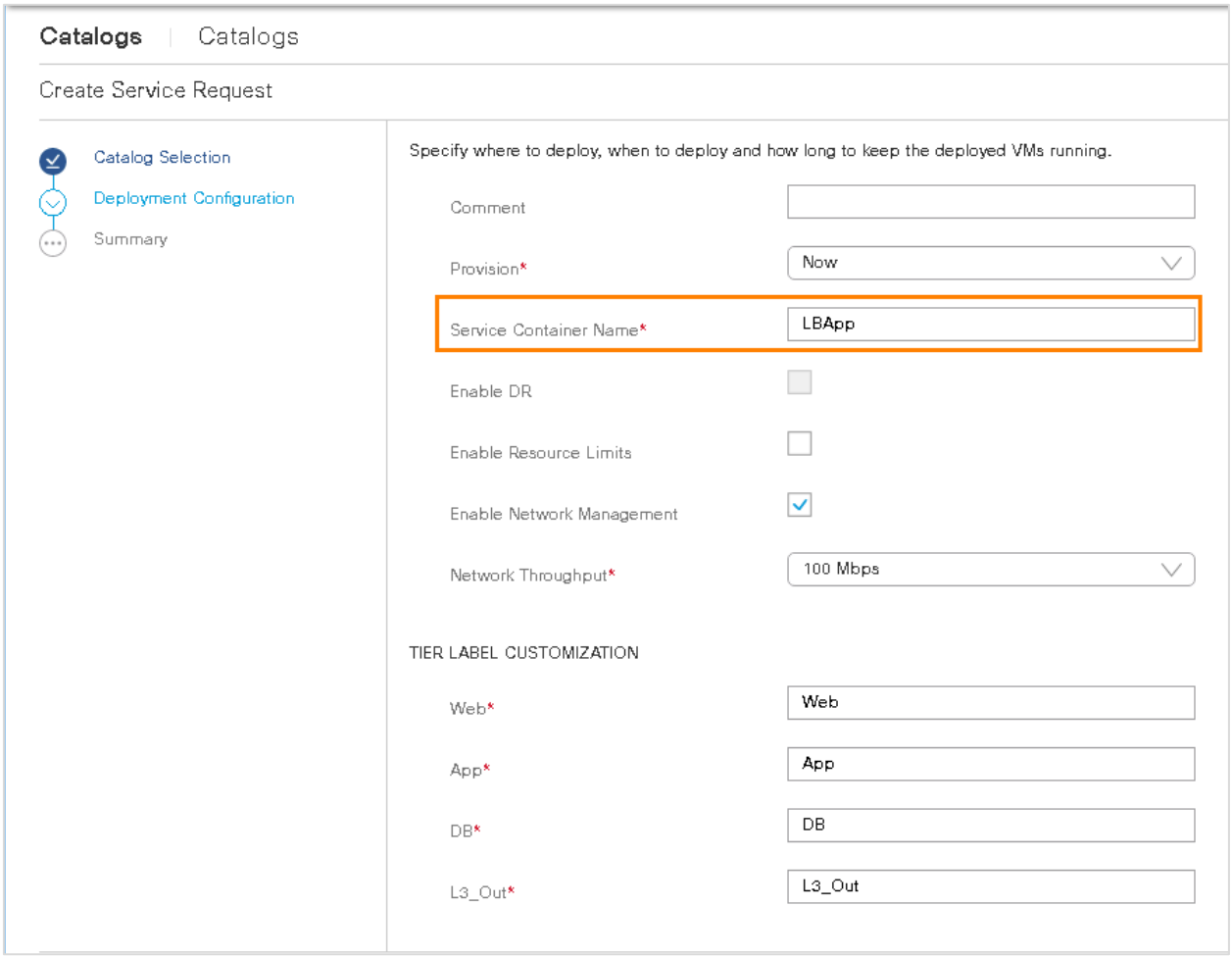
The applications that should still be open from Scenario 3 are:

- UCS Director – logged in with the BlueSky tenant admin username and password
- APIC 3.0, showing the BlueSky tenant, which is empty except for the BlueSky private network
- vSphere Web Client, logged in with Windows credentials and showing the Hosts and Clusters screen

1. In the **UCS Director** window, select **Catalogs** from the side menu.
2. Double-click the **3-Tier App L3Out LB** workflow.

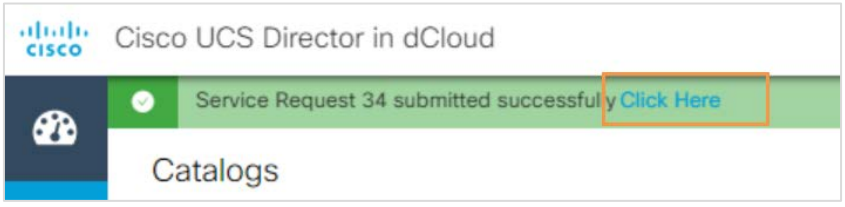


3. In the resulting window, perform the following steps:
    - Click **Next** through the **Catalog** window – no changes are necessary.
    - In the **Service Container Name** field, enter **LBApp** or any other name (the name cannot have any numbers in it).
    - If desired, customize the names of the tiers (Tier Labels), but this is not required.
    - Click **Next**.

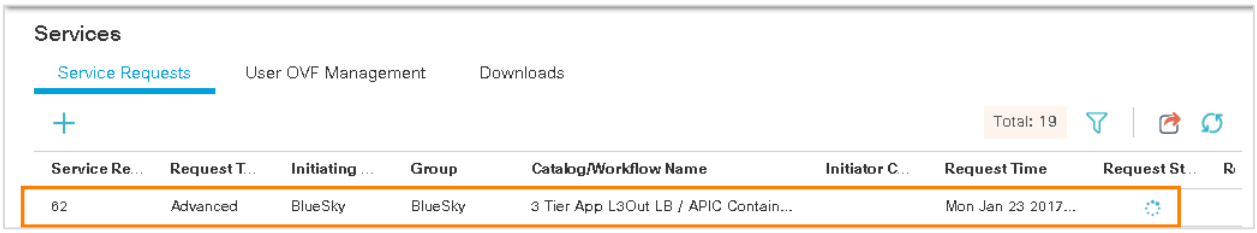


    - Click **Submit**.

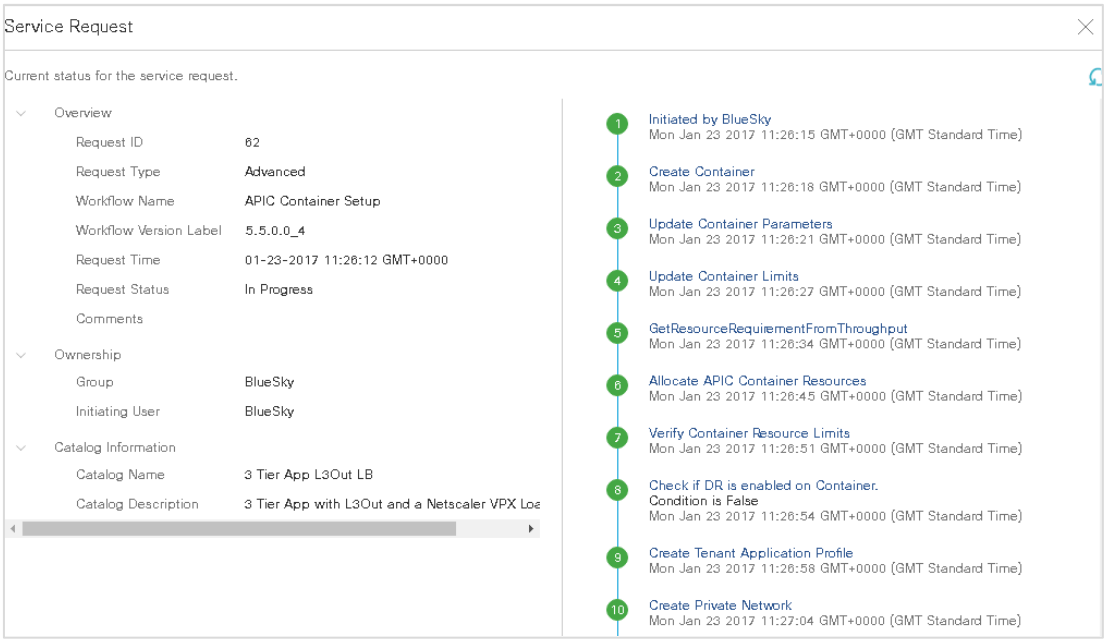
4. Click **Click Here** to review the Service Request.



5. In the resulting window, double-click the Service Request to view the details.



6. Review the workflow steps.

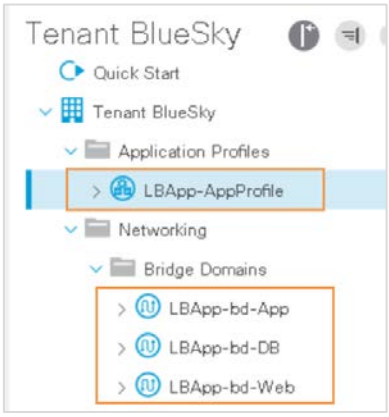


The 3 Tier App L3Out LB workflow performs the following steps:

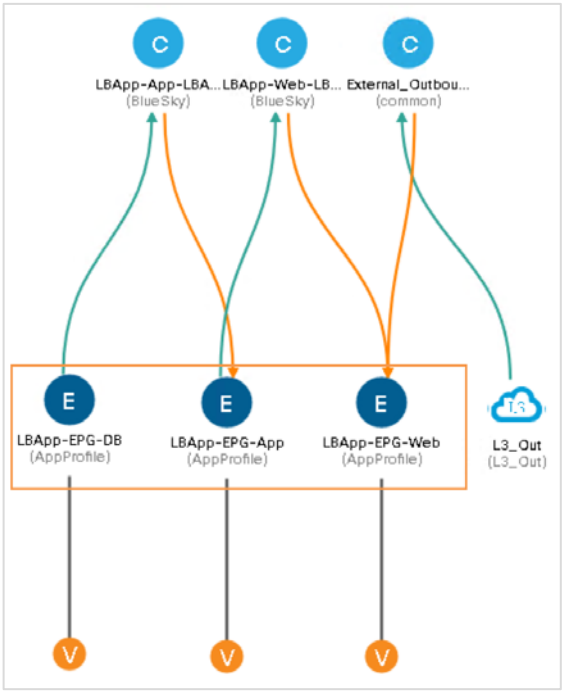
- Creates a container in UCS Director and allocates resources.
- Creates the APIC objects – Application Profile, private network, Bridge Domains and Contracts. New Port Profiles are automatically propagated to the VMware Distributed Switch.
- Creates the VM for each application in VMware, connecting each to the relevant Port Profile for its tier.
- Creates a child workflow that creates the L4-L7 Configuration (Load Balancer), and attaches it to the already available VPX virtual appliance.
- Sends confirmation email to Tenant Admin Email Address (from Scenario 1).

NOTE: It will take approximately 30 minutes for the workflow to complete. Proceed with the following steps while it is running.

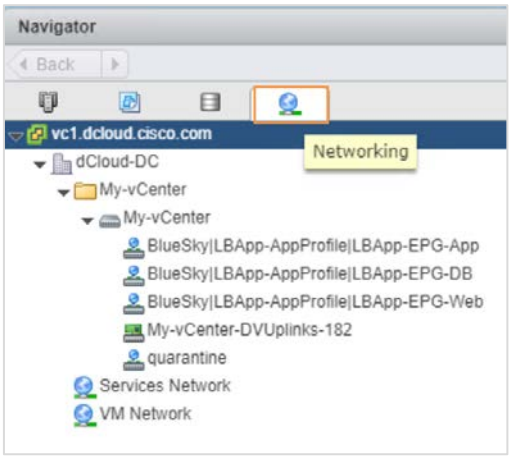
7. In the APIC window, expand **Tenant BlueSky > Application Profiles** to show that the **LBApp-AppProfile** application profile has been created by Step 9 of the UCS Director workflow.
8. Expand **Networking > Bridge Domains** and show the three bridge domains that were created for the application – one each for the App, DB, and Web tiers.



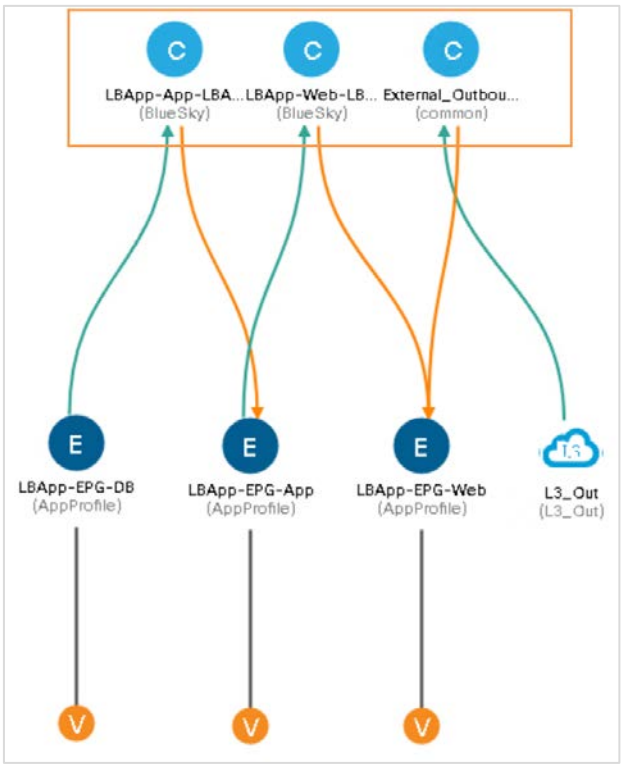
9. Continue monitoring the workflow in the UCS Director window. As Steps 11 and 12 create the EPGs, return to the APIC window and expand the **Application Profiles > LBApp > Application EPGs** directory and show the App, DB, and Web EPGs dropping in.
10. Refresh the work pane to show the current application topology.



11. As the EPGs are created, return to the **vSphere Web Client** window. Click the **Networking** icon and expand **vc1.dcloud.cisco.com > dCloud-DC > My-vCenter > My-vCenter** to show that the three new EPGs now exist as portgroups in vSphere.

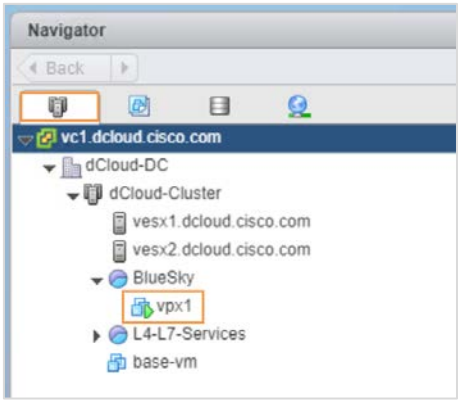


12. Continue to monitor the UCS Director workflow. When Step 14 has completed, return to the APIC to see the contracts.
13. Refresh the APIC work pane to see the contracts that have been created between the three tiers.

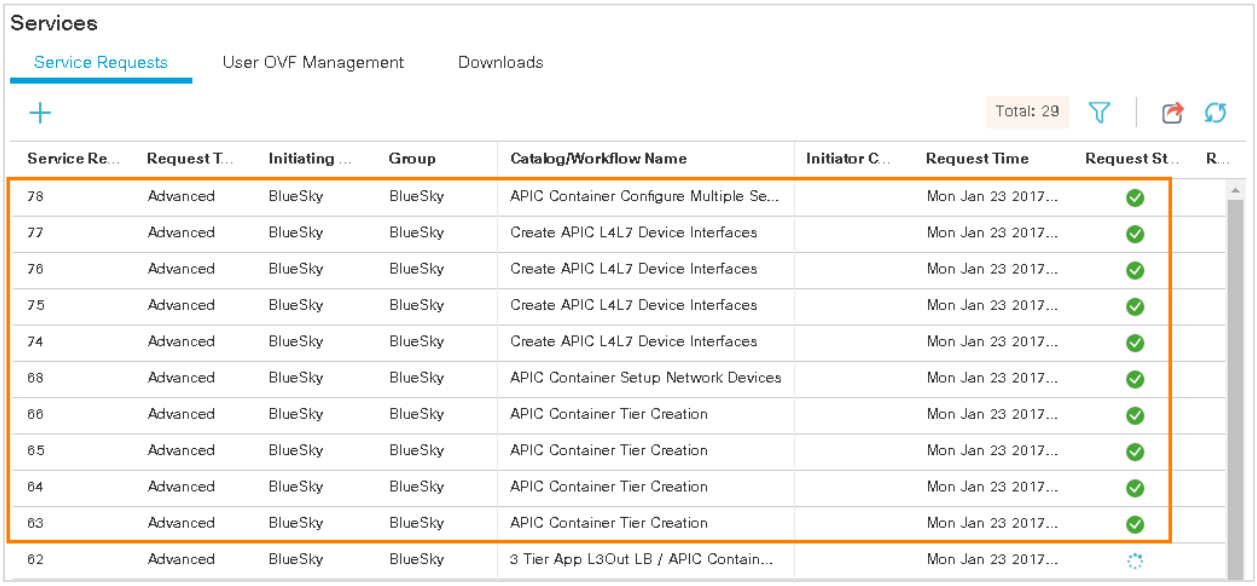


14. Return to **vSphere**, in the vSphere window, click the **Hosts and Clusters** icon.
15. Expand **vc1.dcloud.cisco.com > dCloud-DC > dCloud-Cluster > L4-L7 Services** to show the existing vpx1 VM. This VM is an existing Citrix Netscaler Load Balancing server, which the BlueSky application will use for load balancing. Step 15 of the UCSD Workflow will attach the load balancer as a resource for the BlueSky tenant. This process will take approximately 15 minutes.

NOTE: If Step 15 is already in progress, the Load Balancer may already have moved to the BlueSky resource group and the figure below may look different.

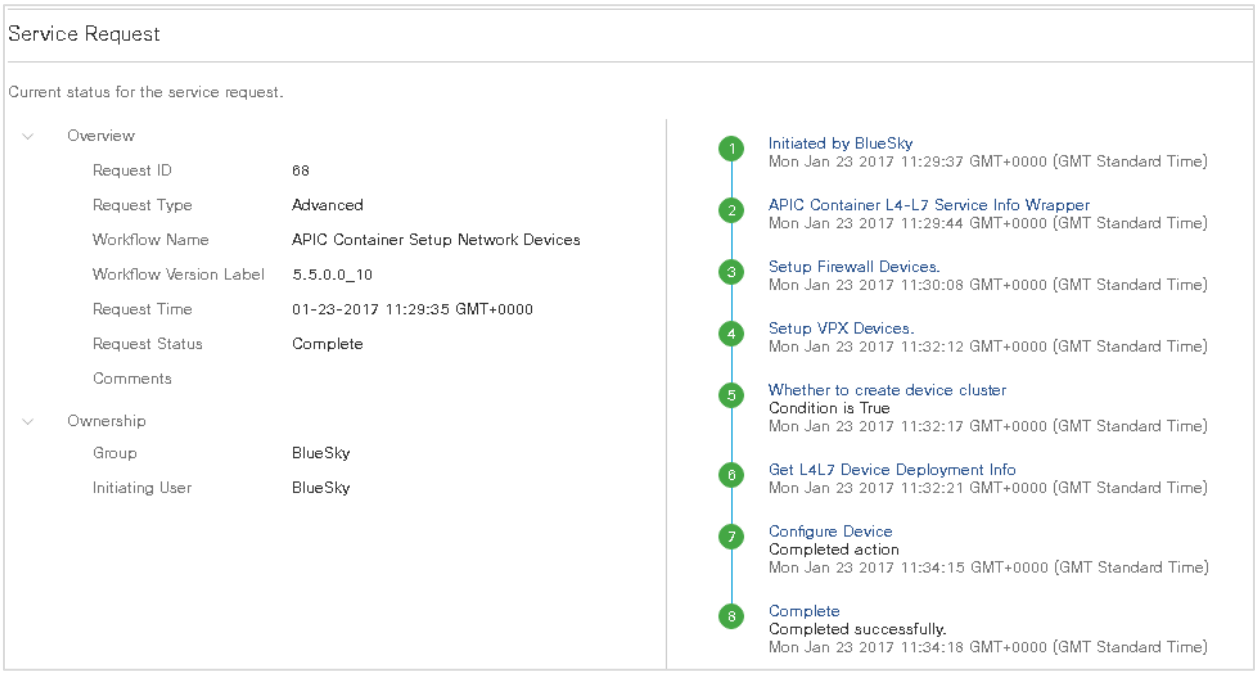


16. Return to UCS Director and close the workflow window. Refresh the Service Requests window to show that the original service request has triggered a number of child requests.

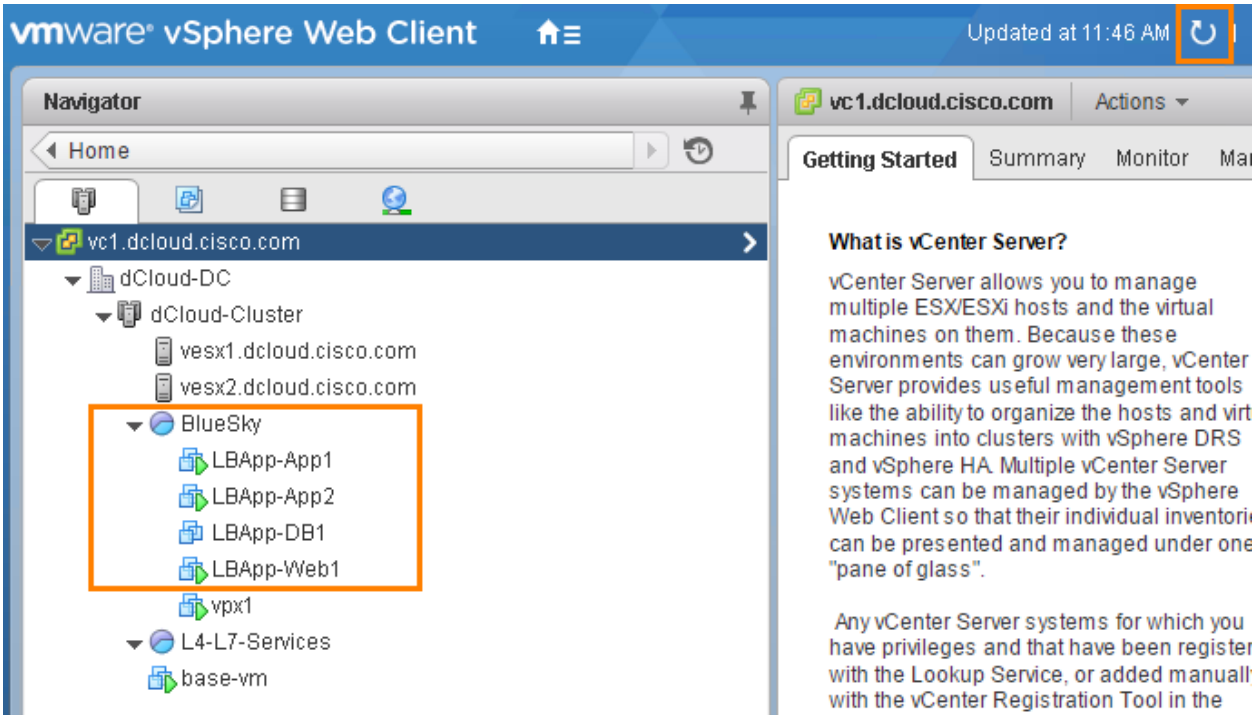


Service Re...	Request T...	Initiating ...	Group	Catalog/Workflow Name	Initiator C...	Request Time	Request St...	R...
78	Advanced	BlueSky	BlueSky	APIC Container Configure Multiple Se...		Mon Jan 23 2017...		
77	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
76	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
75	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
74	Advanced	BlueSky	BlueSky	Create APIC L4L7 Device Interfaces		Mon Jan 23 2017...		
68	Advanced	BlueSky	BlueSky	APIC Container Setup Network Devices		Mon Jan 23 2017...		
66	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
65	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
64	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
63	Advanced	BlueSky	BlueSky	APIC Container Tier Creation		Mon Jan 23 2017...		
62	Advanced	BlueSky	BlueSky	3 Tier App L3Out LB / APIC Contain...		Mon Jan 23 2017...		

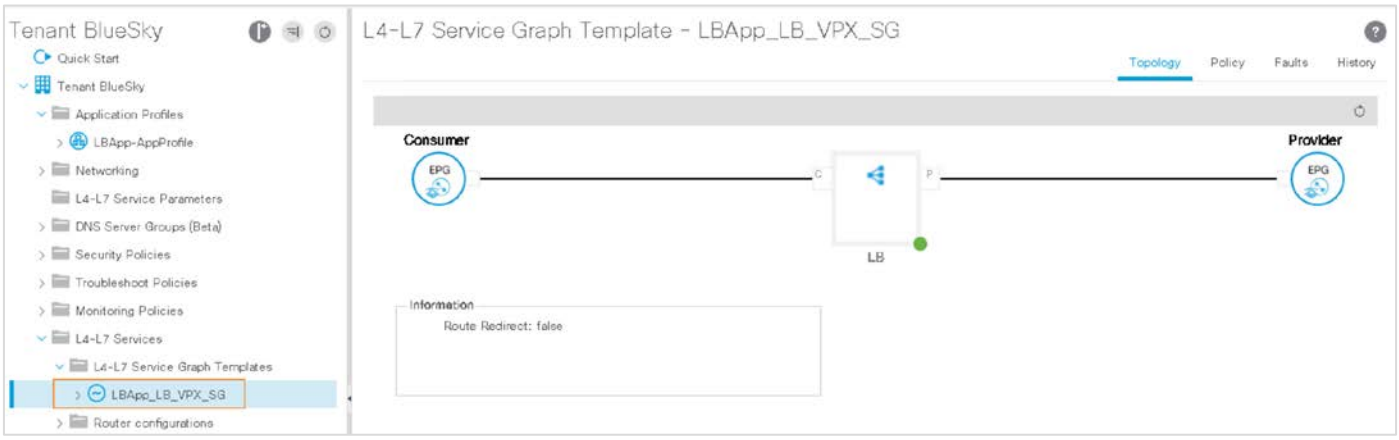
17. Double-click the **APIC Container Setup Network Devices** workflow, which is setting up the VPX load balancer, and show the steps it is completing.



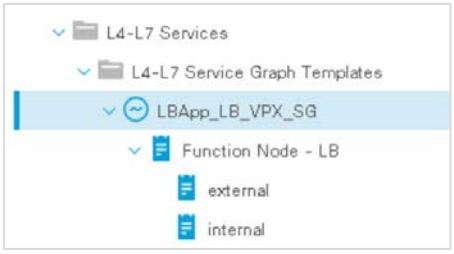
18. Once the VPX Setup workflow has completed, return to the vSphere window and refresh.
19. Expand **vc1.dcloud.cisco.com > dCloud-DC > dCloud-Cluster > BlueSky** and show that the load balancer VM has been moved to the BlueSky resource pool and that the application VMs are being created.
20. Keep refreshing the window until all four application VMs are created. This will take approximately 10 minutes. There are two App VMs because the App tier will utilize two VMs and a load balancer to handle traffic between them.



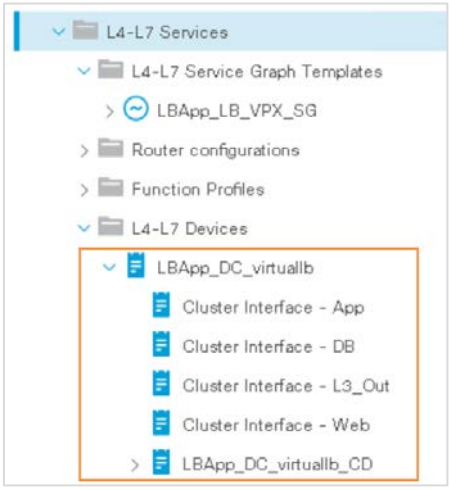
21. Return to the APIC window and expand **Tenant BlueSky > L4-L7 Services > L4-L7 Service Graph Templates.** Click **LBApp_LB_VPX_SG**, the service graph template used to create the Load Balancer service, to view it in the Topology window. It shows the consumer of the load balancer, which in this case will be the Web server, and the provider, which in this case will be the App servers.



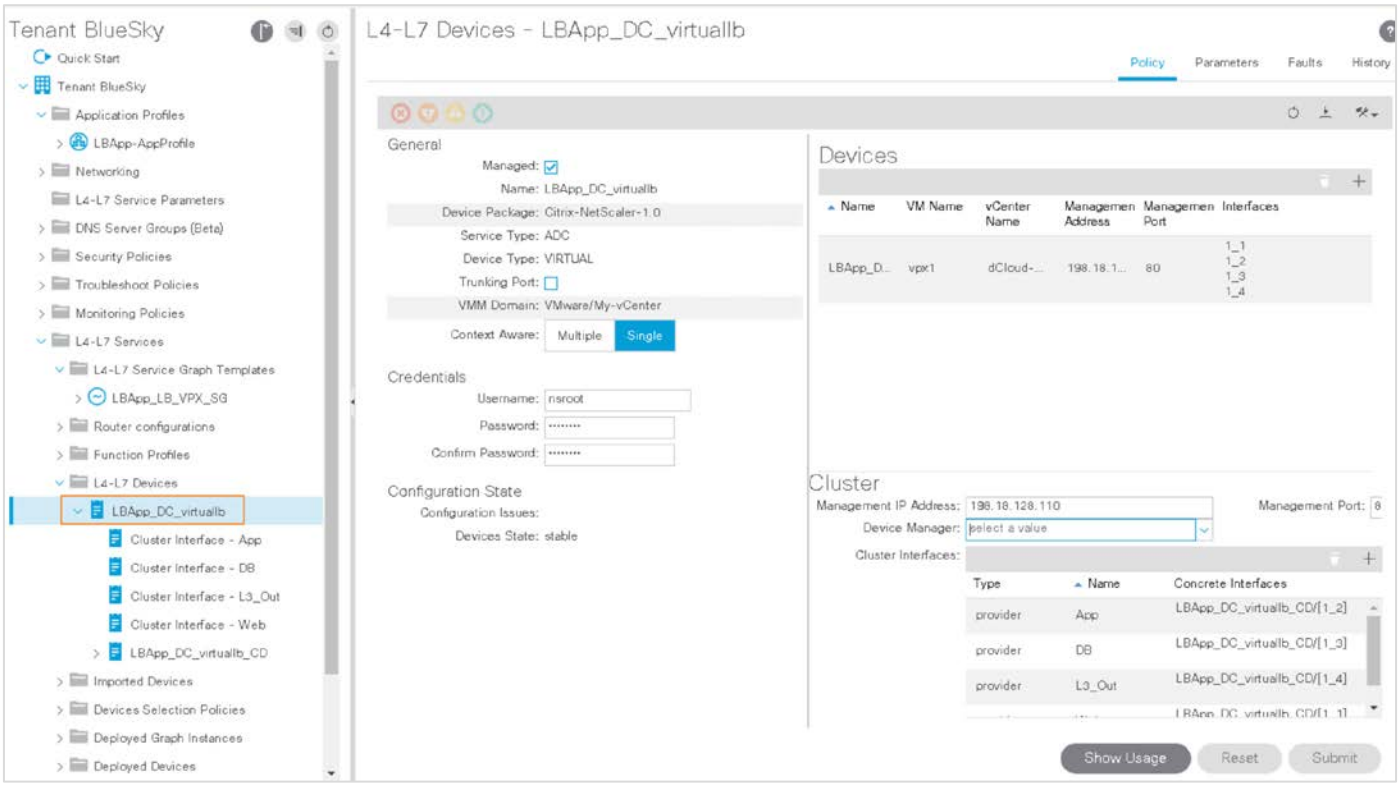
22. Expand the folder fully to show the internal and external connection that will be used to connect to the EPGs.



23. Expand the **L4-L7 Devices** folder to show the **LBApp_DC_virtuallb** virtual load balancer and the interfaces to the VMs that are connected to it.



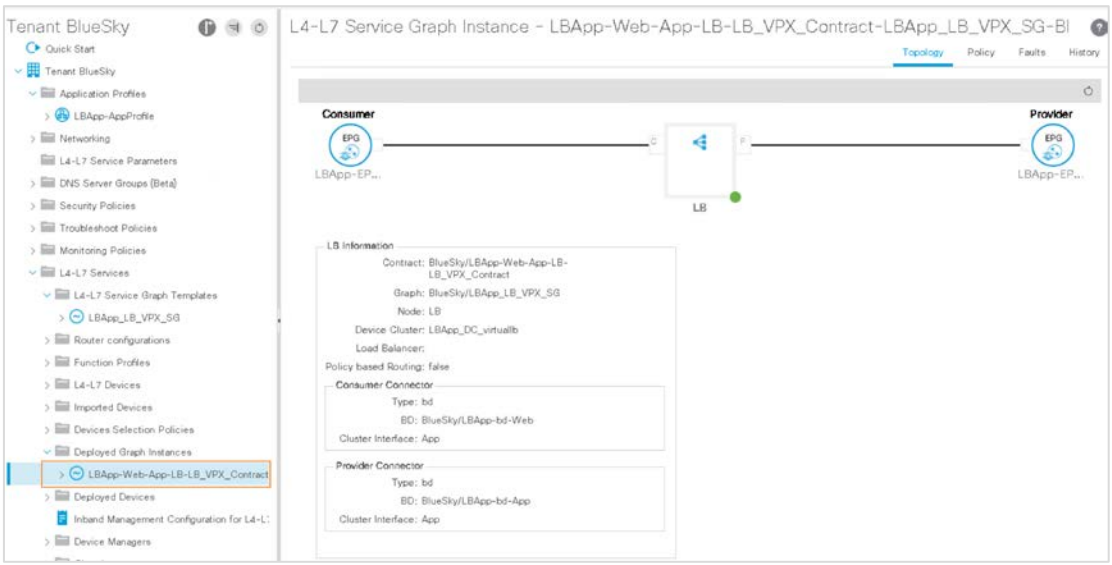
24. Click **LBApp_DC_virtuallb** to see some further details about the virtual load balancer.



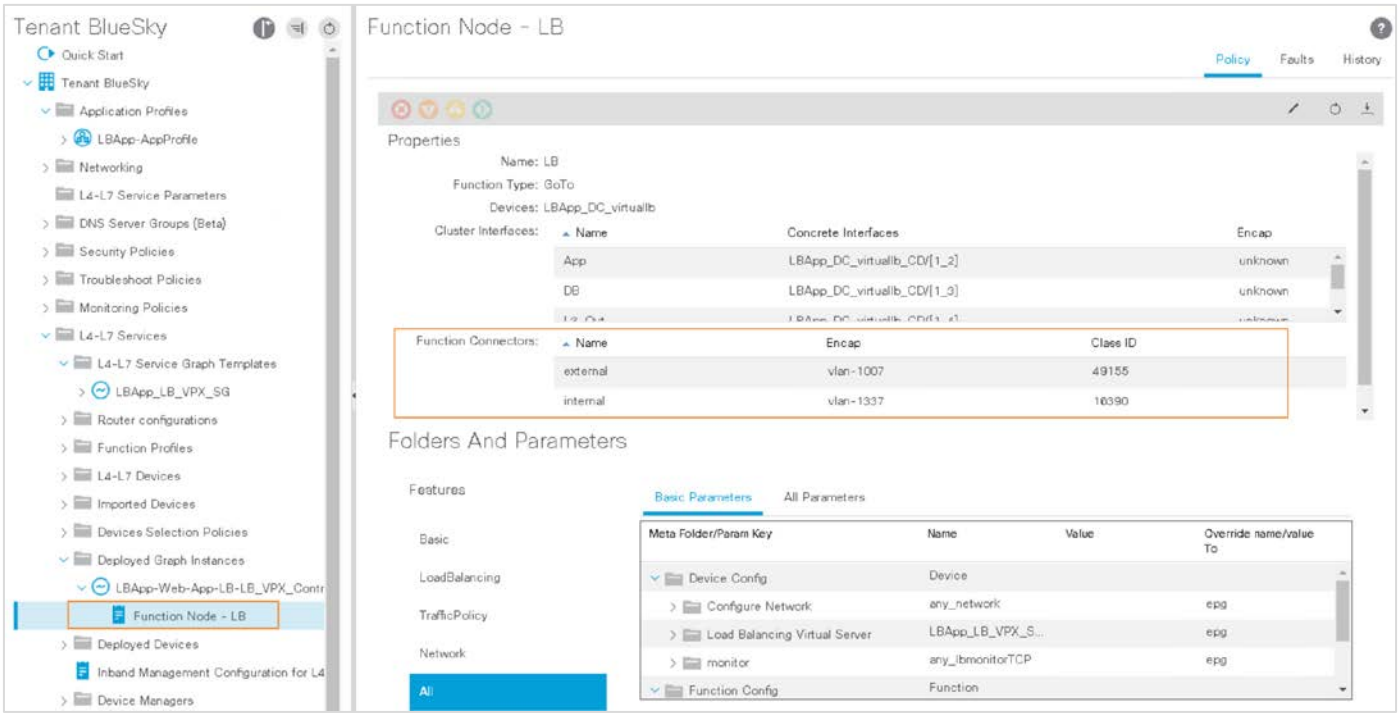
25. Expand the **Deployed Graph Instances** folder to show the **LBApp-Web-Ap-LB-LB_VPX_Contract-LBApp_LB_VPX_SG-BlueSky** service graph, the service graph for the load balancer.

26. Click the service graph to see the topology of the service graph in the Topology window, as well as the details of the service graph that has been created for the 3-Tier application.

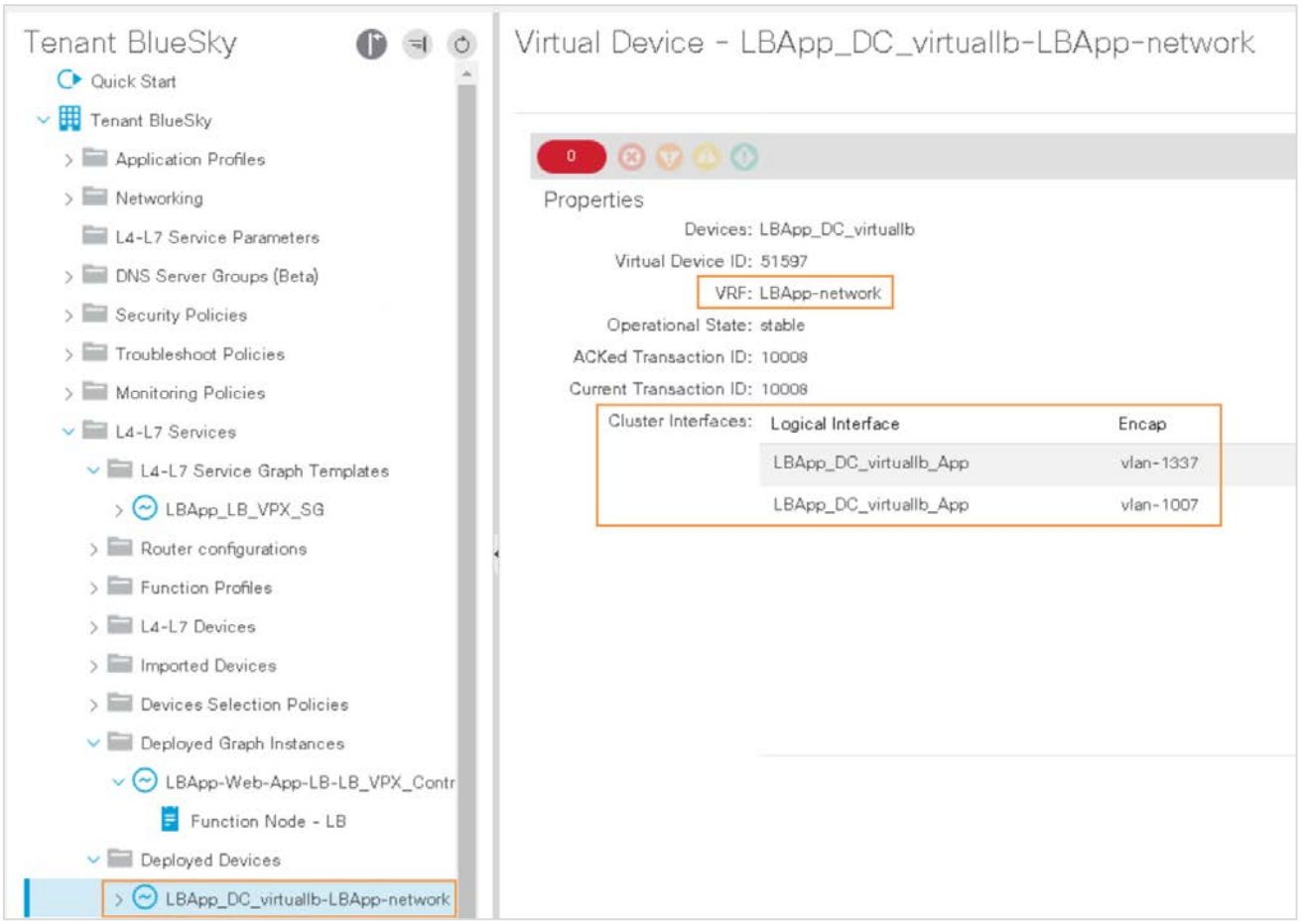
    - The Web tier is identified as the Consumer of the contract
    - The App tier is identified as the Provider of the contract



27. Expand **LBApp-Web-Ap-LB-LB_VPX_Contract-LBApp_LB_VPX_SG-BlueSky** and click the Function Node for the service graph to see the interfaces that connect to the load balancer.

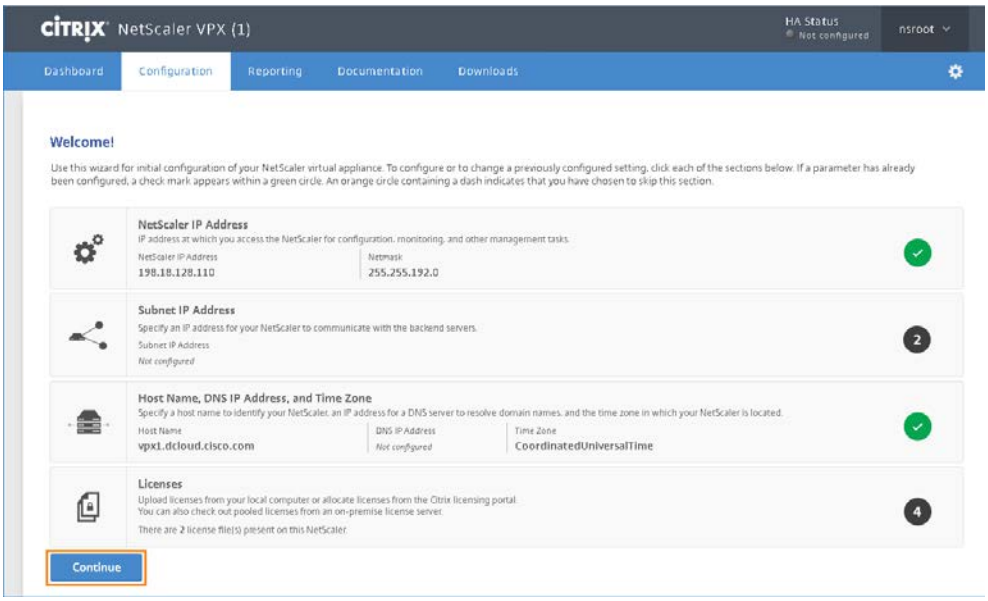


28. Expand **the Deployed Devices**, then explore the **LBApp_DC_virtuallib-LBApp-network** to review the configuration of the device.

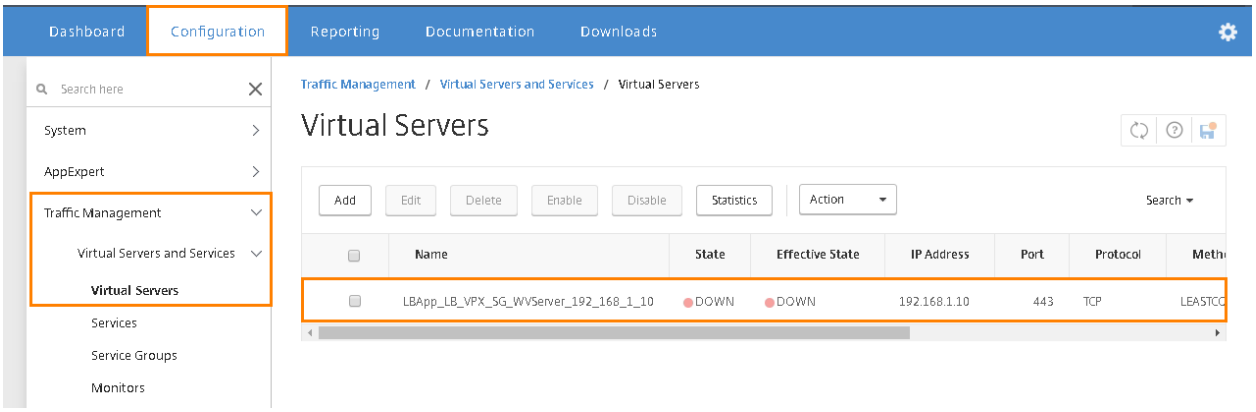


29. Launch Google Chrome and click the **Citrix Netscaler** shortcut  to log in to the VPX (**nsroot/C1sco12345**).

30. Click **Continue** on the Welcome screen.

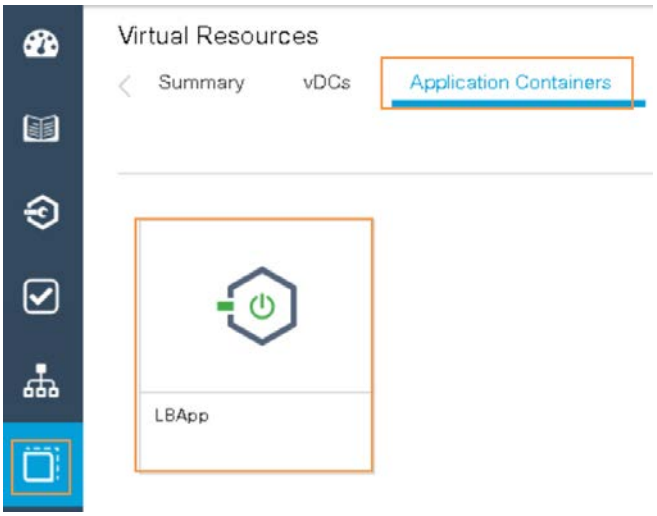


31. On the **Configuration** tab, click **Traffic Management > Virtual Servers and Services > Virtual Servers** to show the virtual load balancer server.

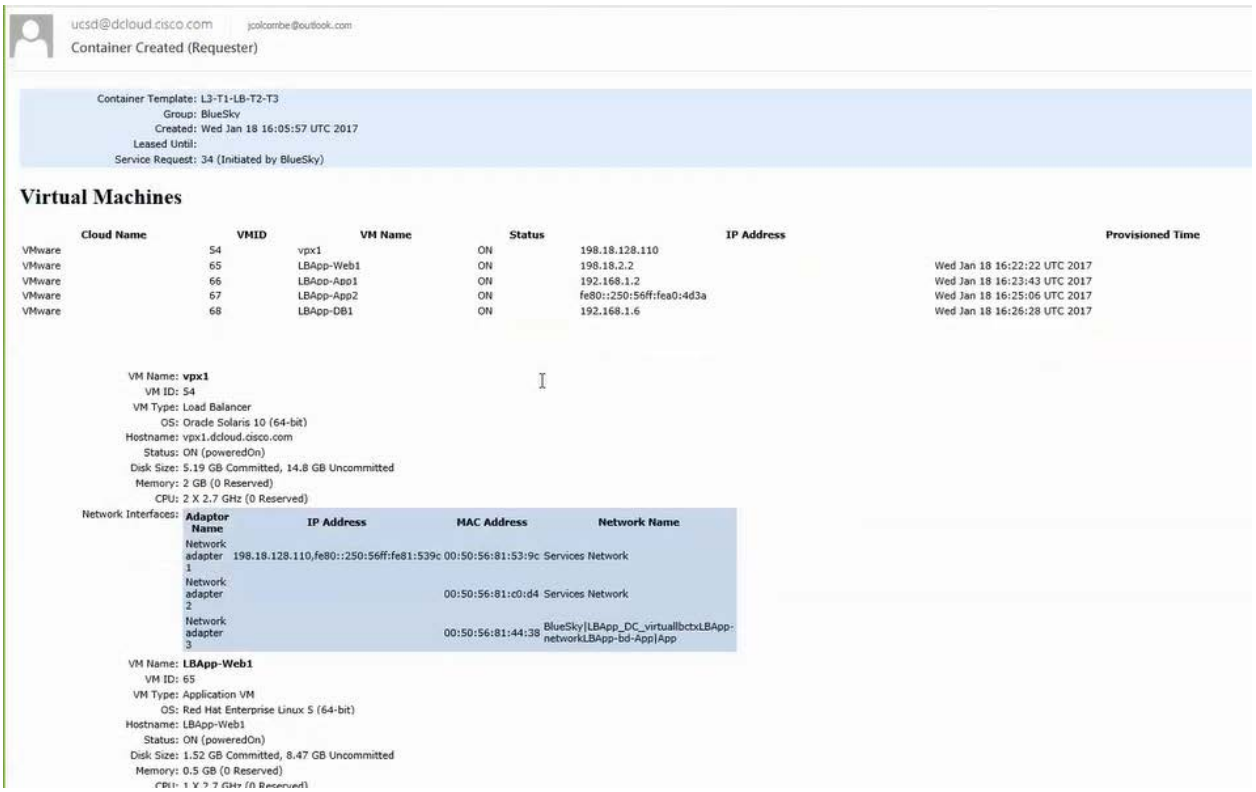


NOTE: As the APIC is an emulator, it has no data plane. No traffic can pass between the VMs, so the Citrix application sees the servers as down and will not come on line.

32. Return to the UCS Director window close the Service Request details window.
33. Click **Virtual Resources** in the side menu.
34. Click **Application Containers** in the top menu to see the newly created **LBApp**. The green status tile means the application is active.

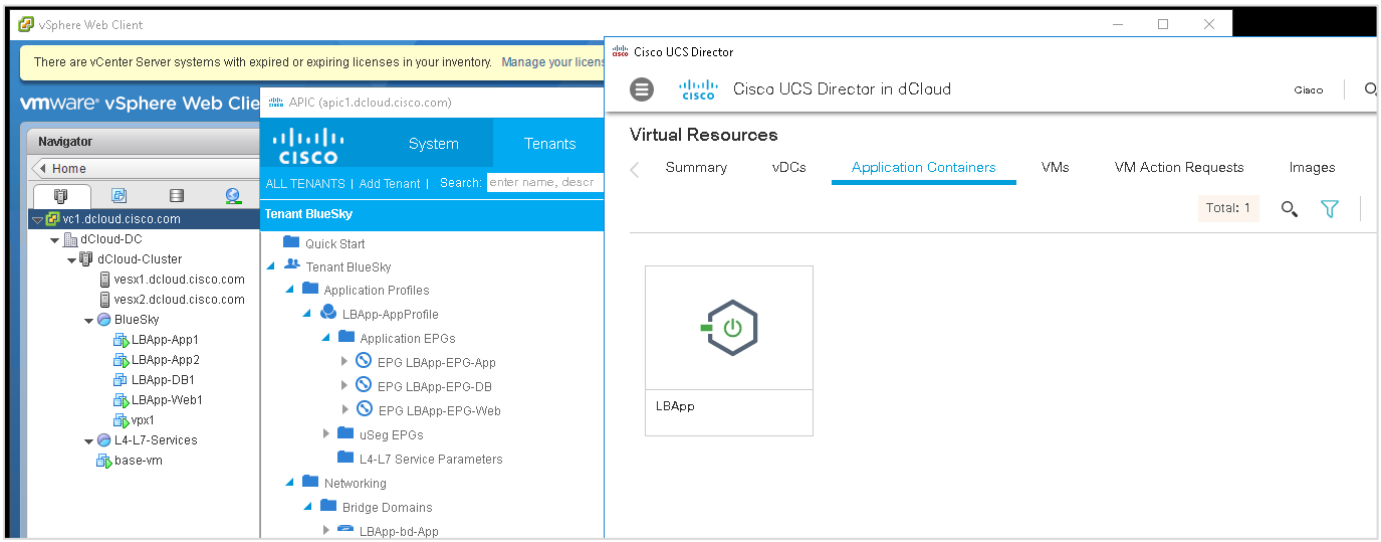


35. Once the application is fully deployed, the Admin email will receive an email containing all the configuration details for the application. Scroll through the email, showing the configuration information.

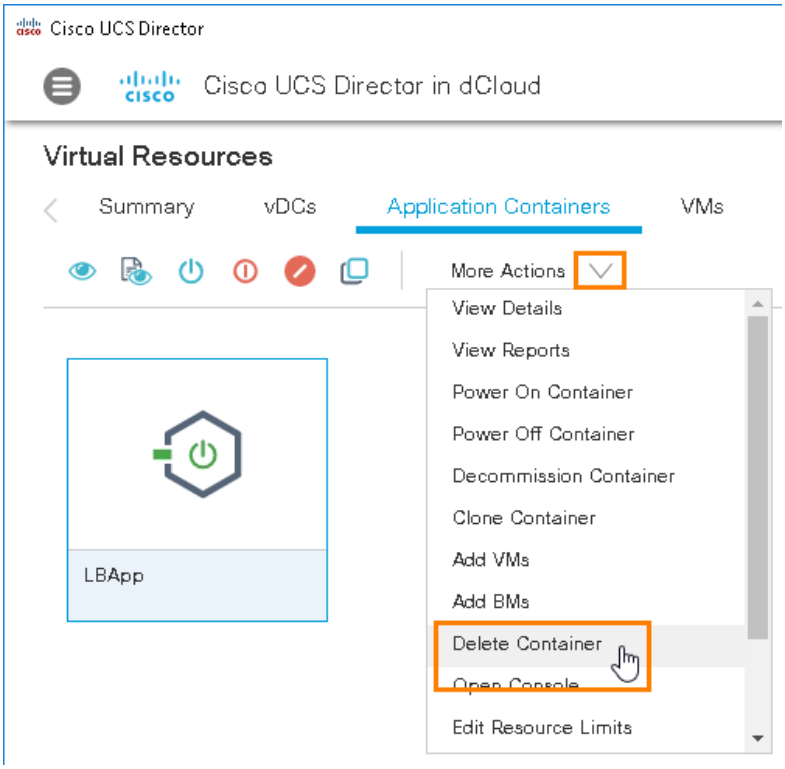


Delete Container

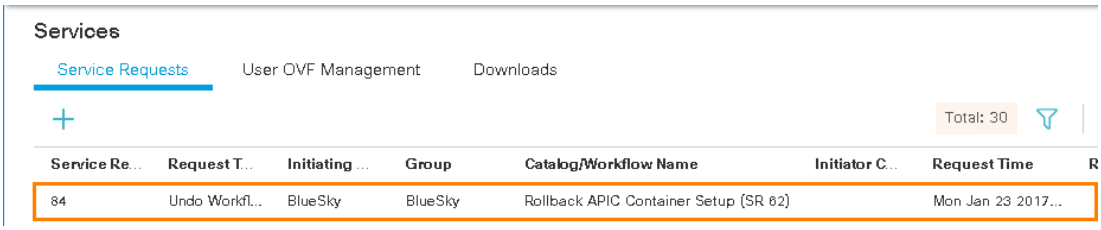
1. Return to the APIC window and expand the **Application Profiles** folder completely to show the EPGs.
2. Return to the VM window, which is still open to the **Hosts and Clusters** window. Expand the **BlueSky** Resource Pool to show the Virtual Machines.
3. Return to the **UCS Director** window, which is still open to the **Application Containers** screen.



4. Click the application container. When the **More Actions** bar becomes live, click it and choose **Delete Container** from the menu. This will delete the LBApp application and set the environment up for the next scenario.
5. Click **Submit**.



6. To see the Service Request for the container deletion, click **Services** in the side menu.
7. In the Service Requests list, locate the **Undo Workflow** request.



8. Double-click the service request to see the steps as the workflow is rolled back. This will take approximately five minutes.
9. Click between the **APIC** and **vSphere** windows, refreshing to watch as the objects in the LBApp application are rolled back and disappear.

NOTE: In the vSphere window, the vpx1 load balancer will move back out of the BlueSky resource pool.

10. Close the workflow detail window.

Scenario 5. Deploy a 3-Tier Application with a Physical Server (Emulated)

The purpose of this scenario is to deploy the three-tier application again, this time with two VMs and a physical server. The physical server is emulated, this demonstration environment does not contain physical hardware.

This workflow creates the Tenant, EPG, Contracts and other network objects in APIC and clones the VMs needed in the new application (Web and App tiers), then joins the VMs to the newly created port profiles in VC. It also creates the UCS Service Profile for the DB tier in USCM and attaches the VLAN selected in APIC EPG to the new SPs.

Reinforce that the **Complete** status indicates that:

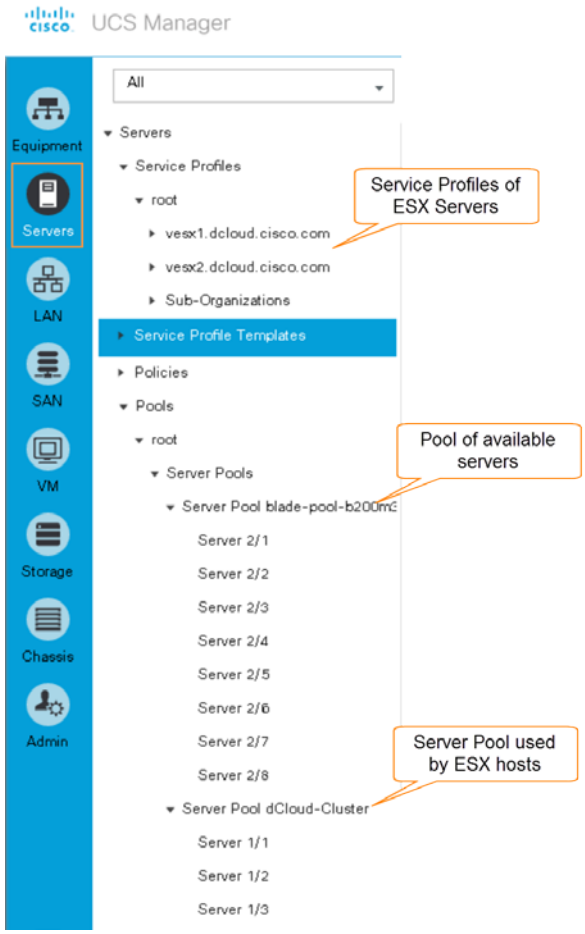
- UCS Director has created the tenants in APIC and associated them to the correct networks, contracts, and filters.
- UCS Director has created all the VMs for the Web and App Tier, and associated them to the proper port-profiles.

UCS Director has created the UCS Organization, then created the Service Profiles for the DB Tier in UCS Manager, created the APIC allocated VLAN and associated that with the newly created Service Profiles.

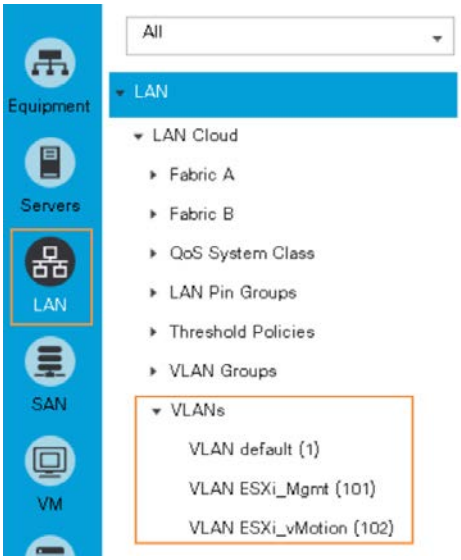
Steps

1. On the wkst1 desktop, double-click the UCS Manager icon 

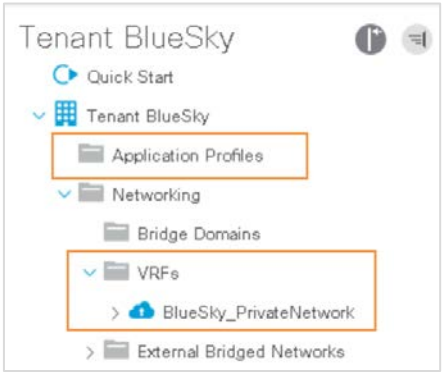
and log in (**admin**/**C1sco12345**).
2. Click **Servers** in the side menu.
3. Expand the **Service Profiles > root** directory, and the **Pools > root > Server Pools** directories.
4. Show the default configuration that exists in UCS Manager at the start of this scenario.



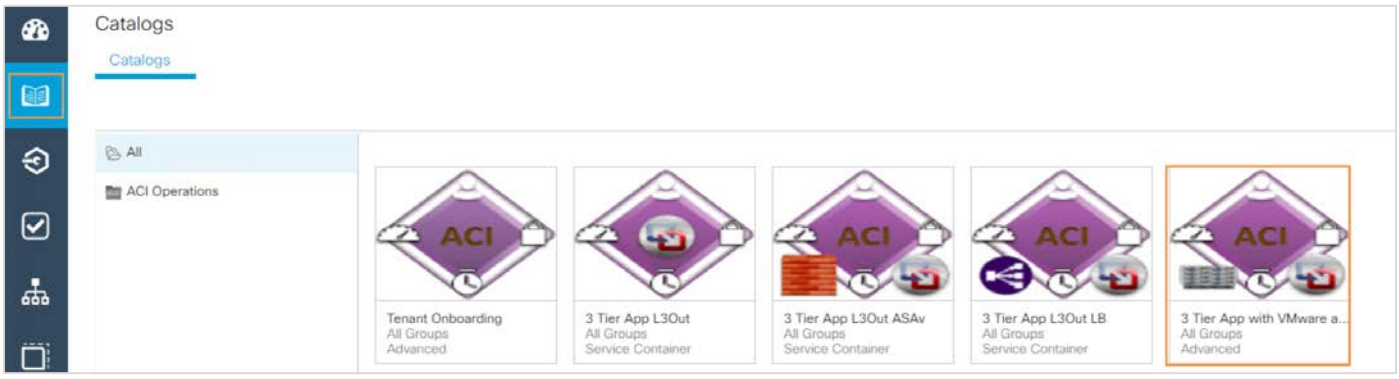
5. Click **LAN** in the side menu. Expand **LAN > LAN Cloud > VLANs** to display the existing VLANs in the work pane.



6. Log in to the **vSphere Web Client** if it is not already open (**Use Windows session authentication**). Click **Networking** to display the Networking window.
7. If the APIC work window for the BlueSky tenant is not already displayed, perform the following steps:
    - Log into the APIC if it is not already open (**admin**/**C1sco12345**/**Advanced**). Click **No** on the **Warning** pop-up.
    - Click **BlueSky** to open the BlueSky tenant.
8. In the APIC window, expand the **Application Profiles** and **Networking > VRFs** folders, to show that the only object configured is a private network for BlueSky.



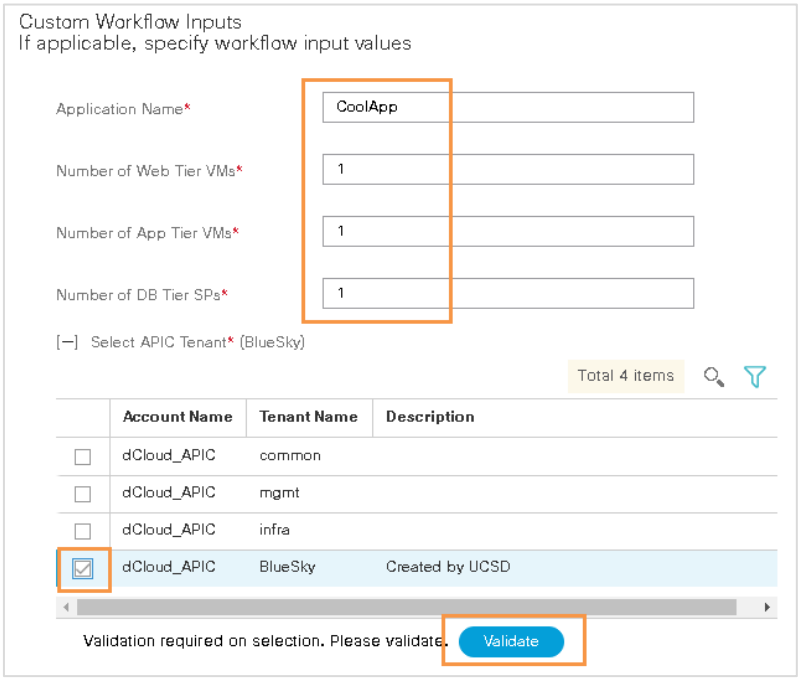
9. If UCS Director is not already open to the Catalog screen, perform the following steps:
    - Double-click the **UCS Director** icon and log in to Cisco UCS Director (**BlueSky**/**C1sco12345**).
    - Click **Catalogs** in the side menu to see the workflows.
10. Double-click the **3 Tier App with VMware and UCS** workflow.



11. In the resulting workflow wizard, perform the following steps:
    - Click **Next** through the **Catalog Selection** window – no changes are required.
    - In the **Deployment Configuration** window, enter:
        - **CoolApp** in the **Application Name** field
        - **1** in the **Number of Web Tier VMs** field

- **1** in the **Number of App Tier VMs** field
- **1** in the **Number of DB Tier SPs** field

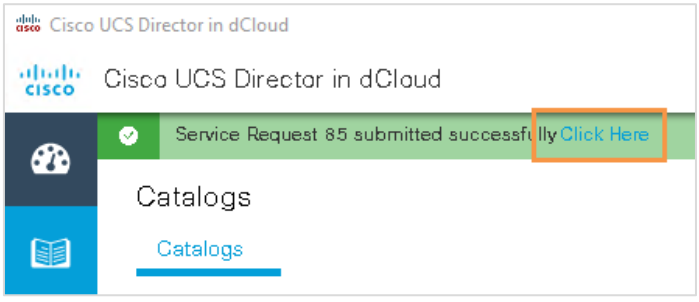
- Select the **BlueSky** APIC tenant.
- Click **Validate**.



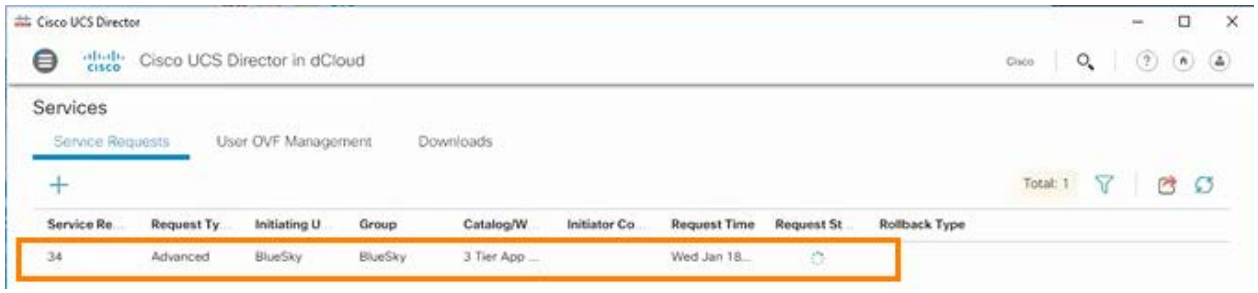
- Click **Next**.
- Click **Submit**.

NOTE: You can specify more than one of each type of VM, but each VM takes approximately five minutes to fully provision. Adding additional machines will add five minutes to the total demo. Adding additional DB Tier SPs will not add significant time to the demo.

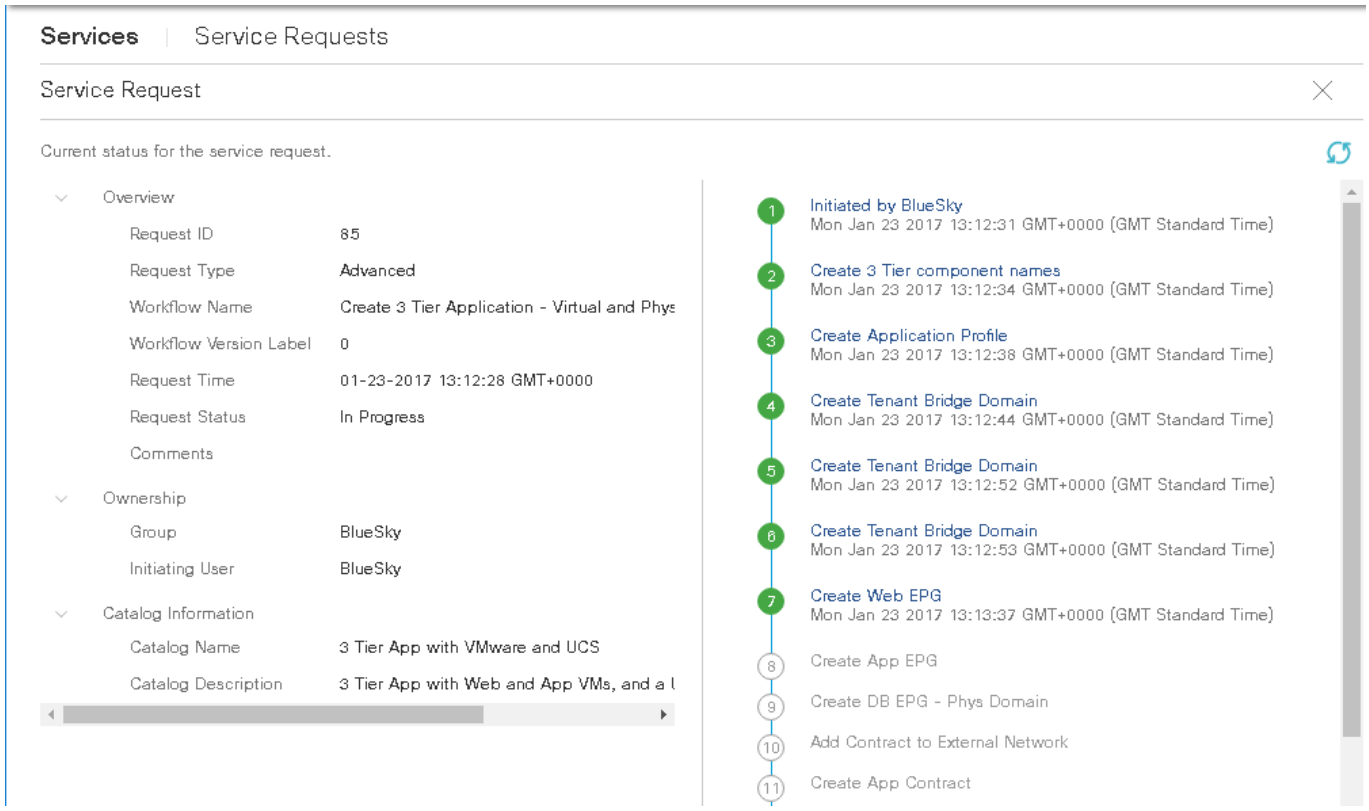
12. Click the **Click Here** link to view the newly submitted Service Request.



13. Double-click the Service Request to review the details of the workflow deployment.



14. Review the workflow steps.

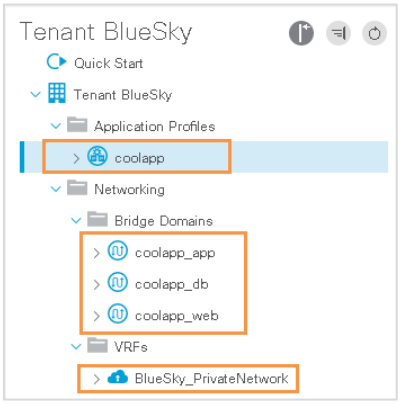


The 3 Tier App with VMware and UCS workflow performs the following steps:

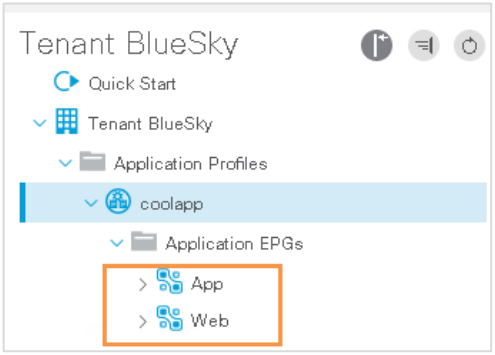
- Creates the APIC objects – Application Profile, Bridge Domains, EPGs and private network.
- Creates the VMs for the App and Web tiers in VMware.
- Creates a new Organisation in UCS Manager and also defines the database tier VLAN.
- Deploys a new Service Profile and associates it with a Server Pool, and attaches it to the database tier VLAN.

NOTE: It will take approximately 20 minutes for the workflow to complete. Proceed with the following steps while it is running.

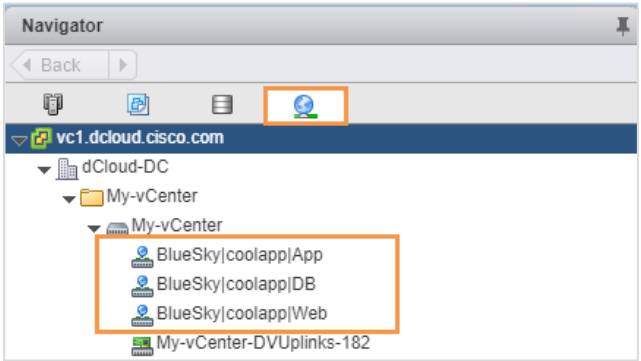
15. In the APIC window, expand **Tenant BlueSky > Application Profiles > coolapp** to show that the application profile has been created by Step 3 of the UCS Director workflow.
16. Expand **Networking > Bridge Domains** and show the three bridge domains that were created for the application – one each for the App, DB, and Web tiers.



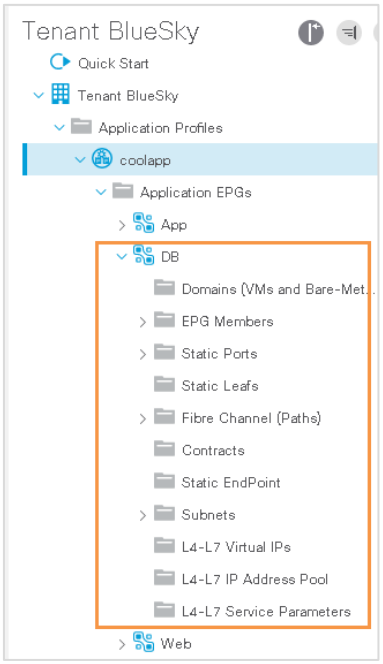
17. Continue monitoring the workflow in the UCS Director window. As Steps 7, 8, and 9 create the EPGs, return to the APIC window. Expand the **Application Profiles > coolapp > Application EPGs** directory and show the App, Web, and DB EPGs dropping in.



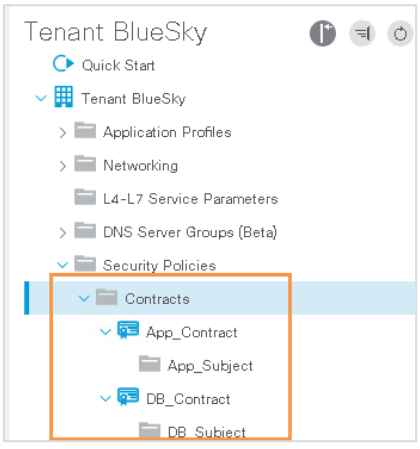
18. As the EPGs are created, return to the **vSphere Web Client** window. Click **Networking** either in the side menu or on the **Home** tab to view the Networking window. (If vSphere is already open to a different screen, click the **Networking** tab.) A portgroup has been created for each application tier.



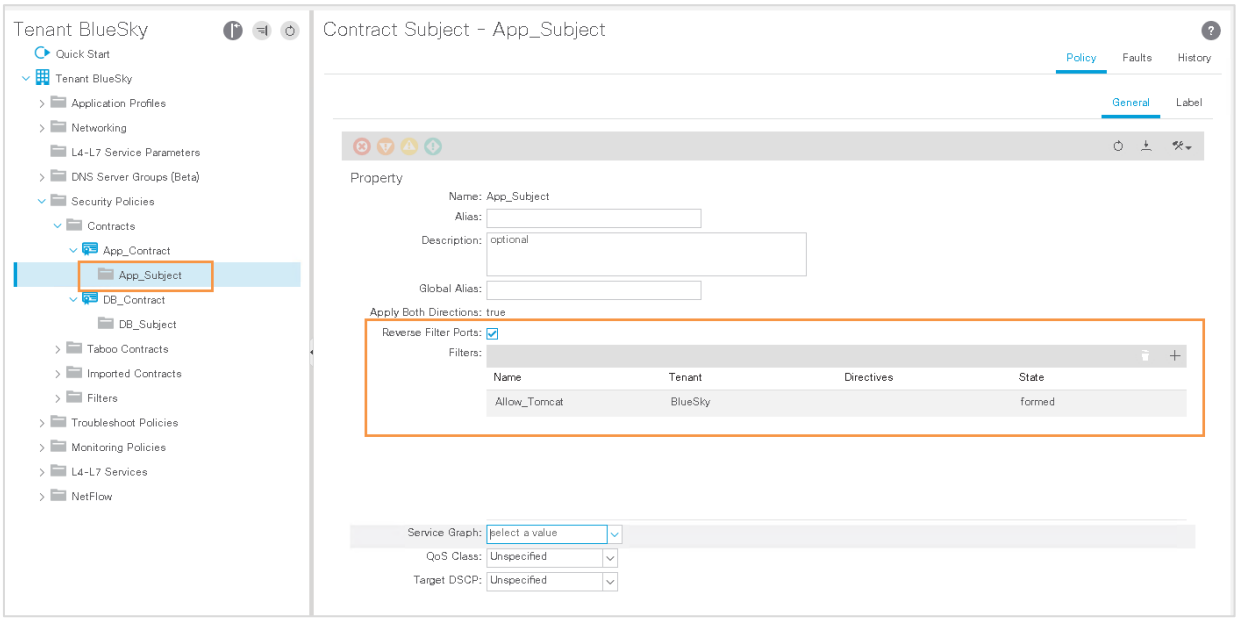
19. Continue to monitor the UCS Director workflow. When **Step 9 – Create DB EPG** has completed, return to the APIC window. It may be necessary to Refresh to see the DB EPG.



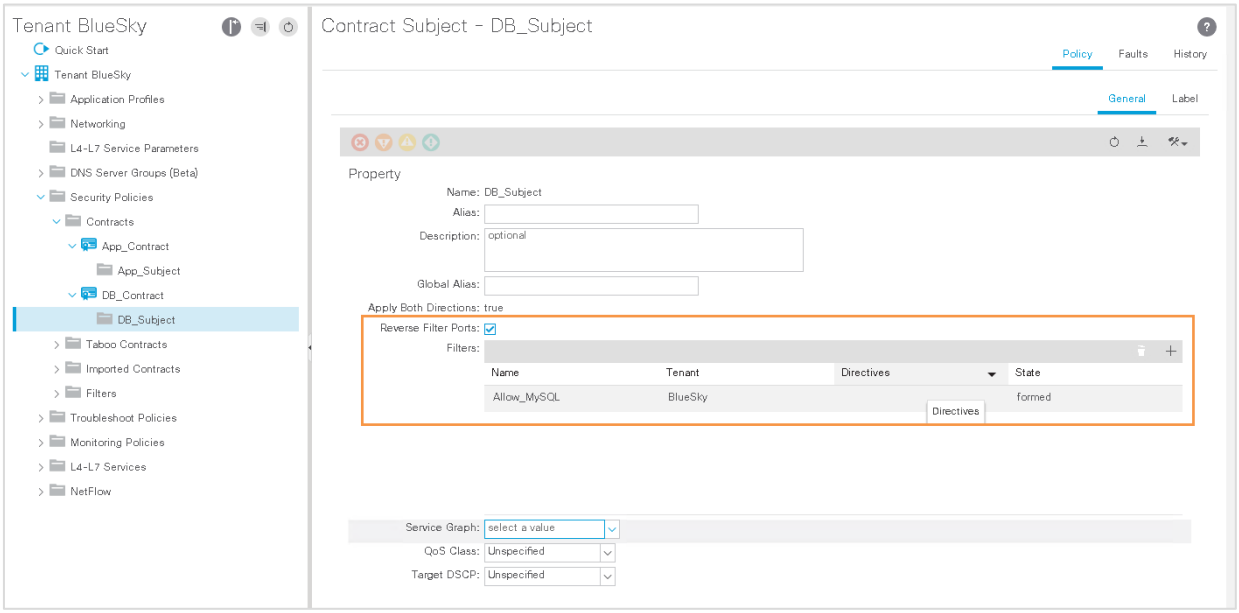
20. Continue to monitor the UCS Director workflow. When Steps 10, 11, and 12 have completed, return to the APIC to see the contracts.
21. In the APIC window, expand **Tenant BlueSky > Security Policies > Contracts** to show the **App_Contract** and the **DB_Contract**.



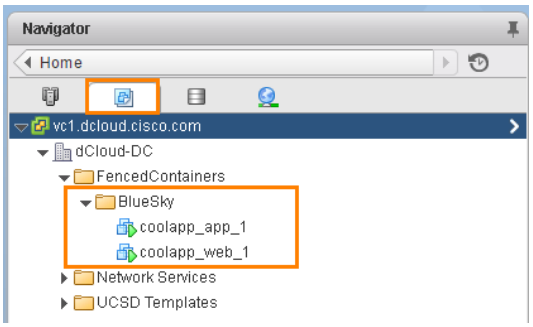
22. Click the **App_Subject** under the **App_Contract** to review the filter. Note that the App filter allows TomCat traffic between the App and Web tiers.



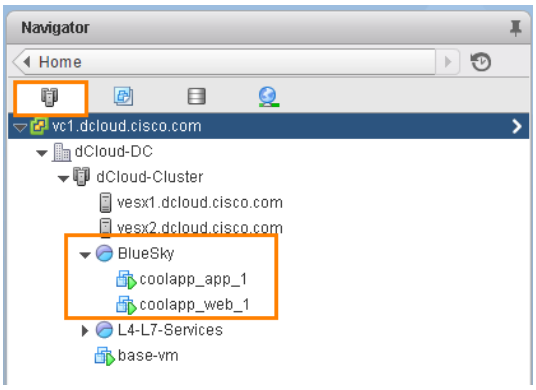
23. Click the **DB_Subject** under the **DB_Contract**, to see that this filter allows SQL traffic between the App and DB tiers.



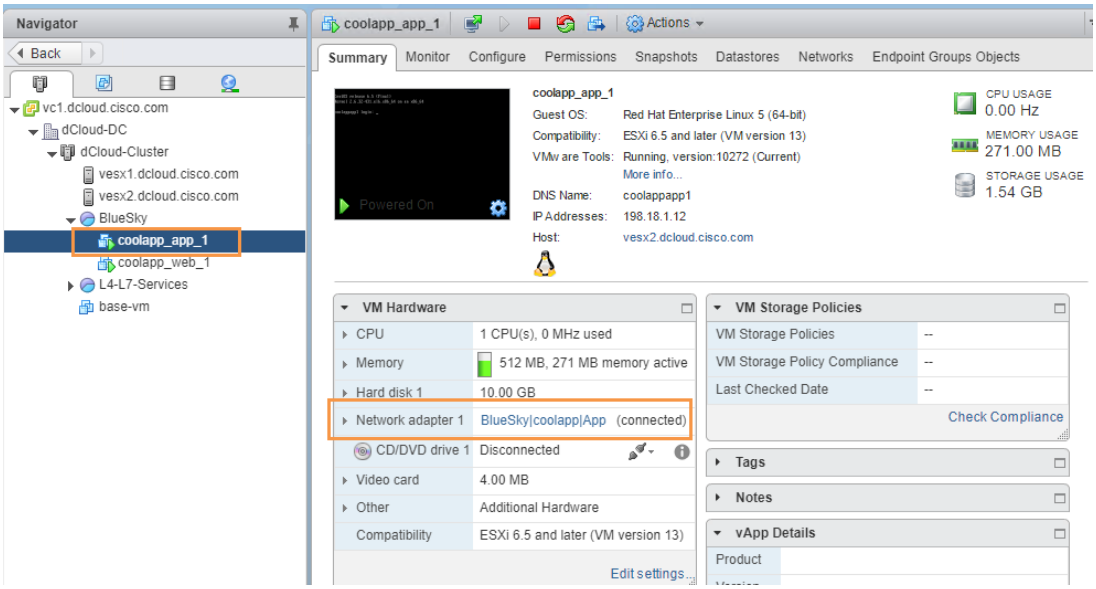
24. Continue to monitor the UCS Director workflow. When Step 26 has completed, return to vSphere.
25. In the vSphere window, click the **VMs and Templates** icon.
26. Expand **vc1.dcloud.cisco.com > dCloud-DC > Fenced Containers > BlueSky** to show the coolapp App and Web VMs as they drop into the folder. If the Fenced Containers folder is not present, refresh until it appears.



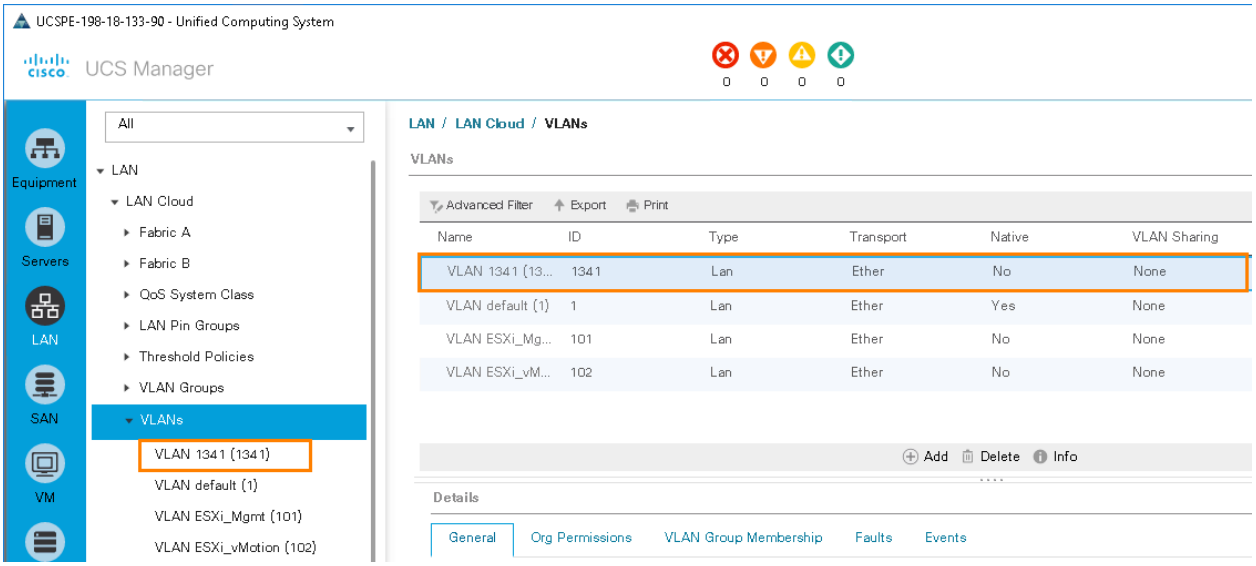
27. When both VMs have been deployed, click the **Hosts and Clusters** icon.
28. Once Step 28 of the workflow has completed, expand **vc1.dcloud.cisco.com > dCloud-DC > dCloud-Cluster > BlueSky** to show that the App and Web VMs have been moved to the BlueSky resource pool. (It may be necessary to refresh to see the VMs.)



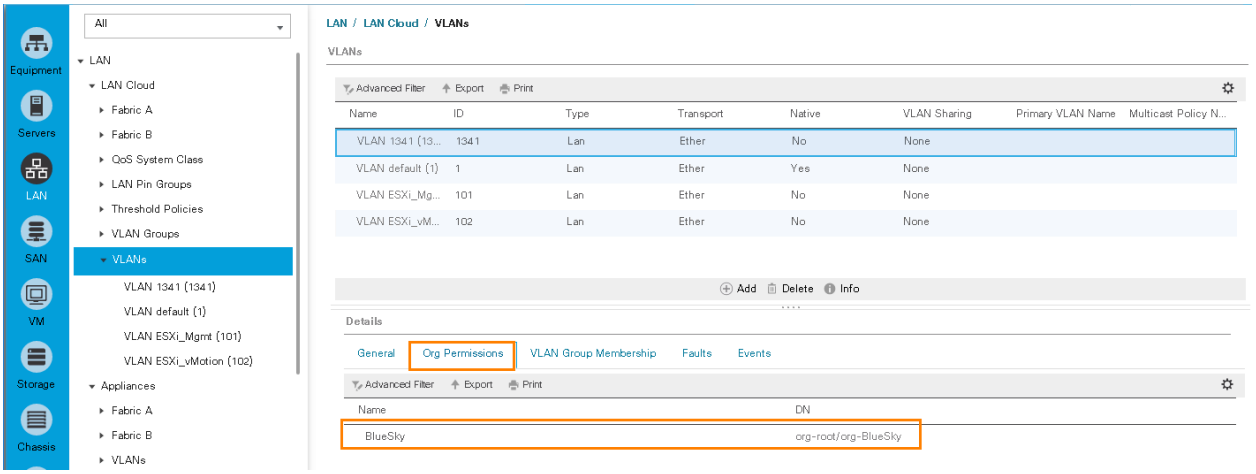
29. Click **coolapp_app_1**.
30. Show that the VM is connected to the **BlueSky|coolapp|App** portgroup, which is made available through the ACI.



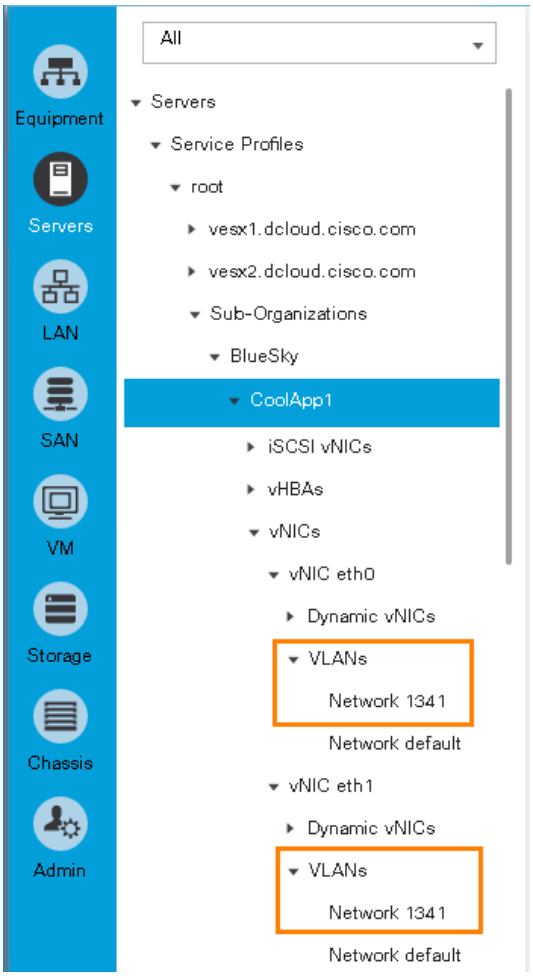
31. Continue to monitor the workflow in UCS Director until it completes.
32. Return to **UCS Manager**, which is still open to the VLANs window.
33. Show the new VLAN that was created by the UCS Director workflow. This VLAN is used for connecting the physical DB server, note this VLAN is not created in vSphere, as seen earlier in the scenario.
34. Click the **VLAN** to show the details of the configuration.



35. Click the **Org Permissions** tab to show that the VLAN is only available to the BlueSky tenant.



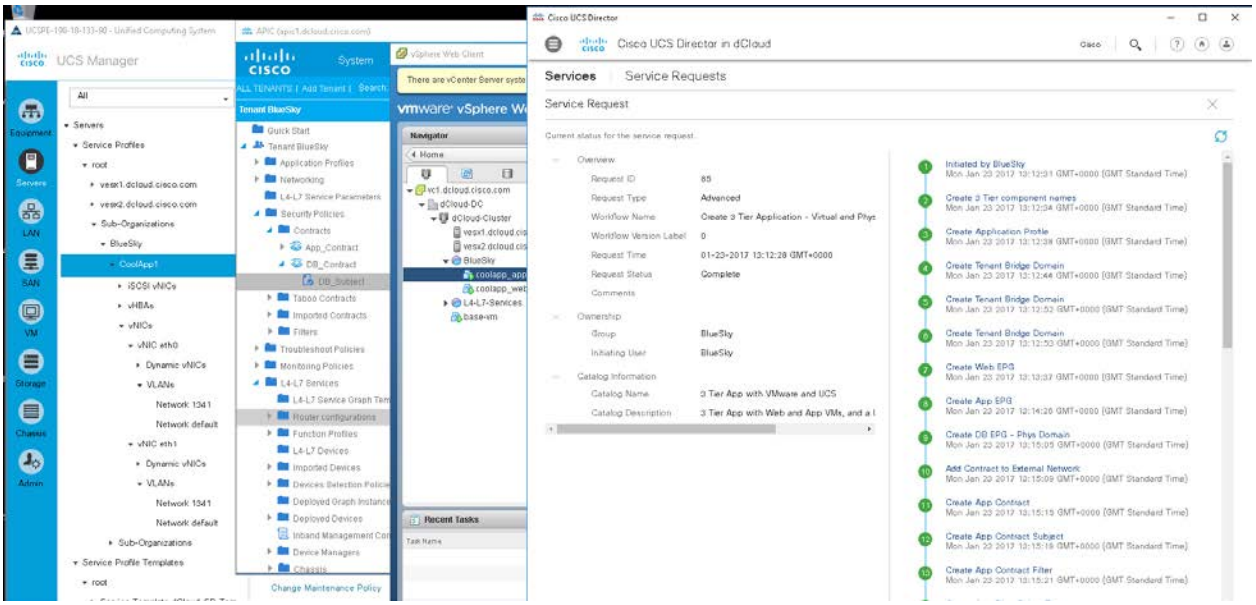
36. Click **Servers** in the left menu and expand **Servers > Service Profiles > root > Sub-Organizations > BlueSky > CoolApp1** to show the network objects that have been created by the UCS Director workflow.
37. Expand the vNICs to show that the two vNICs are connected to the new VLAN.



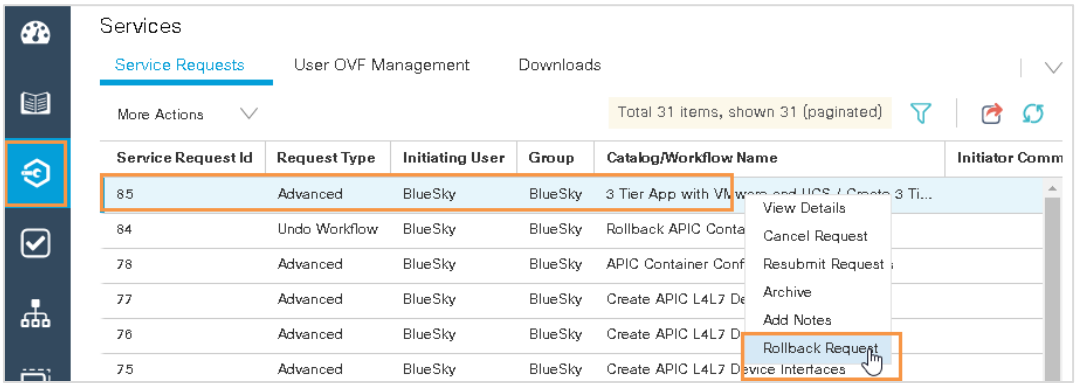
Rollback Workflow

The purpose of this section is to roll back the entirety of the **3-Tier Application with UCS** workflow.

1. Return to the APIC window and expand the **Application Profiles** folder completely to show the EPGs.
2. Return to the VM window, which is still open to the **Hosts and Clusters** window. Expand the **BlueSky** folder to show the portgroups.



3. Return to the UCS Director window and close the Workflow window.
4. In the Service Requests list, click the **3 Tier App with VMware and UCS** service request.
5. Click the **More Actions** drop-down and select **Rollback Request** from the resulting menu.



6. Click **Submit** in the resulting window.
7. If desired, return to the APIC, vSphere, and UCS Manager windows and refresh to see that the objects are disappearing.

Appendix A. Troubleshooting – Fix My Demo

The **Fix My Demo** script enables common issues to be resolved. The following process can be used to manually resolve the following issues:

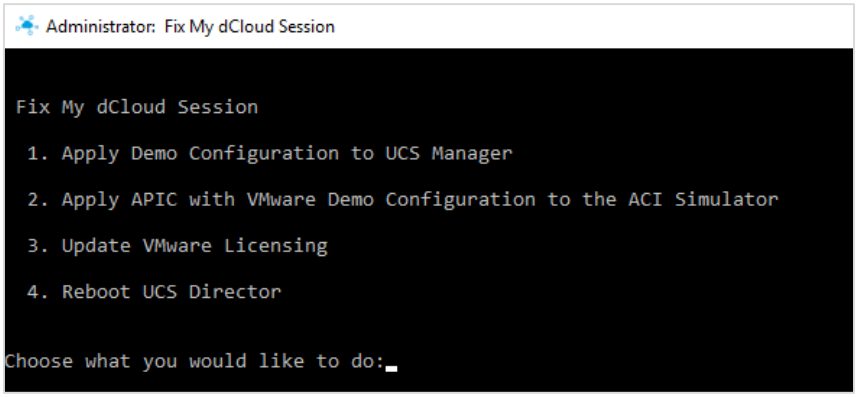
- Apply configuration to UCS Manager
- Discover the ACI Fabric and apply the demo configuration to the ACI Simulator
- Update the licenses applied to VMware vCenter and ESXi hosts.
- Reboot UCS Director.

NOTE: The ACI full fabric discovery can take up to 15 minutes. The apic3 controller will be discovered after all the devices are discovered. You can monitor the progress by selecting **Topology** from the **Inventory** pane in the APIC GUI. While the discovery is taking place, you can complete Scenario 1, which ends in the APIC Topology window showing the discovered elements.

Steps

1. From the demonstration workstation, click the **Fix My Demo** icon 

.
2. Select the desired task. Do not close the command window until the task fully completes.



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