VMware Cloud Experience: Consuming VMware Cloud with vRealize Cloud Assembly – Holodeck

Part 1 – Fixed Networks

vmware

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VCF Experience Program Lab Overview

The VMware Cloud Foundation (VCF) Experience Program is designed to provide a hands-on experience highlighting how VCF delivers a *Cloud Operating Model* for customer managed on premises environments, capable of hosting traditional and modern applications. This Experience Program guide is intended for use with a VCF Lab Constructor (VLC) based nested environment built using the Automated Holodeck config.

Credentials

The following credentials are used in this lab. For your convenience, links to all management interfaces are in the bookmark bar of Google Chrome in your lab environment.

- **SDDC Manager**
  - Username: administrator@vsphere.local
  - Password: VMware123!
- **SDDC Manager as Sam Jones**
  - Username: sam@vcf.sddc.lab
  - Password: VMware123!
- **vCenter Server Admin Console**
  - Username: root
  - Password: VMware123!
- **vSphere Web Client**
  - Username: administrator@vsphere.local
  - Password: VMware123!
- **VMware NSX Manager**
  - Username: admin
  - Password NSX-T: VMware123!VMware123!
- **vRealize Operations Manager**
  - Username: admin
  - Password: VMware123!
- **vRealize Automation Cloud Assembly**
  - Username: configadmin
  - Password: VMware123!
- **Windows Console (Jump Host)**
  - Username: administrator
  - Password: VMware123!
- **Opencart Apache and MqSQL VMs**
  - Username: ocuser
  - Password: VMware123!

VCF Experience Program: Consuming VMware Cloud Resources with vRealize Cloud Assembly

Overview

This session introduces consumption of a VCF based VMware Cloud using vRealize Cloud Assembly. Participants will gain experience with:

- Using vRealize Automation Cloud Assembly to deploy application workloads onto preconfigured NSX Segments and firewall policies

This section relies on:

1. Holodeck Opencart SDN lab completed
2. Holodeck VRA initial setup complete (On Prem or Cloud)

Deploying Opencart to pre-existing NSX Segments – Holodeck Config

Lab Overview

It is anticipated that this module will take ~XX minutes to complete.

In this lab we show how to use vRealize Automation Cloud Assembly to deploy an Opencart instance to pre-defined NSX networks configured on the Cloud Foundation management domain.

This module consists of the following exercises

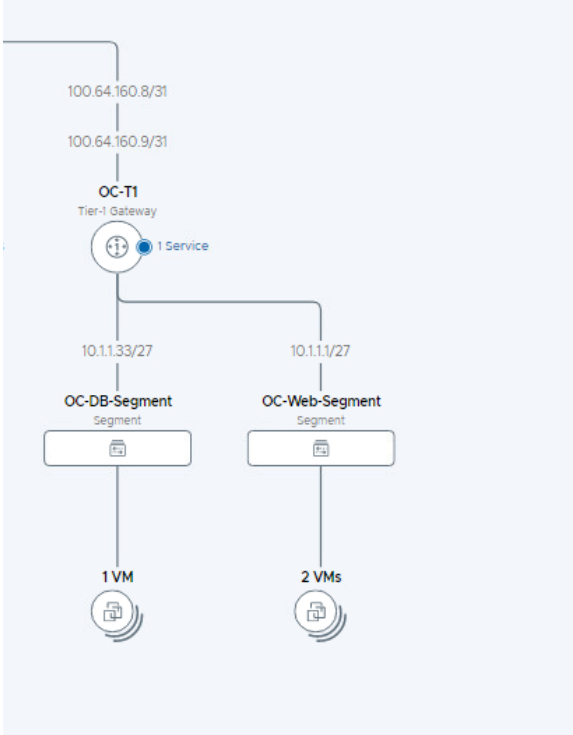
1. Create NSX Segments with DHCP services, and connect to OC-T1 Tier-1 router
2. Create Cloud Assembly Network Profile for OC-DB-Auto-Seg
3. Create Cloud Assembly Network Profile for OC-Web-Auto-Seg
4. Review vRealize Cloud Template
5. Deploy Opencart from Cloud Template
6. Review Provisioning Diagram
7. Review Deployed Application
8. Delete Deployed Application

Exercise 1: Create NSX Segments with DHCP Server

In this exercise we will create two new NSX segments to host Opencart web and database servers. Each segment will use a /24 subnet and reserve a part of the address space for VRA deployed services like load balancers and the remainder for DHCP boot of hosts.

[Step 1] Logging in to the environment

A. Open a new tab in the Chrome browser
B. Click the Management NSX-T shortcut in the bookmark bar (click advanced / proceed to nsx-mgmt.vcf.sddc.lab, if required to accept the certificate)
C. Log into NSX Manager as user: **admin** with the password: **VMware123!VMware123!**
D. From the NSX-T Manager interface click the **Networking** tab
E. Select **Network Topology**



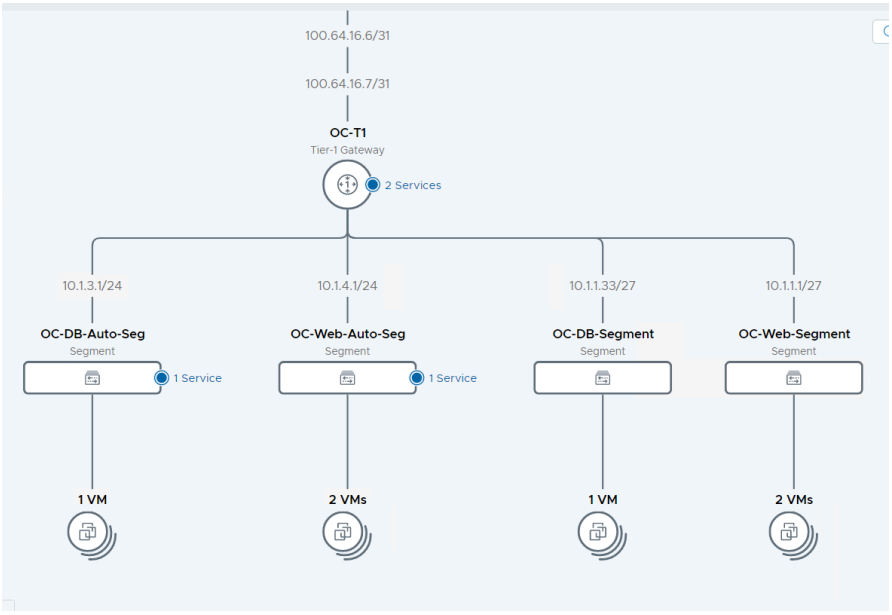
On the right side of the topology view you should see the OC-T1 router and OC-DB-Segment and OC-Web-Segment from the previous module. We are going to add additional segments to this Tier-1 router for use by vRealize Cloud Assembly. The next steps will create the following networks

OC-DB-Auto-Seg

- 10.1.3.0/24
- Gateway 10.1.3.1/24
- DHCP Server 10.1.3.254
- DHCP Range 10.1.3.100-10.1.3.253
- VRA Address space 10.1.3.2-10.1.3.99

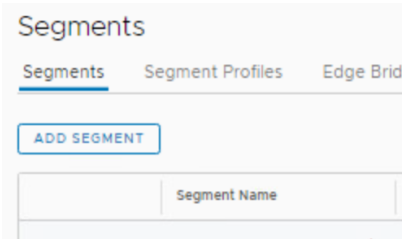
OC-Web-Auto-Seg

- 10.1.4.0/24
- Gateway 10.1.4.1/24
- DHCP Server 10.1.4.254
- DHCP Range 10.1.4.100-10.1.4.253
- VRA Address space 10.1.4.2-10.1.4.99

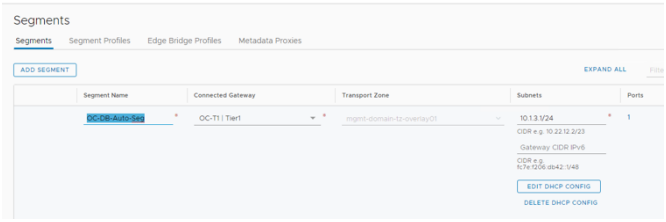


[Step 2a] Create the OC-DB-Auto-Seg

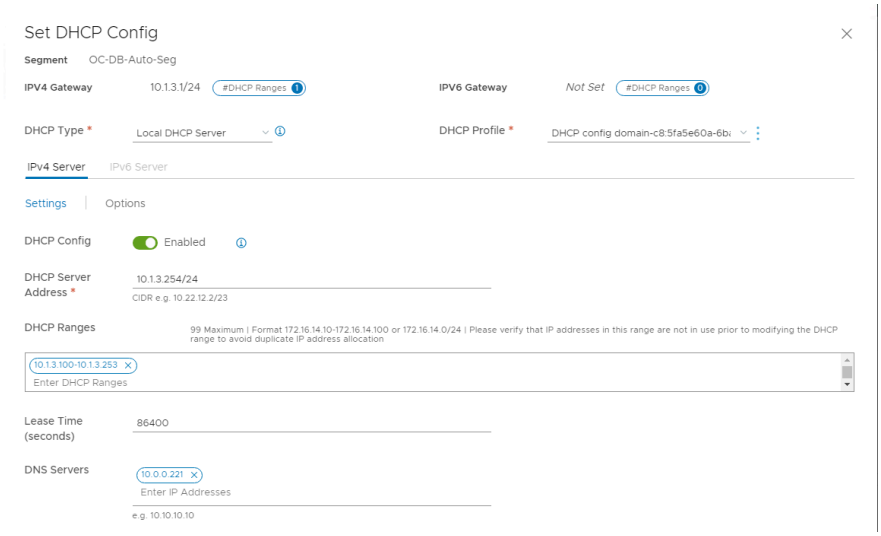
A. From the NSX-T Manager interface click the **Networking** tab at the top of the screen
B. Click **Segments** in the left pane.
C. Click **ADD SEGMENT** button



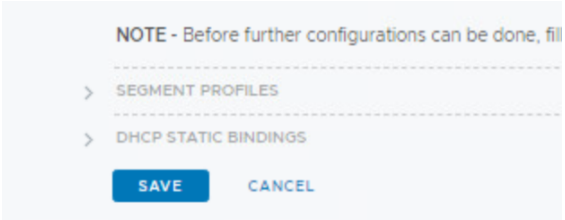
D. In the **Segment Name** field, enter **OC-DB-Auto-Seg**
E. Set **Connected Gateway** to OC-T1
F. In the **Transport Zone** dropdown, select **mgmt-domain-tz-overlay01**
G. Add IPv4 gateway 10.1.3.1/24



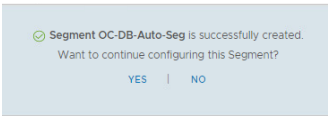
H. Click SET DHCP CONFIG
I. Set DHCP Type to Local DHCP Server
J. Under IPv4 Server set DHCP Config Enabled
K. Set DHCP Server Address 10.1.3.254/24
L. Set DHCP Ranges 10.1.3.100-10.1.3.253
M. Set DNS to 10.0.0.221



N. Leave all IPv6 settings Not Set
O. Click Apply
P. At bottom of the Segments screen, click Save

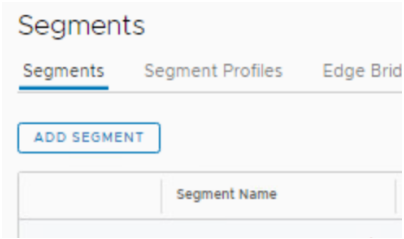


Q. You will see your segment has been successfully created. Click **NO** on the Want to continue configuring this segment?



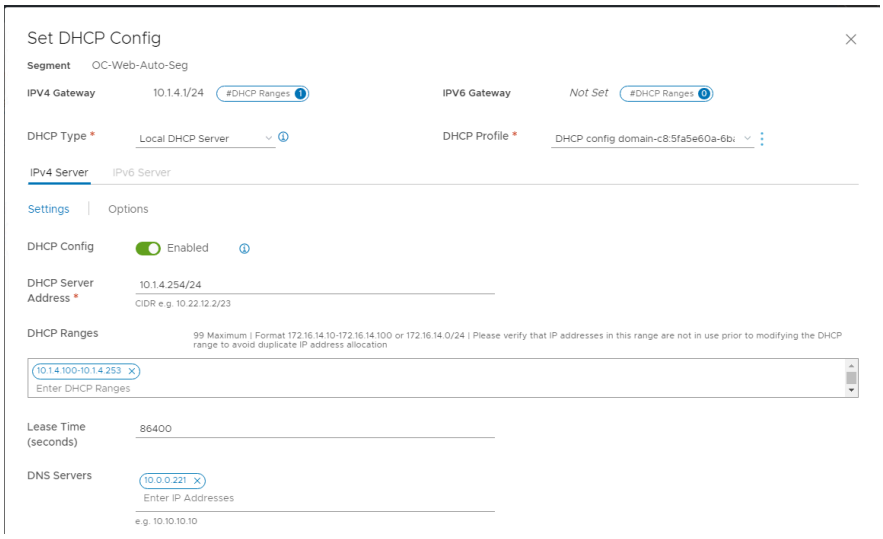
[Step 2a] Create the OC-Web-Auto-Seg

A. From the NSX-T Manager interface click the **Networking** tab at the top of the screen
B. Click **Segments** in the left pane.
C. Click **ADD SEGMENT** button

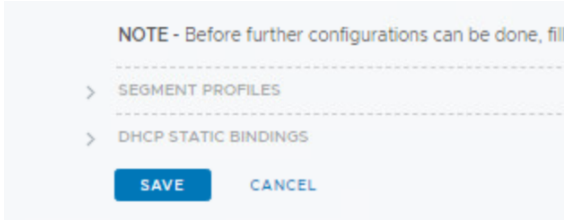


D. In the **Segment Name** field, enter **OC-Web-Auto-Seg**
E. Set **Connected Gateway** to OC-T1
F. In the **Transport Zone** dropdown, select **mgmt-domain-tz-overlay01**
G. Add IPv4 gateway 10.1.4.1/24

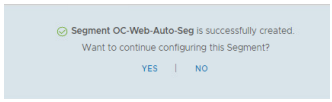
H. Click SET DHCP CONFIG
I. Set DHCP Type to Local DHCP Server
J. Under IPv4 Server set DHCP Config Enabled
K. Set DHCP Server Address 10.1.4.254/24
L. Set DHCP Ranges 10.1.4.100-10.1.4.253
M. Set DNS to 10.0.0.221



N. Leave all IPv6 settings Not Set
O. Click Apply
P. At bottom of the Segments screen, click Save

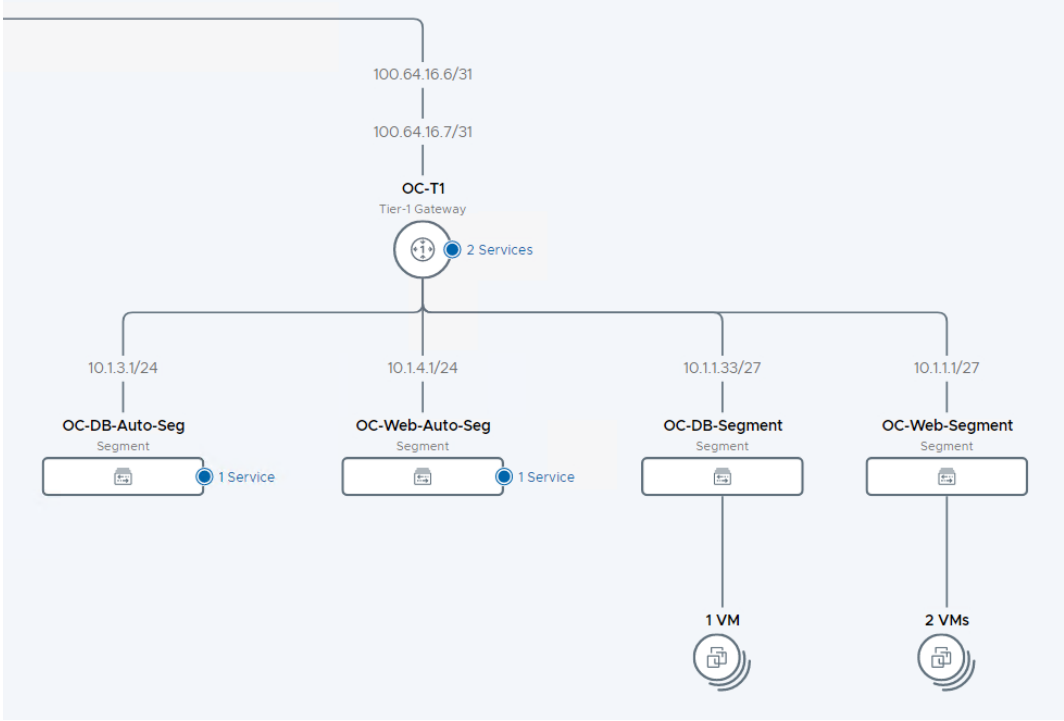


Q. You will see your segment has been successfully created. Click **NO** on the Want to continue configuring this segment?

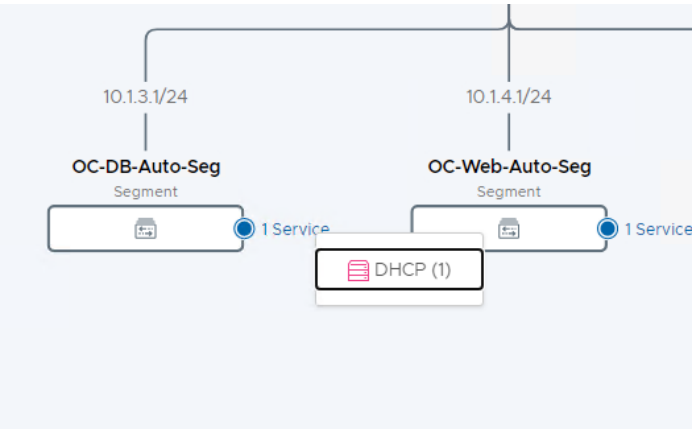


[Step 2c] Review the network topology

A. From the NSX-T Manager interface click the **Networking** tab at the top of the screen
B. Click **Network Topology** in the left pane.
C. Scroll to the right
D. Your topology should look like the following



E. Click on 1 Service on OC-DB-Auto-Seg. Notice the DHCP service



Exercise 2: Create OC-DB-Auto-Seg Cloud Assembly Network Profile

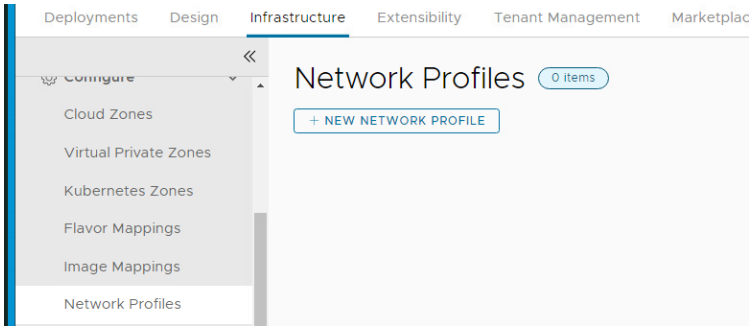
In this exercise we will configure a new Network Profile in Cloud Assembly for the OC-DB-Auto-Seg segment and associated DHCP Server that was created earlier

[Step 1] Connect to vRealize Cloud Assembly (if necessary)

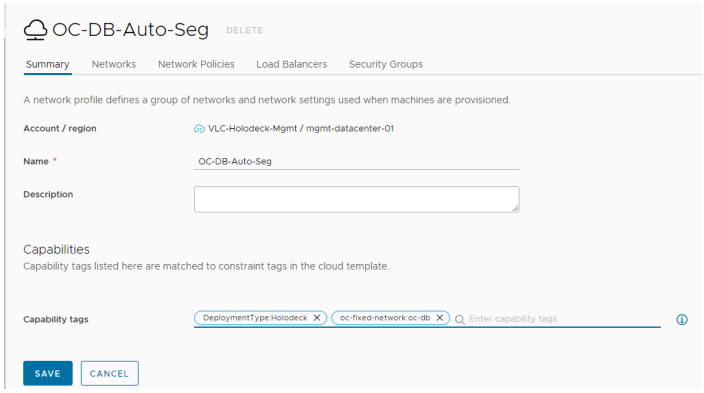
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Create OC-DB-Auto-Seg Network Profile

A. Click Infrastructure -> Network Profiles

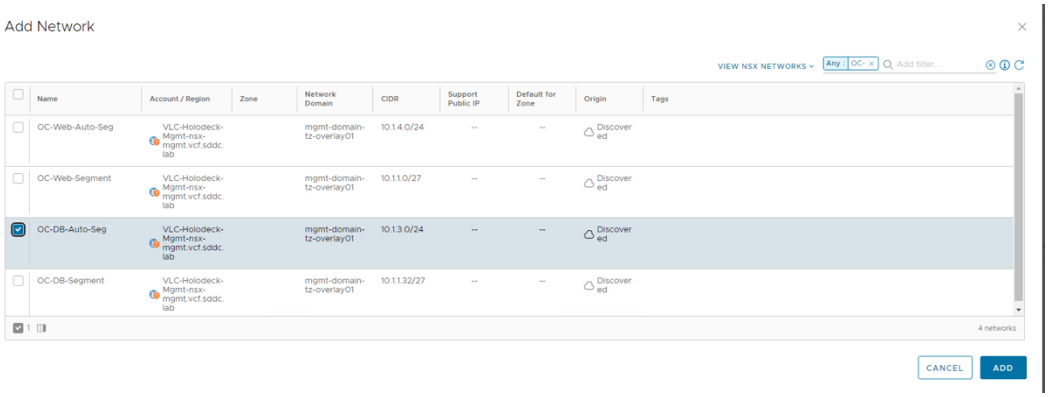


B. Click New Network Profile
C. On the Summary tab, Click on Account/Region and select VLC-Holodeck-Mgmt / mgmt-datacenter-01
D. Set the name to OC-DB-Auto-Seg
E. Add the tag oc-fixed-network:oc-db
F. Add the tag DeploymentType:Holodeck

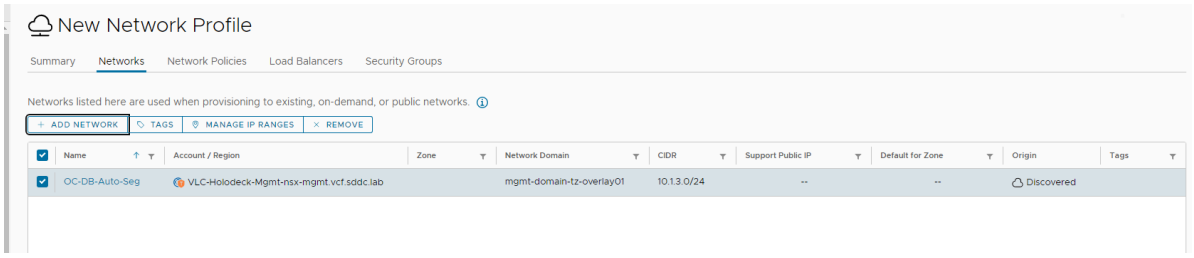


[Step 2.1] Add Networks on Networks Tab

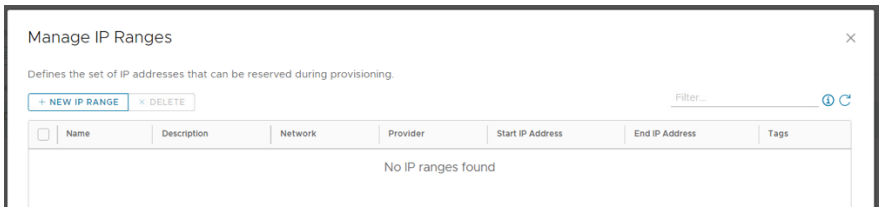
A. Click on Networks tab, then Add Network
B. Click in the filter area and type OC-
C. Select the OC-DB-Auto-Seg



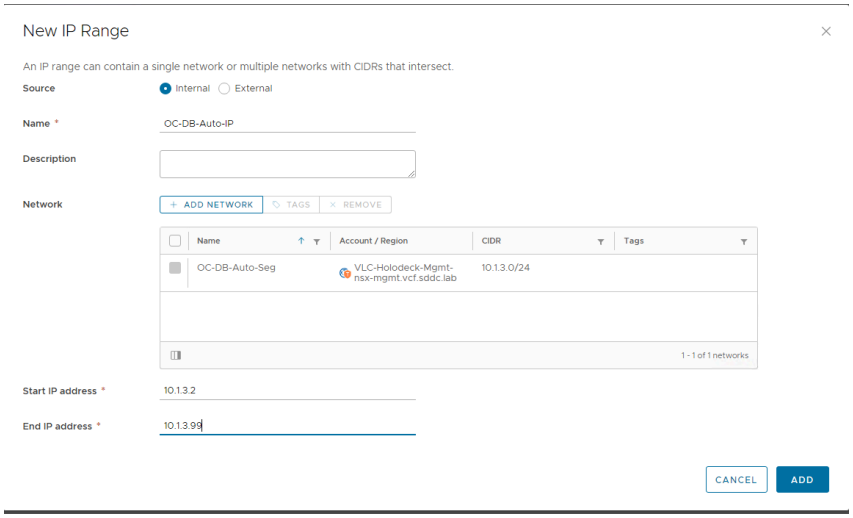
D. Click Add. Your output should look like this



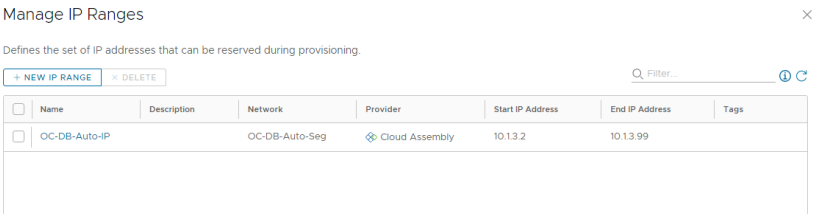
E. Click Manage IP Ranges -> New IP Range



F. Set Source Internal
G. Name OC-DB-Auto-IP
H. Network OC-DB-Auto-Seg should already be selected
I. Start address 10.1.3.2
J. End IP address 10.1.3.99



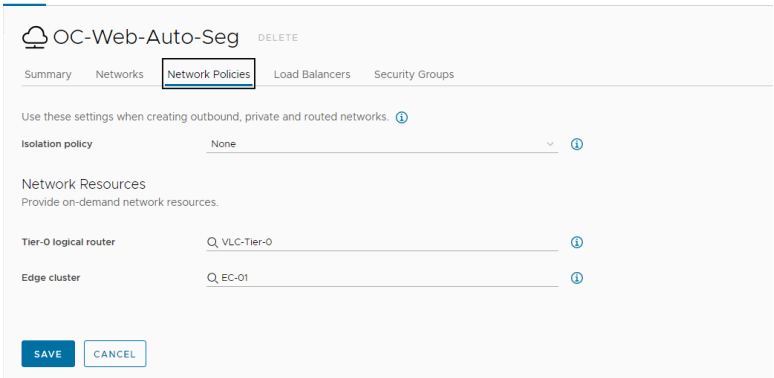
K. Click Add.
L. Your output should look like this



M. Note: In a previous exercise we created a DHCP server for this NSX segment and assigned it the IP address range 10.1.3.100-10.1.3.253. The NSX range represents the IPs that can be assigned to VMs that get deployed on the OC-Web-Auto-Seg segment. Here we are assigning a different IP range (10.1.3.2-10.1.3.99) to Cloud Assembly. This range represents the IPs that Cloud Assembly will assign to NSX services that get created as part of the cloud template deployments. For example, IPs in this range will be assigned to any virtual servers created on an NSX load balancer
N. Click Close

[Step 2.2] Add Network Policy on Network Policies Tab

A. Click **Network Policies**
B. Leave **Isolation Policy** setting default as 'None'.
C. Set Tier-0 to VLC-Tier-0 and Edge Cluster to **EC-01**

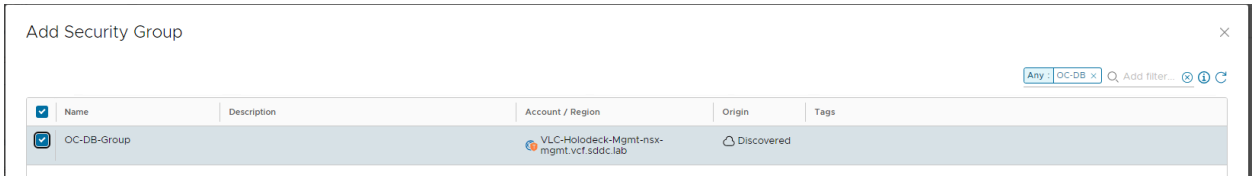


[Step 2.3] Load Balancers Tab

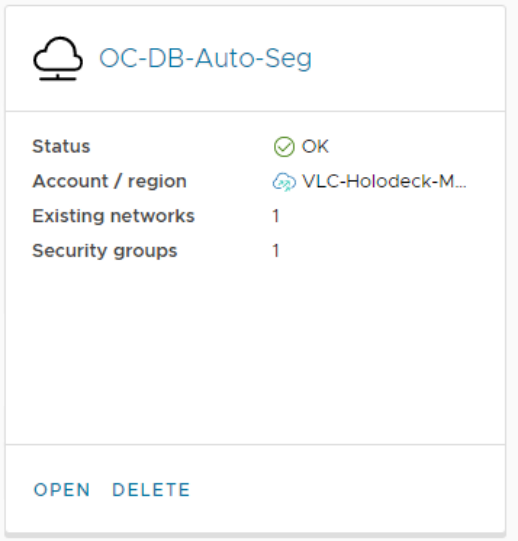
A. Leave Load Balancers tab empty

[Step 2.4] Security Groups Tab

A. Click on Security Groups tab, then Add Security Group
B. Click on Filter, properties Any and type OC-DB



C. Select OC-DB-Group and then click Add
D. Note: This will add anything deployed on this network to the OC-DB-Group NSX security group, which will make VM's deployed subject to NSX security rules set for that group
E. Click **Create**
F. Your result should look like



Exercise 4: Create OC-Web-Auto-Seg Cloud Assembly Network Profile

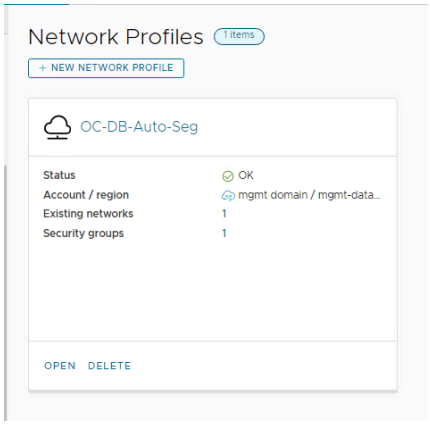
In this exercise we will configure a new Network Profile in Cloud Assembly for the OC-Web-Auto-Seg segment load balancer and associated DHCP Server that was created earlier

[Step 1] Connect to vRealize Cloud Assembly (if necessary)

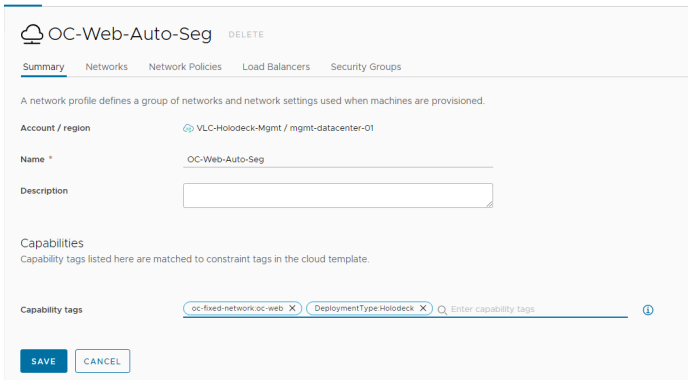
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Create OC-Web-Auto-Seg Network Profile

A. Click Infrastructure -> Network Profiles



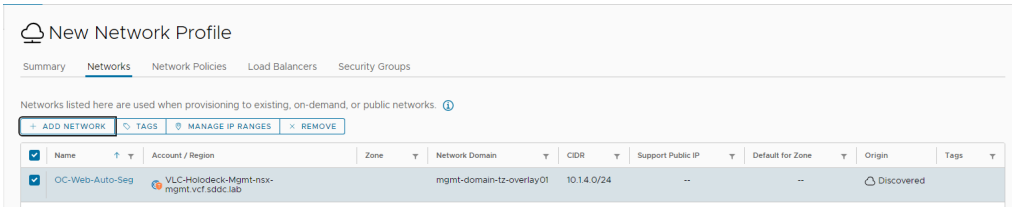
B. Click New Network Profile
C. On the Summary tab, Click on Account/Region and select VLC-Holodeck-Mgmt / mgmt-datacenter-01
D. Set the name to OC-Web-Auto-Seg
E. Add the tag oc-fixed-network:oc-web
F. Add the tag DeploymentType:Holodeck



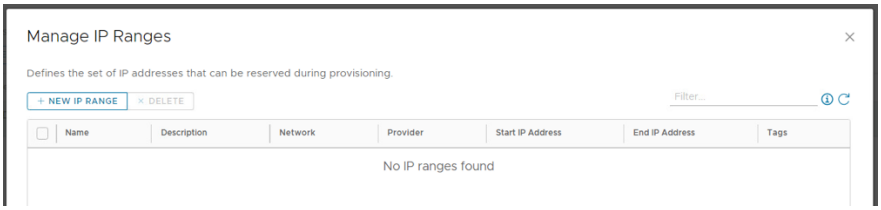
[Step 2.1] Add Networks on Networks Tab

A. Click on Networks tab, then Add Network
B. Filter for OC-

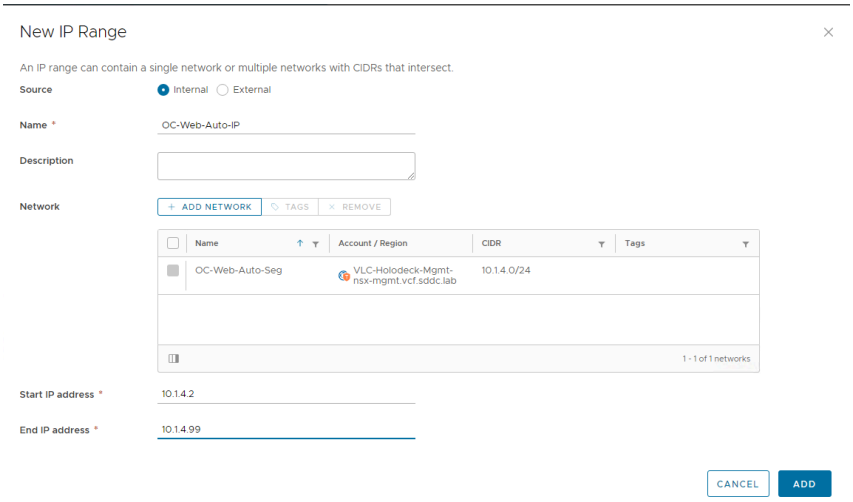
C. Click Add. Your output should look like this



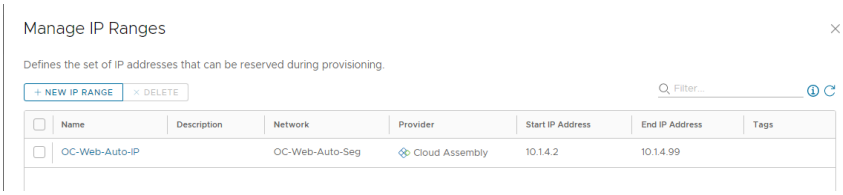
D. Click Manage IP Ranges -> New IP Range



E. Set Source Internal
F. Name OC-Web-Auto-IP
G. Network OC-Web-Auto-Seg should already be selected
H. Start address 10.1.4.2
I. End IP address 10.1.4.99



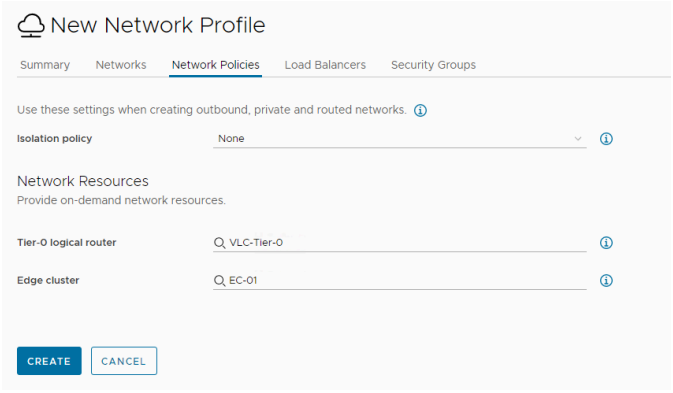
J. Click Add.
K. Your output should look like this



L. Click **Close**

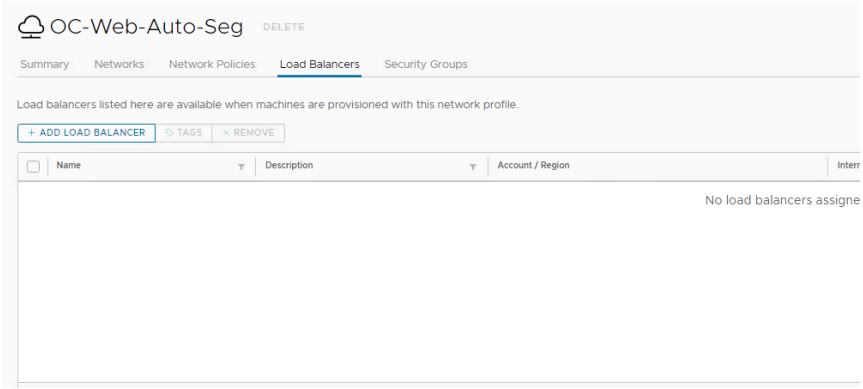
[Step 2.2] Add Network Policy on Network Policies Tab

A. Click **Network Policies**
B. Set Tier-0 to VLC-Tier-0 and Edge Cluster to **EC-01**

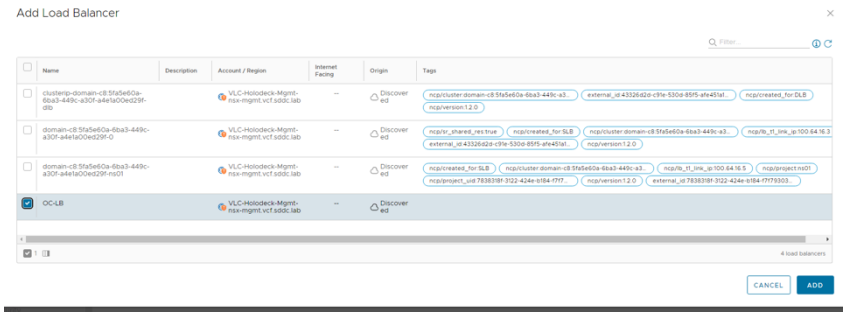


[Step 2.3] Add Load Balancer on Load Balancers Tab

A. Click Load Balancers
B. Click Add Load Balancer



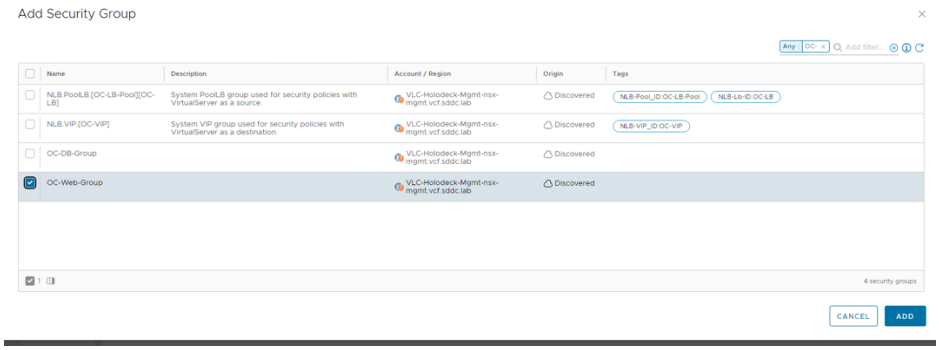
C. Scroll down and select OC-LB



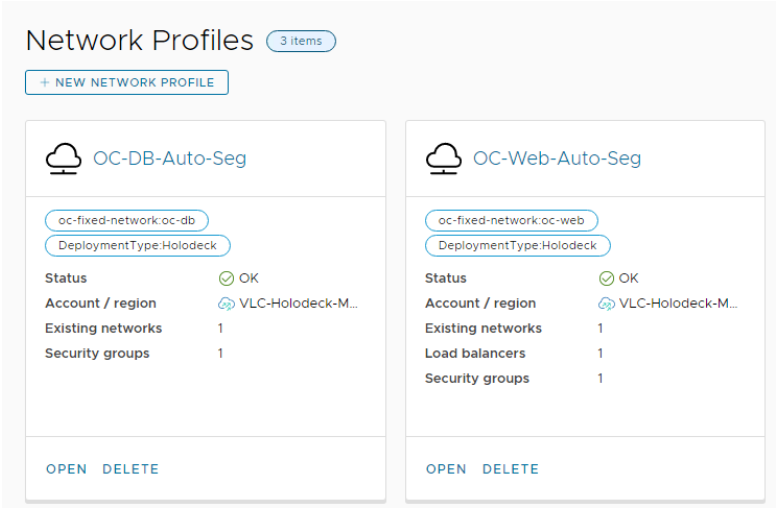
D. Click Add

[Step 2.4] Add Security Group on Security Groups Tab

A. Click on Security Groups tab, then Add Security Group
B. Click on Filter, properties Any and type OC-



C. Select OC-Web-Group and then click Add
D. Note: This will add anything deployed on this network to the OC-Web-Group NSX security group, which will make VM's deployed subject to NSX security rules set for that group
E. Click **Create**



Exercise 5: Upload and Review "Holodeck-OC-Fixed Network" Cloud Template

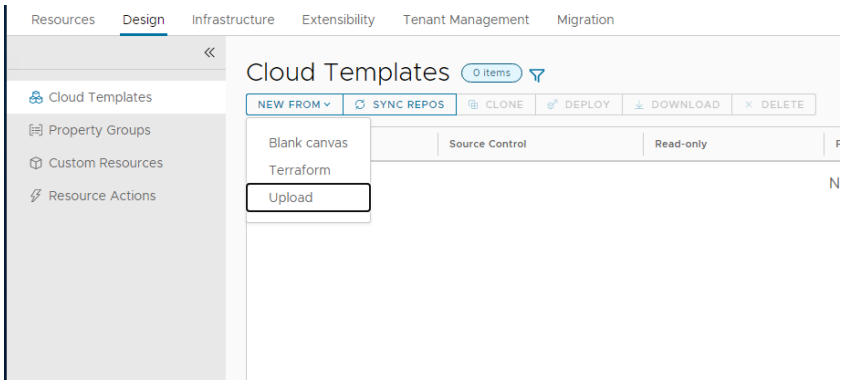
This exercise will upload the cloud template that will deploy an instance of the Opencart demo application to the networks you created in the previous exercises.

[Step 1] Connect to vRealize Cloud Assembly (if necessary)

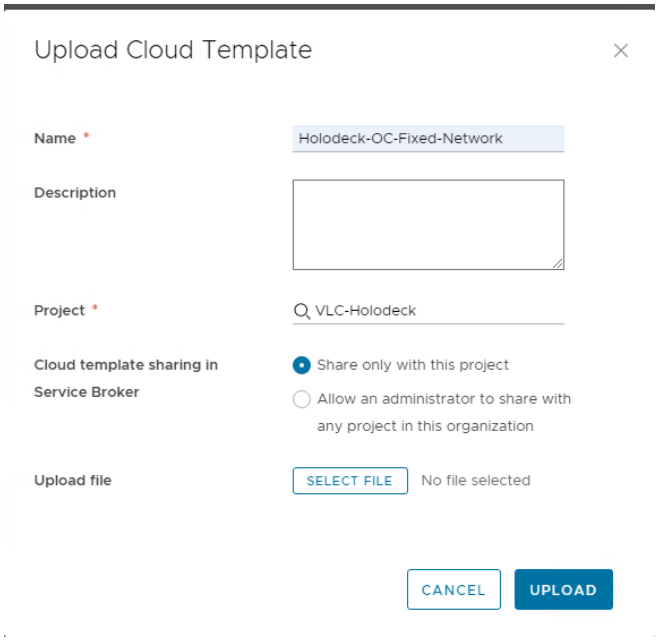
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Upload Cloud Template

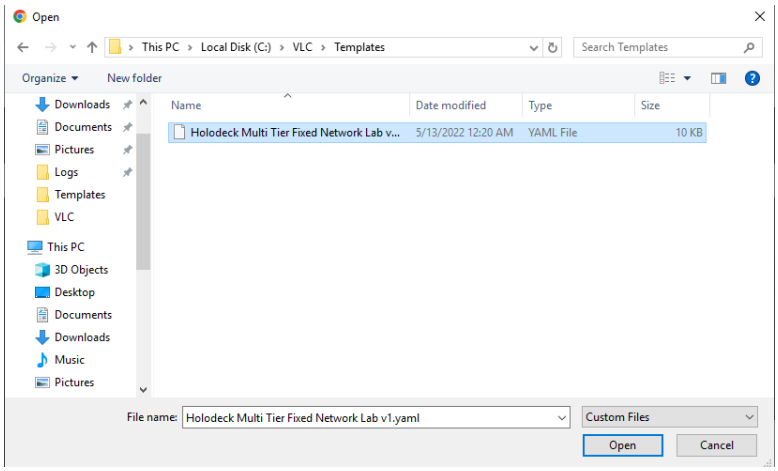
A. Click **Design**
B. Click New From -> Upload



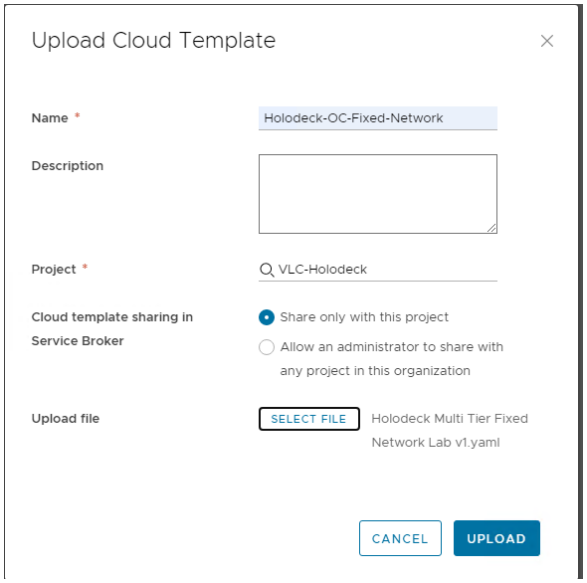
C. Name the template Holodeck-OC-Fixed-Network
D. Select VLC-Holodeck for project



E. Click Select File
F. Select the C:\VLC\Templates directory
G. Select Holodeck Multi Tier Fixed Network Lab v2.yaml file then click Open



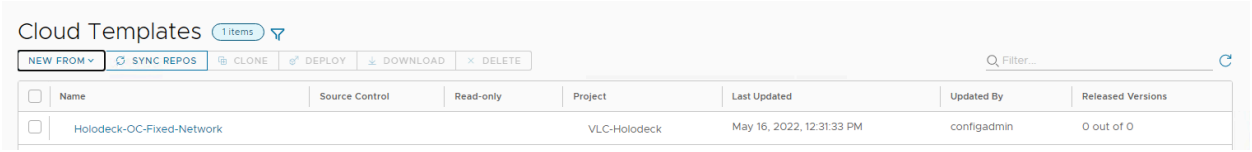
H. Click upload



[Step 3] Review Cloud Template

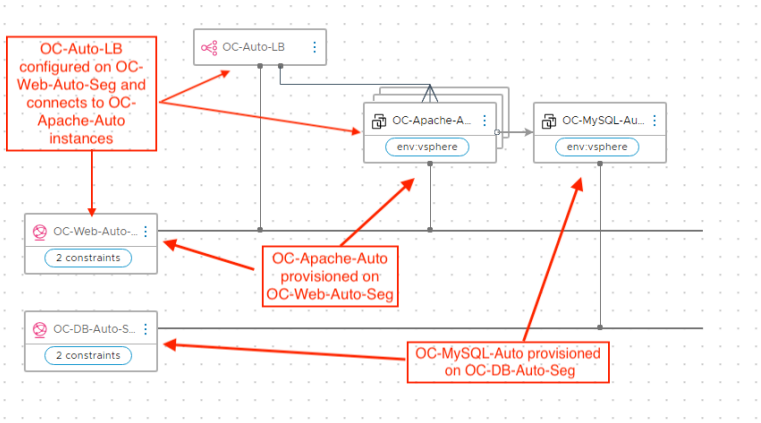
Prior to deployment, we will take a quick look at what the template will deploy. As this is now an active template, please be careful to not make any changes.

A. Click on the link for the Holodeck-OC-Fixed-Network template uploaded in the previous step



B. Click on the Holodeck-OC-Fixed-Network template. Note we have five resources.

- 2 Network resources which connect deployed virtual machines to the correct networks
- A Cloud NSX Load Balancer which configures the virtual server for this instance of Opencart on the existing OC-LB load balancer specified as part of the
- 1 or more Apache web servers (number of servers set when the user deploys the template)
- An instance of MySQL for this Opencart application



C. Click on the **OC-Web-Auto-Seg** resource

- This highlights the relevant part of the yaml file for this cloud template
- Note the OC-Web-Auto-Seg resource is looking for an existing network with a capability tags of oc-fixed-network:oc-web and DeploymentType:Holodeck. These are known as “constraints”. Cloud Assembly needs to find a Network Profile with Capabilities that meet these Constraints when deploying this template

```
243  OC-Web-Auto-Seg:
244    type: Cloud.NSX.Network
245    properties:
246      networkType: existing
247      constraints:
248        - tag: 'oc-fixed-network:oc-web'
249        - tag: 'DeploymentType:Holodeck'
```

D. Click on the **OC-DB-Auto-Seg** resource

- The DB_NSX-Network has constraints of oc-fixed-network:oc-db and DeploymentType:Holodeck.

```
250 OC-DB-Auto-Seg:
251   type: Cloud.NSX.Network
252   properties:
253     networkType: existing
254     constraints:
255       - tag: 'oc-fixed-network:oc-db'
256       - tag: 'DeploymentType:Holodeck'
257
```

E. Click on the OC-Auto-LB load balancer resource.

- The Load balancer resource will create virtual server resources on the OC-Web-Auto-Seg segment, with members of the server pool (instances) based on the number of OC-Apache-Auto web servers this template deploys. The load balancer is configured to listen on Port 80 Protocol and Port), and talk to the backend Apache server on Port 80 (InstanceProtocol and InstancePort)

```
143 OC-Auto-LB:
144   type: Cloud.NSX.LoadBalancer
145   properties:
146     routes:
147       - protocol: HTTP
148         port: 80
149         instanceProtocol: HTTP
150         instancePort: 80
151     network: '${resource["OC-Web-Auto-Seg"].id}'
152     instances: '${resource["OC-Apache-Auto"][*].id}'
153   # instances: '${resource.OC-Apache-Auto[*].id}'
```

F. Click on the OC-Apache-Auto resource

- This resource creates an Apache server from a basic Ubuntu template using extensive “Cloud Init” functionality built into Cloud Assembly. Notice this resource uses both Flavor and Image mapping.
- The remainder of the Apache resource definition will add needed Linux packages, configure users, and then configure the Apache Webserver for our Opencart application
- Feel free to review the entire OC-Apache-Auto Cloud.Machine resource definition.

```
25 OC-Apache-Auto:
26   type: Cloud.Machine
27   dependsOn:
28     - OC-MySQL-Auto
29   properties:
30     flavor: '${input.size}'
31     image: Ubuntu
32     name: '${self.resourceName}'
```

G. Click on the OC-MySQL-Auto resource

- This resource creates the MySQL database server from a basic Ubuntu template using extensive “Cloud Init” functionality built into Cloud Assembly. Notice this resource uses both Flavor and Image mapping.
- For additional info on Cloud Init see *https://cloudinit.readthedocs.io/en/latest/*
- For more information on vRealize Cloud Assembly see *https://docs.vmware.com/en/vRealize-Automation/index.html*

```
OC-MySQL-Auto:
  type: Cloud.Machine
  properties:
    flavor: '${input.size}'
    image: Ubuntu
    tags:
      - key: OC Deployment
        value: '${env.deploymentId}'
      - key: Application-Tier
        value: MySQL
      - key: Application-Name
        value: '${env.deploymentName}'
    name: '${self.resourceName}'
    networks:
      - network: '${resource["OC-DB-Auto-Seg"].id}'
```

Exercise 6: Deploy Holodeck-OC-Fixed-Network Cloud Template

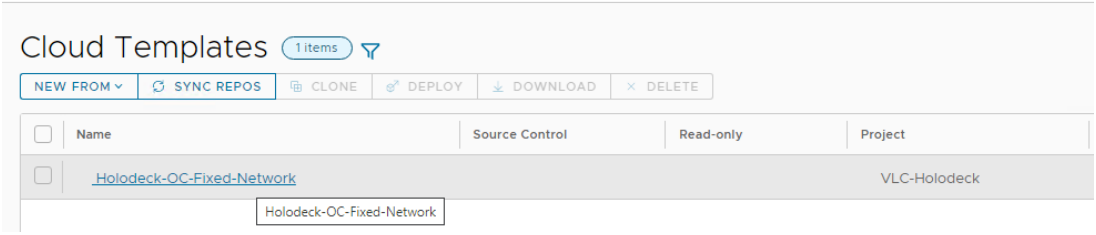
This exercise will deploy an instance of the Opencart demo application to the networks you created in the previous exercises.

[Step 1] Connect to vRealize Cloud Assembly (if necessary)

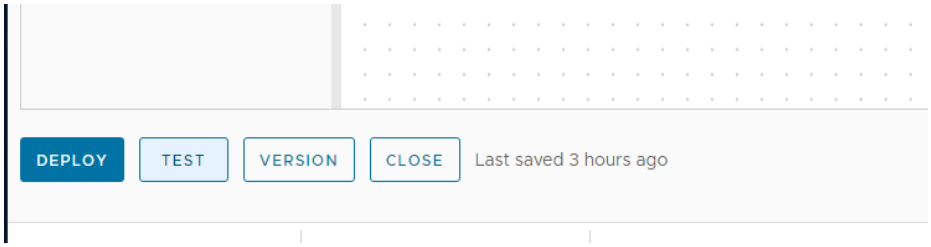
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize Suite** bookmark folder and select **VMware Cloud Services**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Test Cloud Template

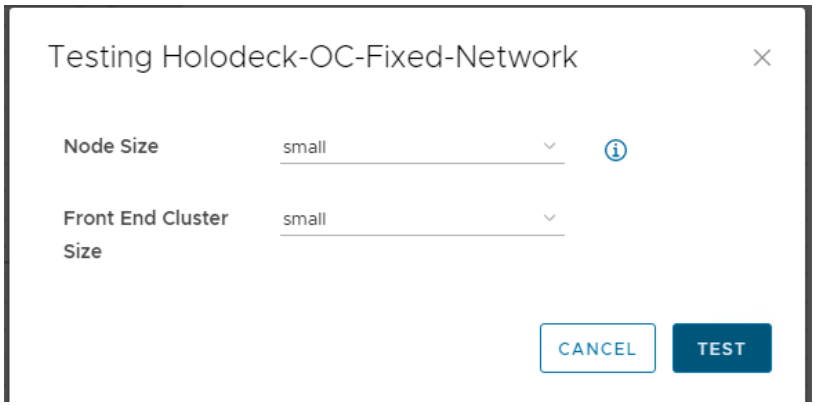
A. If necessary, click **Design**
B. Click on the **Holodeck-OC-Fixed-Network link**



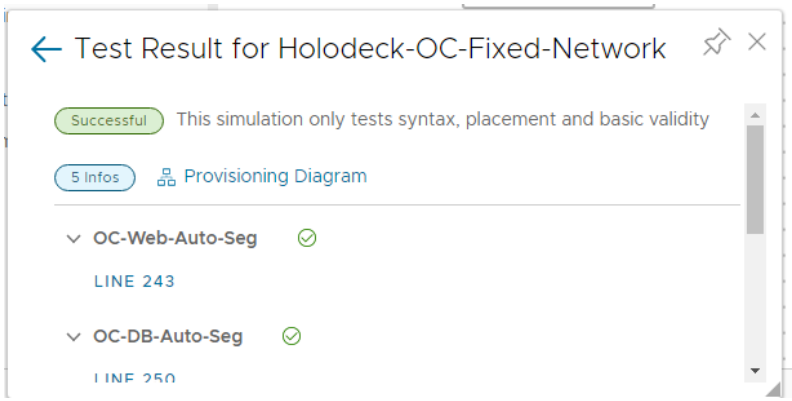
C. Click Test



D. Click test



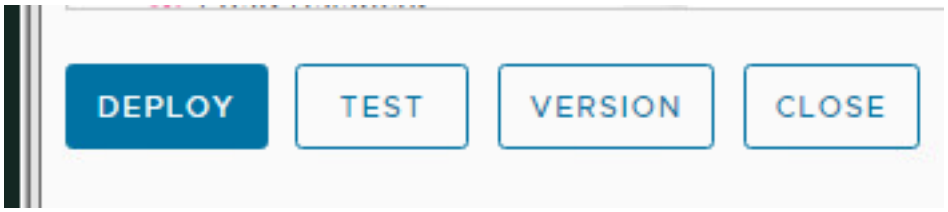
E. Your result should be



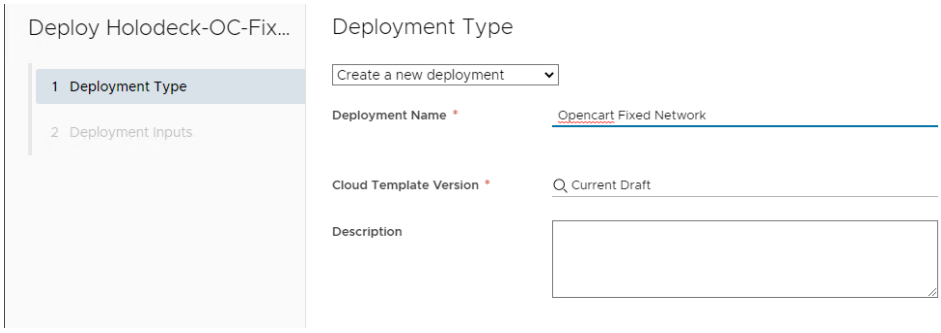
F. Click the X to close the test window

[Step 3] Deploy Cloud Template

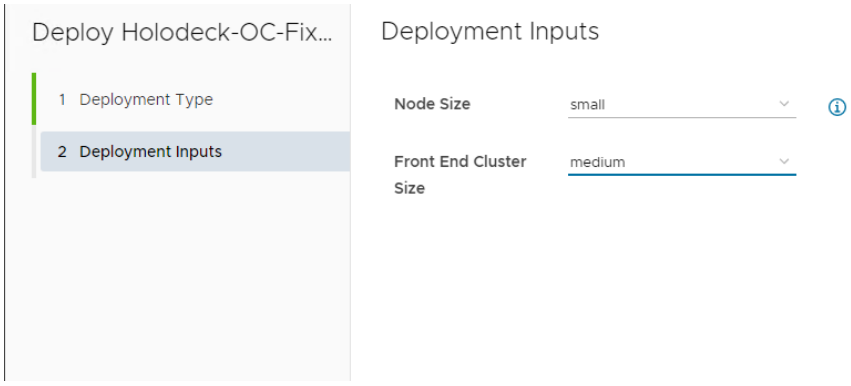
A. Click Deploy



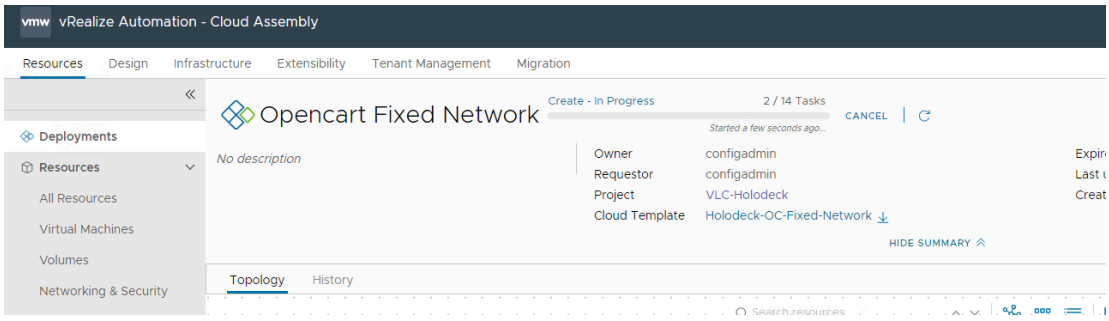
B. Leave as **Create a new deployment**
C. Name the deployment Opencart Fixed Network
D. Leave Cloud Template Version as Current Draft
E. Click Next



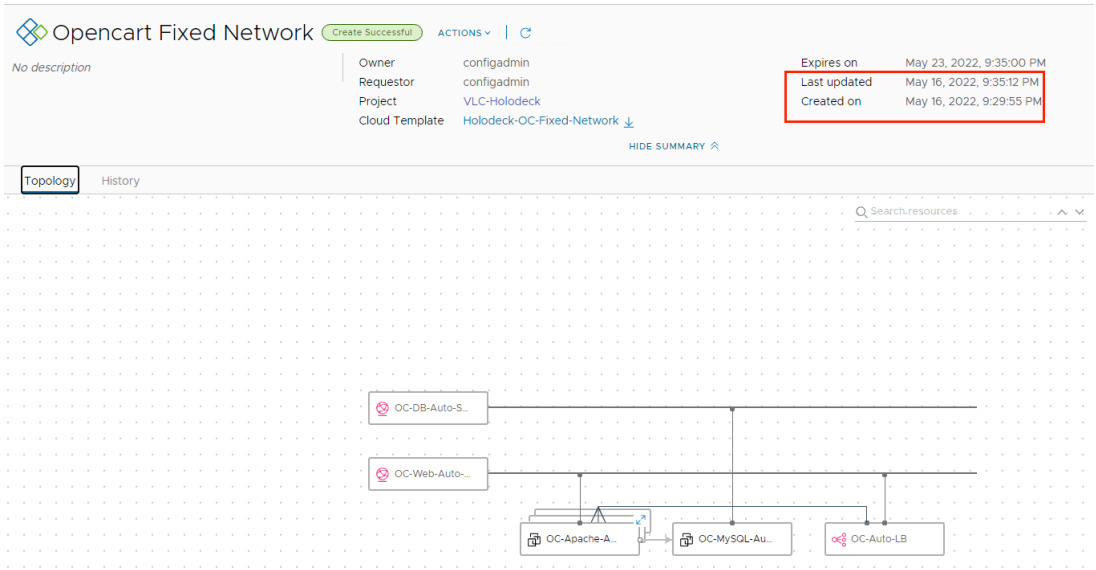
F. Leave Node Size as small
G. Set Front End Cluster Size to medium
H. Click Deploy



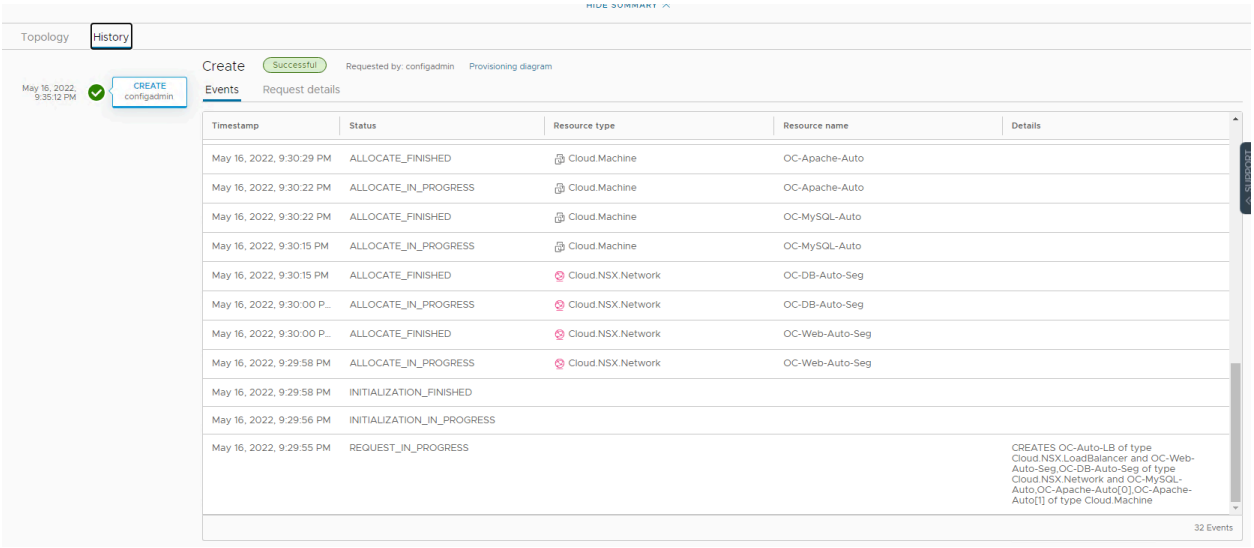
I. Observe the deployment process beginning



J. In about 10-15 minutes you should see a **Create Successful** status



K. Notice that this deployment took approximately 7 minutes
L. Click History
M. Scroll back and review the sequence of resource creation

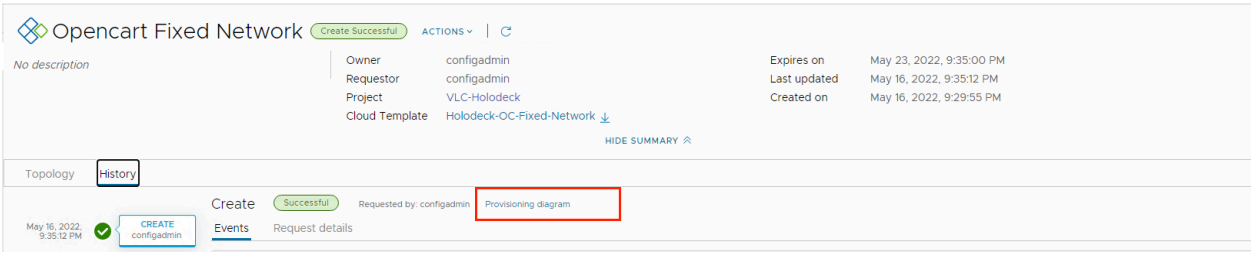


Exercise 7: Review Provisioning Diagram

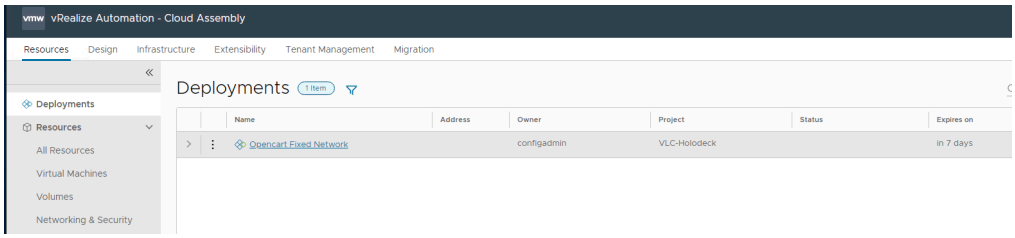
This exercise will review the Cloud Assembly Provisioning Diagram following a deployment. This is one of the best troubleshooting tools available for diagnosing failing deployments. This exercise will only show the initial network allocation to familiarize you with navigating the provisioning diagram

[Step 1] Access Provisioning diagram

A. If your deployment history is still on screen, simply click on the Provisioning diagram link



B. Alternately access the diagram from Resources->Deployments, and selecting your deployment

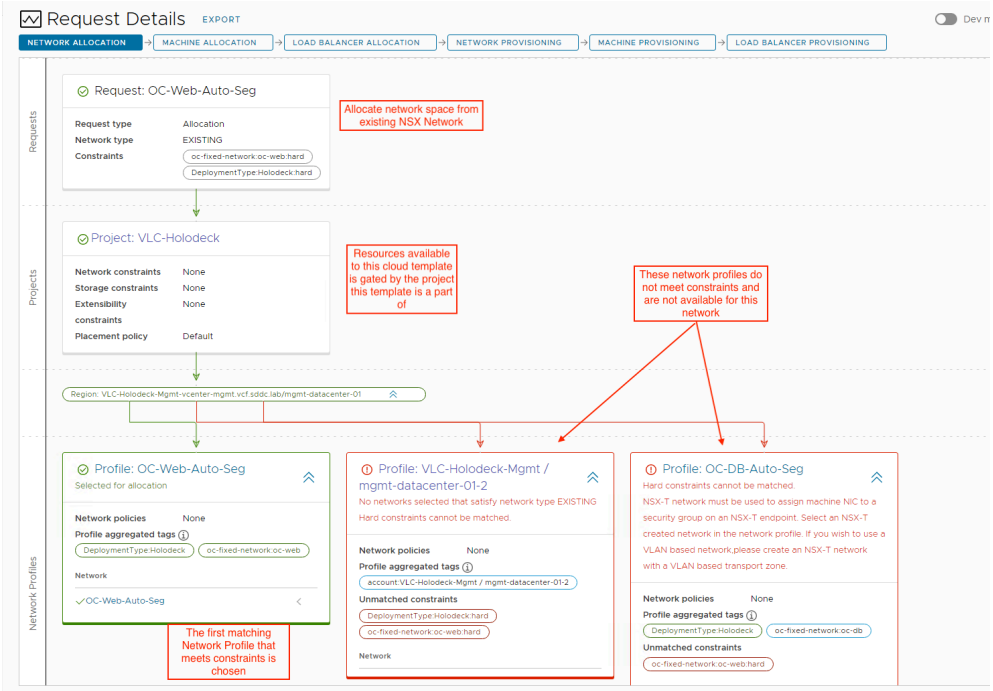


C. Then click History and Provisioning Diagram

[Step 2] Review Network Allocation for OC-Web-Auto-Seg

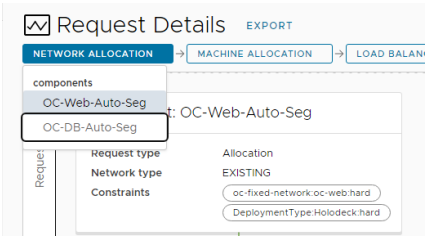
A. The initial screen presented will default to the fist network provisioned, which in this lab is OC-Web-Auto-Seg
B. The top most box describes the item to be created. In this case we are allocating network space from an existing segment
C. The second box shows the project that this template is a part of. Access to resources can be controlled with projects
D. The bottom row shows the process Cloud Assembly walks through to choose where to allocate this network. In effect, Cloud Assembly chooses the first Network Profile it finds that meets the constraints of the object being provisioned.

- Network Profile OC-Web-Auto-Seg meets the constraints of this resource
- The remaining two Network Profiles do not meet the constraints and are ineligible

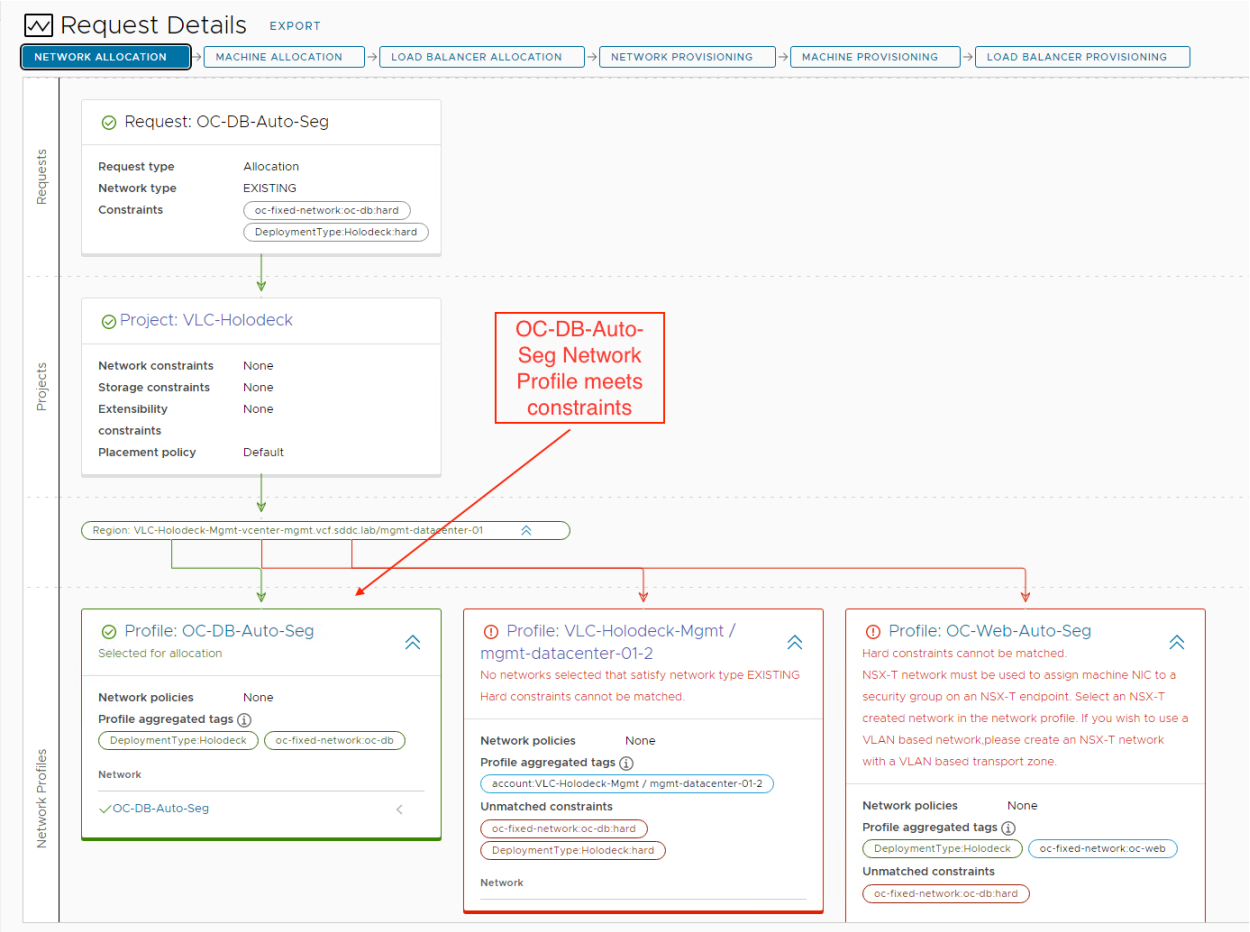


[Step 3] Review Network Allocation for OC-DB-Auto-Seg

A. Click on the blue Network Allocation box and select the OC-DB-Auto-Seg



B. Notice how the Network Profile that meets the constraints for OC-DB-Auto-Seg changes



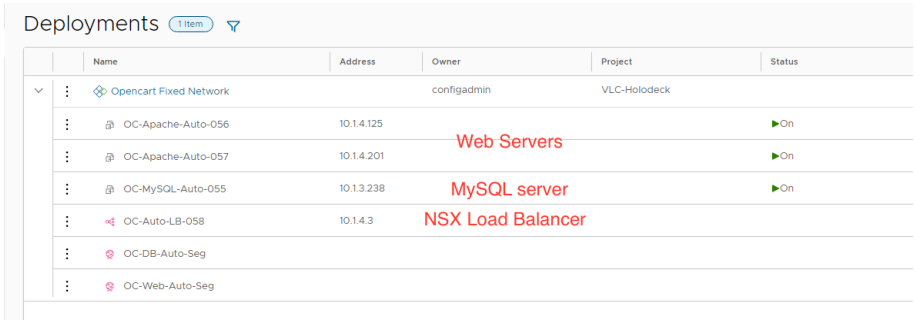
Exercise 8: Review deployed Opencart application

This exercise will review the components deployed by the Cloud Template.

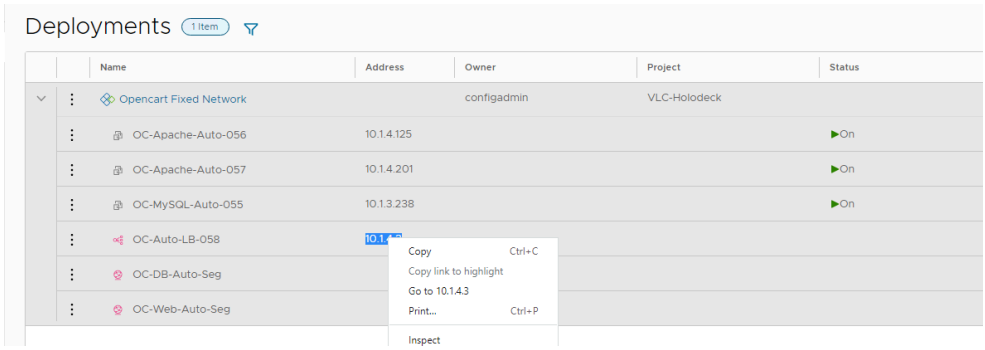
[Step 1] Test web servers

A. Select Resources-> Deployments
B. Click the **>** next to Opencart Fixed Network
C. Note the following

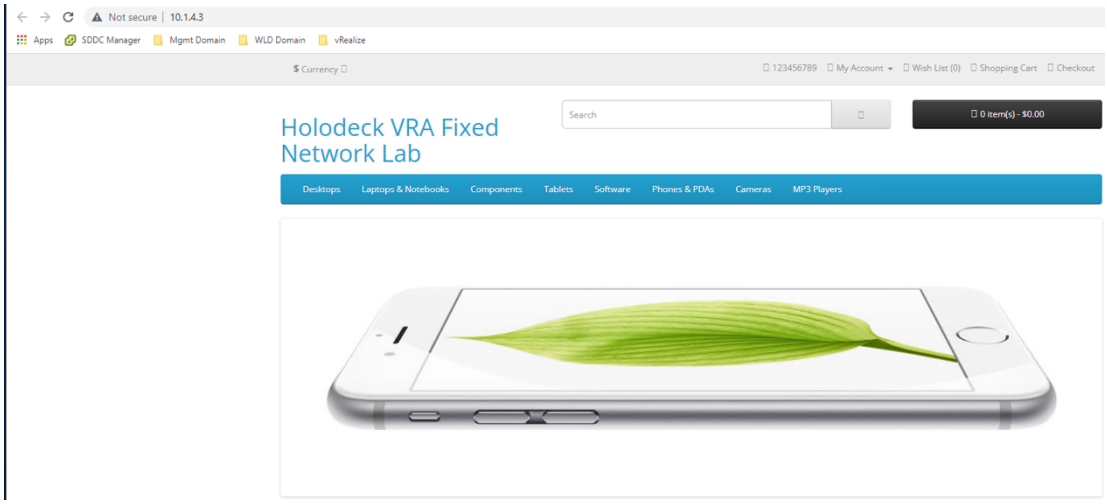
- Two deployed OC-Apache-Auto-XXX web servers on the 10.1.4.x network, with IP addresses in the range controlled by NSX for DHCP on the OC-Web-Auto-Seg. (Note: The numeric suffix after the resources name is set by Cloud Assembly to keep resource names unique. This naming mechanism was chosen during initial Cloud Assembly setup in this environment).
- An OC-MySQL-Auto-XXX resource in the 10.1.3.x network
- An NSX Load Balancer on the 10.1.4.x network, with IP address in the range controlled by Cloud Assembly on the OC-Web-Auto-Seg



D. Double click on the OC-Auto-LB-XXX IP and go to that IP address (or open a new browser window to that IP address



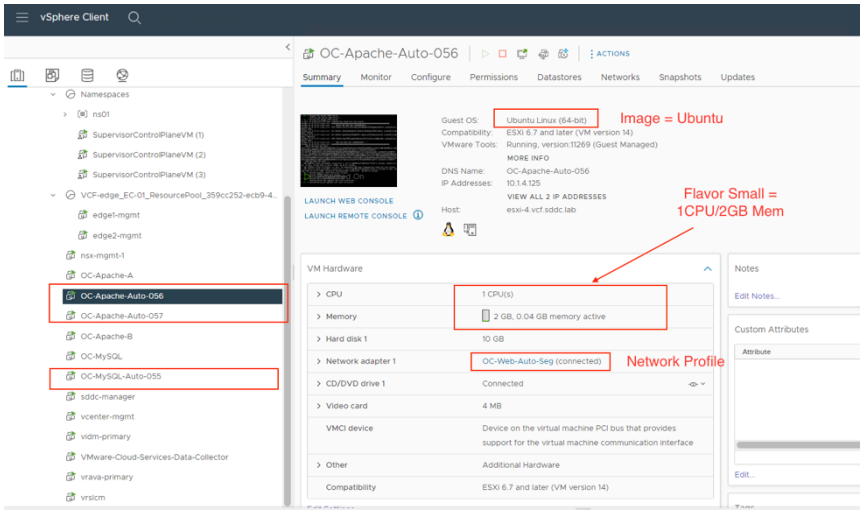
E. You should open a page that looks like this



[Step 2] Review in vCenter Server

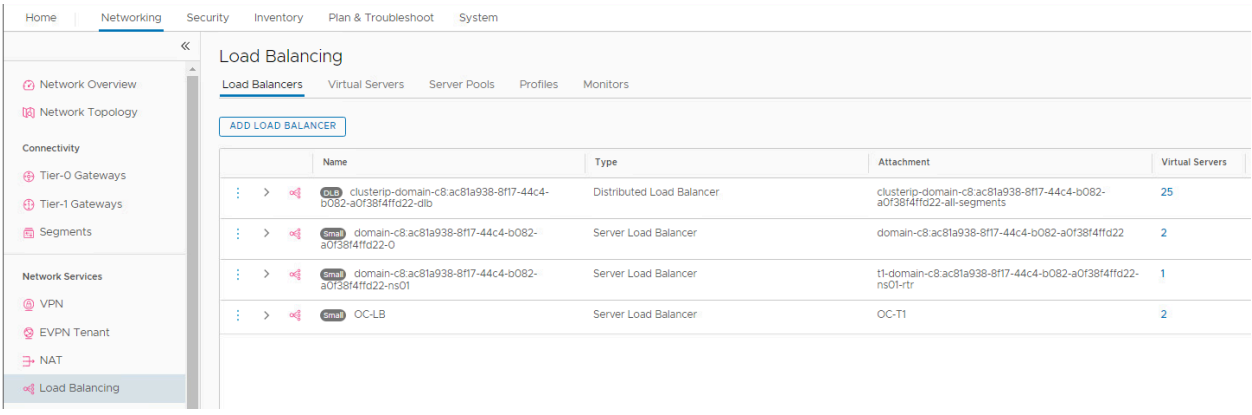
A. Click **+** in the Chrome browser to open a new window if necessary
B. Click the **Mgmt Domain** Folder then **vCenter** bookmark in the bookmark bar
C. Login: Username: **administrator@vsphere.local** Password: **VMware123!**

D. From hosts and clusters view, Select one of the OC-Apache-Auto webservers identified in the Cloud Assembly Deployment Summary. In this example the machines are OC-Apache-Auto-056 and OC-Apache-Auto-057
   - Notice:
   - CPU and Memory sizes match “Flavor = Small” from Cloud Assembly Flavor Mapping
   - The VM is connected to OC-Web-Auto-Seg based on the OC-Web-Auto-Seg Network Profile selected for this VM. This was selected by the constraint oc-fixed-network:oc-web being matched in the network profile

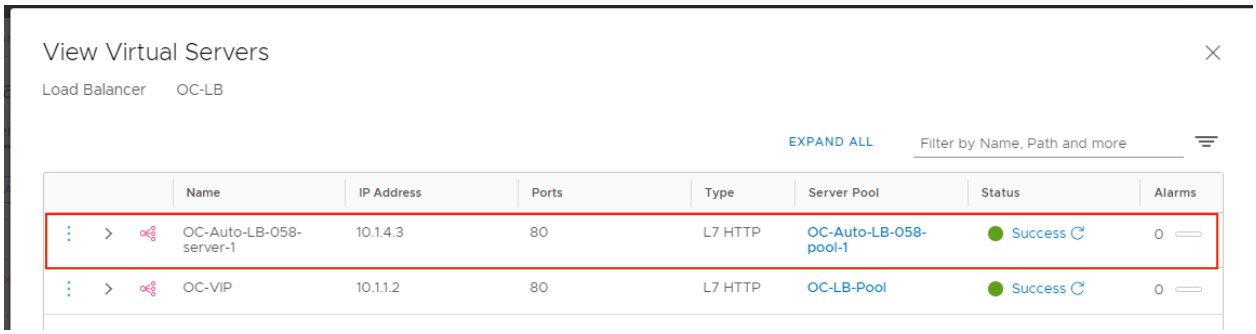


[Step 3] Review in NSX Manager

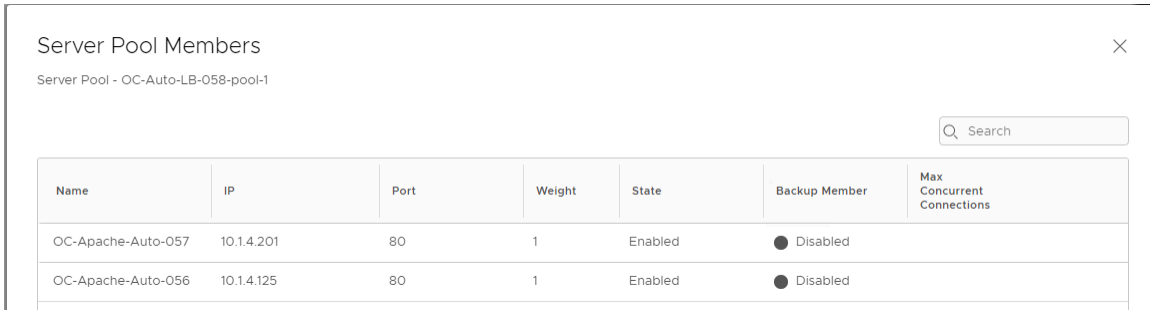
A. Open a new tab in the Chrome browser(If needed)
B. Click the Mgmt Domain folder and Mgmt NSX shortcut in the bookmark bar (click advanced / proceed to nsx-mgmt.vcf.sddc.lab, if required to accept the certificate)
C. Log into NSX Manager as user: **admin** with the password: **VMware123!VMware123!**
D. From the NSX-T Manager interface click the **Networking** tab
E. Select **Load Balancing**



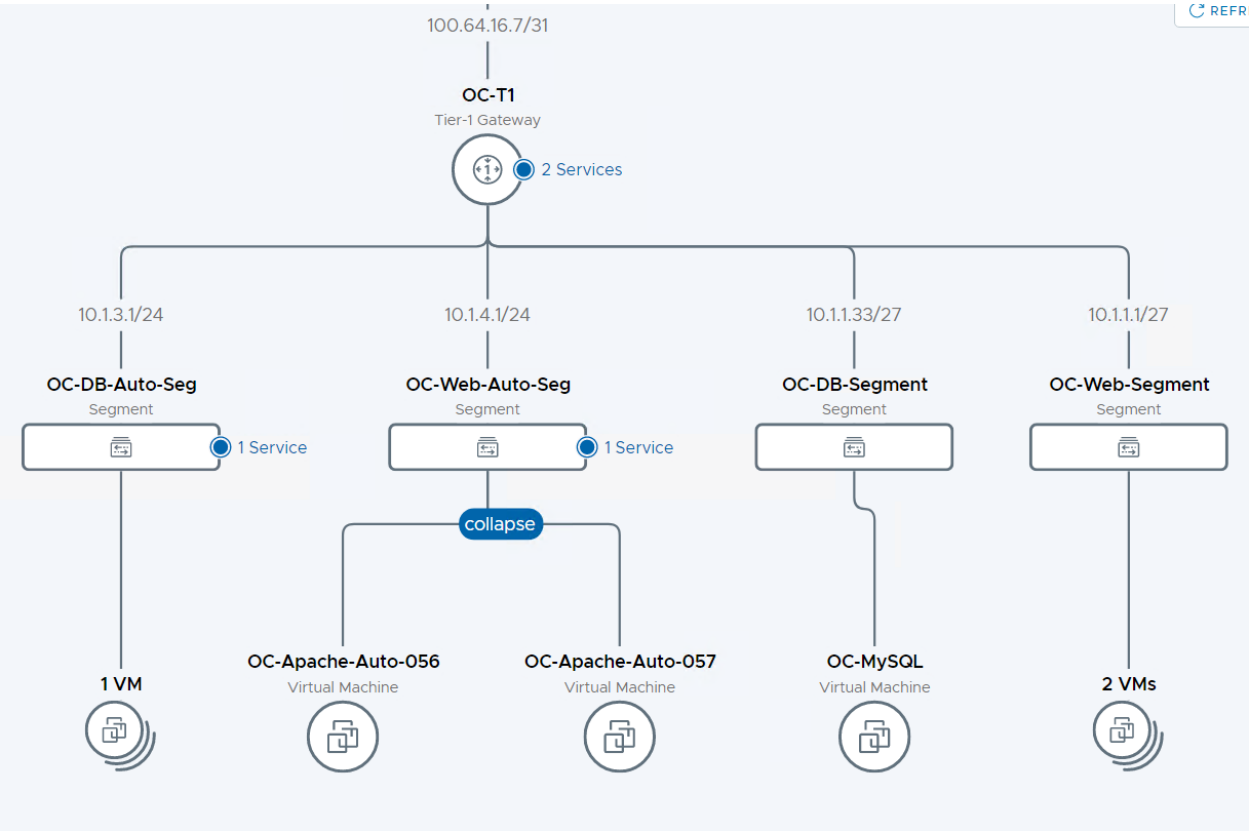
F. Click on the Virtual Servers link for OC-LB. Notice where Cloud Assembly has created a second Virtual Server for this instance of Opencart



G. Click on the Server Pool link for this Virtual Server. Notice the two Apache servers deployed by Cloud Assembly



H. Click **Close -> Close**
I. Click Networking -> Network Topology
J. Scroll the view to the right to expand OC-T1
K. Expand virtual machines under the OC-DB-Auto-Seg and OC-Web-Auto-Seg. Notice the Virtual Machines placed on these segments by Cloud Assembly



Exercise 8: Delete deployed Opencart application

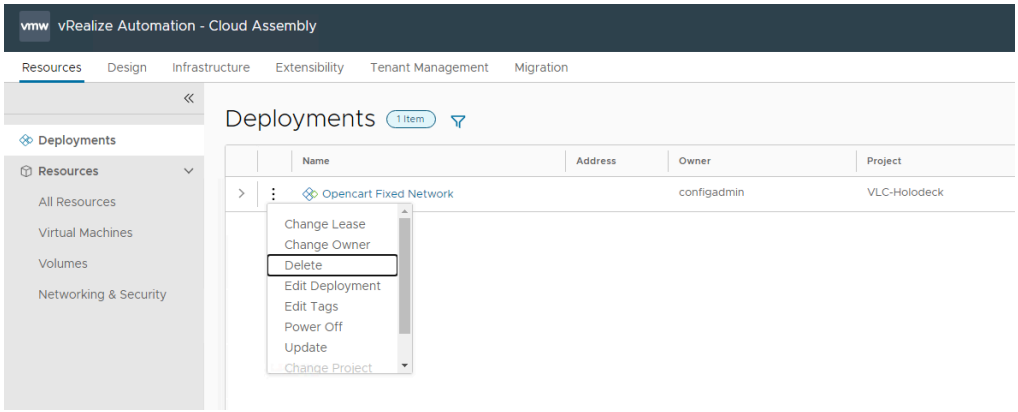
This exercise will delete the components deployed by Cloud Assembly.

[Step 1] Connect to vRealize Cloud Assembly (if necessary)

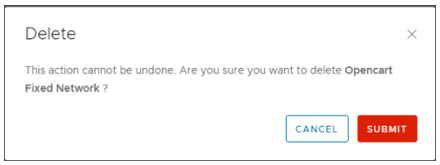
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Delete Deployment

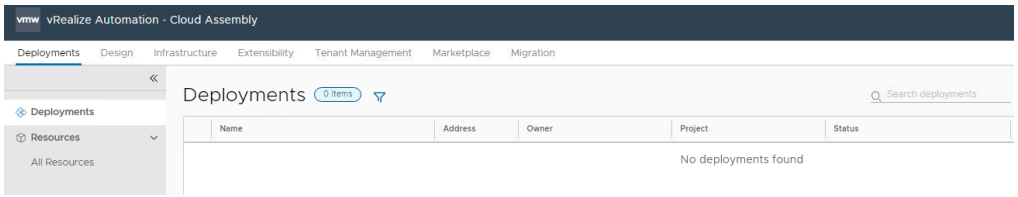
A. Click **Close** on the deployment history if needed
B. Click the **three dots** next to Opencart Fixed Network
C. Click Delete



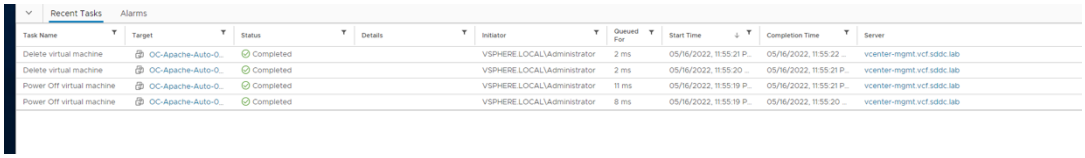
D. Click Submit



E. The delete process usually takes 2-3 minutes to complete



F. Optional: If you have a vCenter Server window open during the delete process, you will see virtual machines power off and being deleted



Module summary

VMware, Inc. 3401 Hillview Avenue Palo Alto CA 94304 USA Tel 877-486-9273 Fax 650-427-5001 vmware.com Item No: vmw-wp-temp-uslet-word-101-proof 6/20