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

Part 2 – Cloud 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: VMware1!
- **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 dynamically provisioned NSX Segments and dynamic distributed firewall configuration
-

This section relies on:

1. Holodeck VRA initial setup complete (On Prem or Cloud)

Deploying Opencart with dynamic NSX Segments and Firewall Policy – 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 with NSX networks and security policies on the Holodeck Cloud Foundation management domain.

This module consists of the following exercises

1. Create Cloud Assembly Network Profile for OC-DB-Cloud-Seg
2. Create Cloud Assembly Network Profile for OC-Web-Cloud-Seg
3. Review vRealize Cloud Template
4. Deploy Opencart from Cloud Template
5. Review Deployed Application
6. Delete Deployed Application

Exercise 1: Create OC-DB-Cloud-Seg Cloud Assembly Network Profile

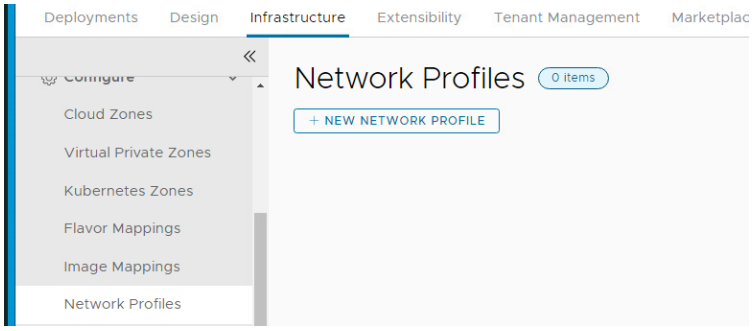
In this exercise we will configure a new Network Profile in Cloud Assembly for the OC-DB-Cloud-Seg segment. This Network Profile will specify a “Routed” network, which directs Cloud Assembly to deploy a dynamic NSX segment and T1 router

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

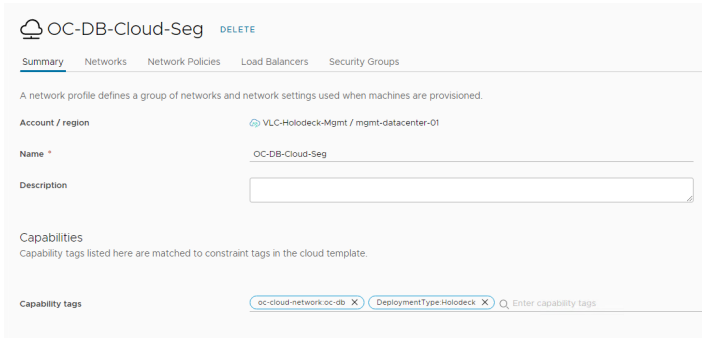
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

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

A. Click Infrastructure -> Network Profiles

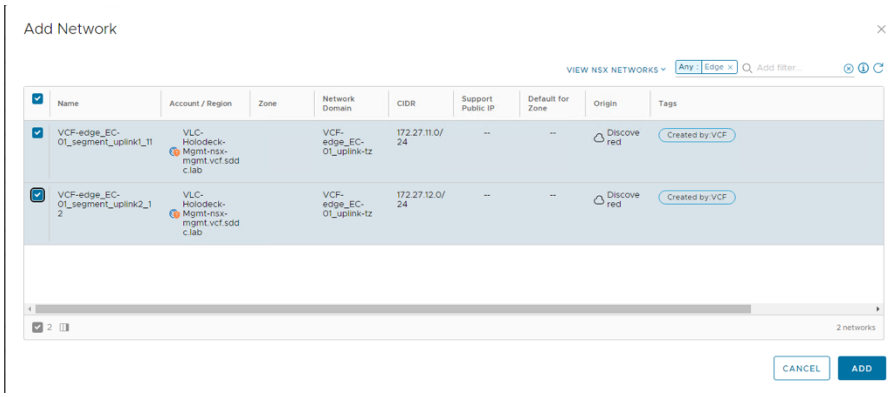


B. Click New Network Profile
C. On the Summary tab, Click on Account/Region and select VLC-Holodeck-Mgmt / mgmt-datacenter-01
D. Set the name to OC-DB-Cloud-Seg
E. Add the tag oc-cloud-network:oc-db
F. Add the tag DeploymentType:Holodeck



[Step 2.1] Add Networks on Networks Tab

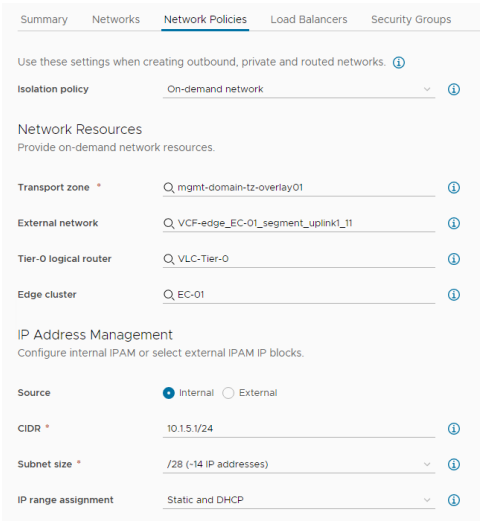
A. Click on Networks tab, then Add Network
B. Click in the filter area and type Edge-
C. Select both VCF-edge segments shown (This allows VRA created routed networks to reach the outside via the Tier-0 uplinks)



D. Click Add.

[Step 2.2] Add Network Policy on Network Policies Tab

A. Click **Network Policies**
B. Set Isolation policy to On-demand network
C. Set transport zone to mgmt-domain-tz-overlay01
D. Set External network to VCF-edge_EC-01_segment_uplink1_11
E. Set Tier-0 to VLC-Tier-0
F. Set Edge Cluster to **EC-01**
G. Leave Source at Internal (VRA will act as IPAM for this segment)
H. Set CIDR to 10.1.5.1/24
I. Set Subnet size to /28 (-14 IP addresses)
J. Leave IP Range Assignment at Static and DHCP

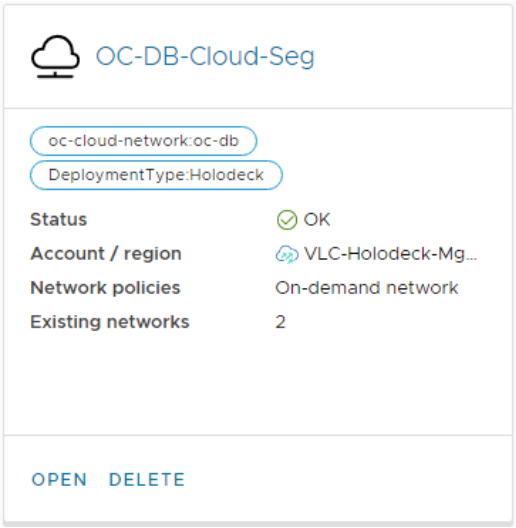


[Step 2.3] Load Balancers Tab

A. Leave Load Balancers tab empty

[Step 2.4] Security Groups Tab

A. Leave Security tab empty
B. Click **Create**
C. Your result should look like



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

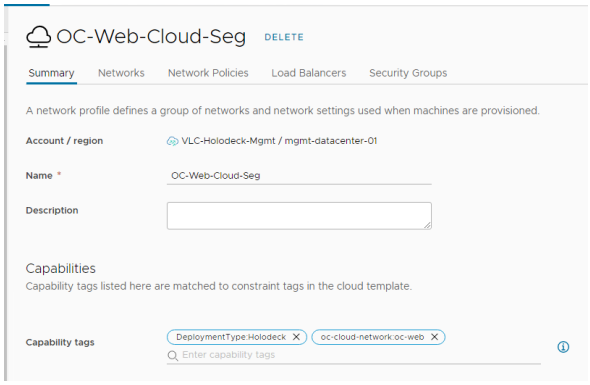
In this exercise we will configure a new Network Profile in Cloud Assembly for the OC-Web-Cloud-Seg segment

[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**

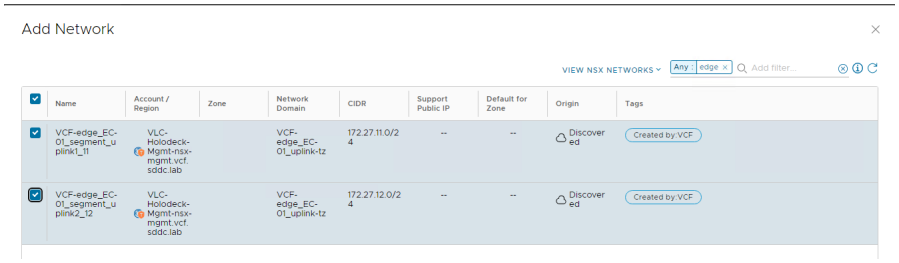
[Step 2] Create OC-Web-Cloud-Seg Network Profile

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-Cloud-Seg
E. Add the tag oc-cloud-network:oc-web
F. Add the tag DeploymentType:Holodeck



[Step 2.1] Add Networks on Networks Tab

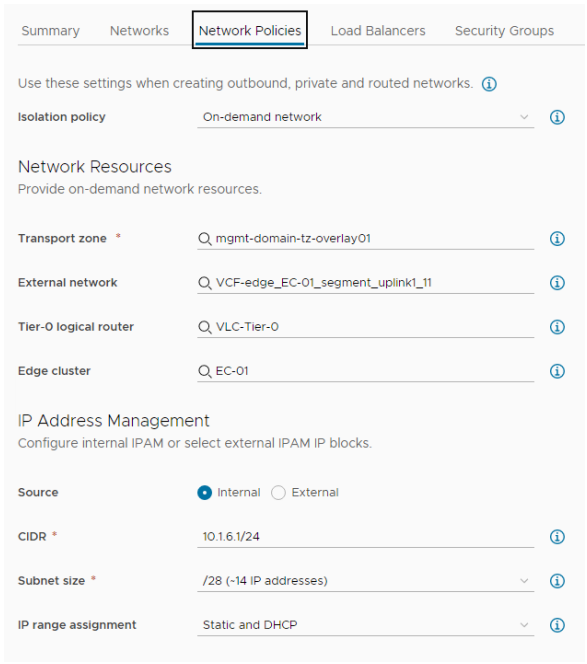
A. Click on Networks tab, then Add Network
B. Filter for edge
C. Select both VCF-edge networks
D. Click Add



E. Click Add.

[Step 2.2] Add Network Policy on Network Policies Tab

A. Click **Network Policies**
B. Set Isolation policy to On-demand network
C. Set transport zone to mgmt-domain-tz-overlay01
D. Set External network to VCF-edge_EC-01_segment_uplink1_11
E. Set Tier-0 to VLC-Tier-0
F. Set Edge Cluster to **EC-01**
G. Leave Source at Internal (VRA will act as IPAM for this segment)
H. Set CIDR to 10.1.6.1/24
I. Set Subnet size to /28 (-14 IP addresses)
J. Leave IP Range Assignment at Static and DHCP

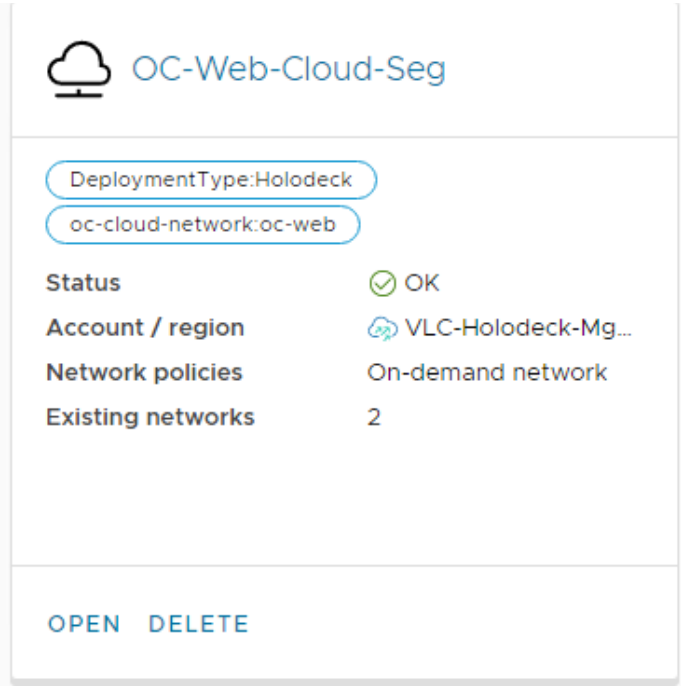


[Step 2.3] Load Balancers Tab

A. Leave Load Balancers blank

[Step 2.4] Security Groups Tab

A. Leave security groups blank
B. Click **Create**



Exercise 5: Upload and Review "Holodeck Opencart Cloud Network" Cloud Template

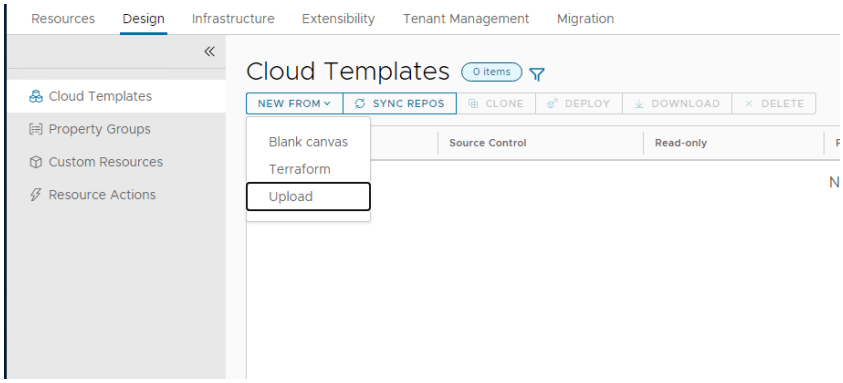
This exercise will upload the cloud template that will deploy an instance of the Opencart demo application to the networks you created in the previous exercises.

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

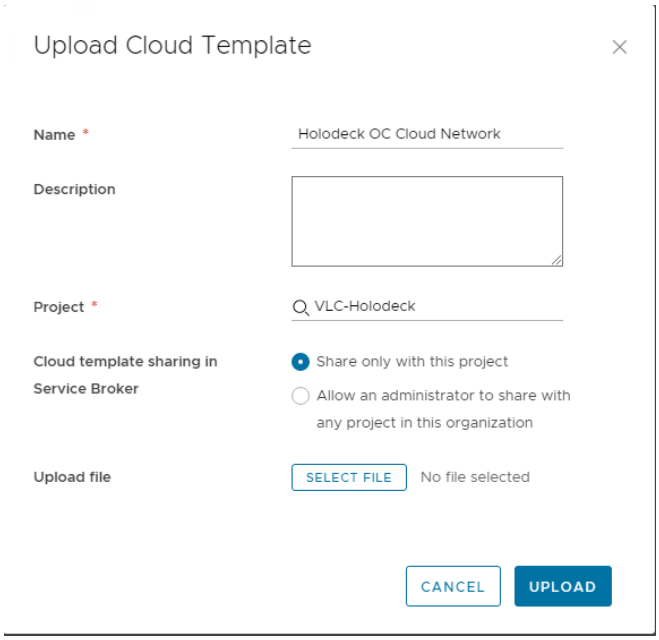
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Upload Cloud Template

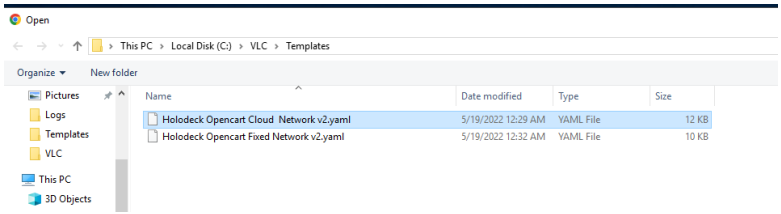
A. Click **Design**
B. Click New From -> Upload



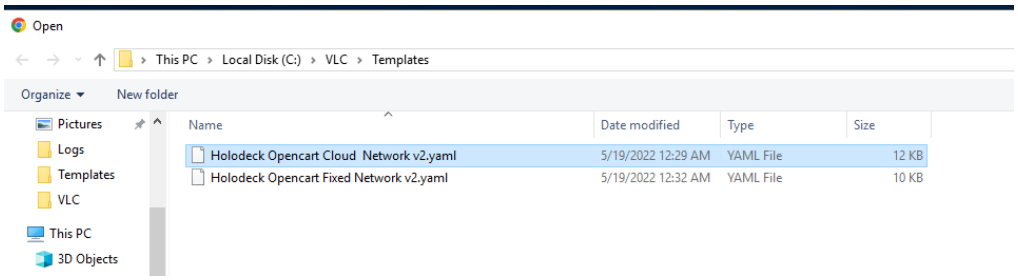
C. Name the template Holodeck OC Cloud Network
D. Select VLC-Holodeck for project



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



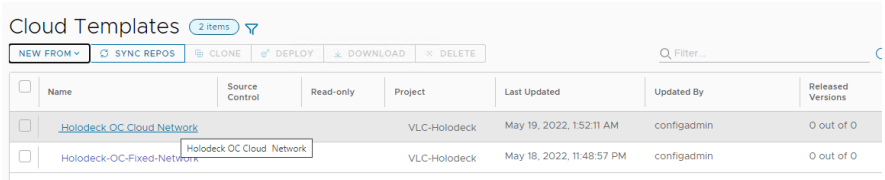
H. Click upload



[Step 3] Review Cloud Template

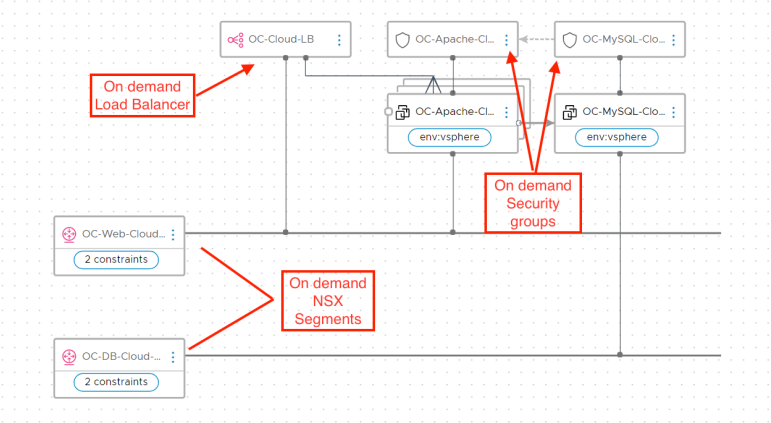
Prior to deployment, we will take a quick look at what the template will deploy. As this is now an active template, please be careful to not make any changes.

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



B. Note we have seven resources.

- 2 Network resources which create on demand NSX networks and T1 routers
- On demand NSX Load Balancer and virtual servers for this instance of Opencart
- 1 or more Apache web servers (number of servers set when the user deploys the template)
- An instance of MySQL for this Opencart application
- 2 Security objects attached to respective virtual machines, to create on demand security policies per VM type



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

- This highlights the relevant part of the yaml file for this cloud template
- Note the OC-Web-Cloud-Seg resource will create a new "routed" network. It will match with a network profile that has the capabilities oc-cloud-network:oc-web and DeploymentType:Holodeck.

```
305 | OC-Web-Cloud-Seg:
306     type: Cloud.NSX.Network
307     properties:
308       networkType: routed
309       constraints:
310         - tag: 'DeploymentType:Holodeck'
311         - tag: 'oc-cloud-network:oc-web'
```

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

- The OC-DB-Cloud-Seg has constraints of oc-fixed-network:oc-db and DeploymentType:Holodeck that will need to be matched by a corresponding network profile

```
312 | OC-DB-Cloud-Seg:
313     type: Cloud.NSX.Network
314     properties:
315       networkType: routed
316       constraints:
317         - tag: 'DeploymentType:Holodeck'
318         - tag: 'oc-cloud-network:oc-db'
```

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

- The Load balancer resource will create a new load balancer and virtual server resources on the OC-Web-Cloud-Seg segment, with members of the server pool (instances) based on the number of OC-Apache-Cloud 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).

```
24   OC-Cloud-LB:
25     type: Cloud.NSX.LoadBalancer
26     properties:
27       routes:
28         - protocol: HTTP
29           port: 80
30           instanceProtocol: HTTP
31           instancePort: 80
32       network: '${resource["OC-Web-Cloud-Seg"].id}'
33       instances: '${resource["OC-Apache-Cloud"][*].id}'
```

F. Click on the OC-Apache-Cloud-Sec-Group resource

- This resource creates an on demand distributed firewall policy that applies to virtual machines created by the OC-Apache-Cloud VM resource.
- This creates a set of rules similar to what you have created and used in the previous Opencart lab modules.

```
34 OC-Apache-Cloud-Sec-Grp:
35   type: Cloud.SecurityGroup
36   properties:
37     securityGroupType: new
38     rules:
39       - name: OC-Apache-Cloud-80
40         ports: 80
41         direction: inbound
42         protocol: TCP
43         source: ANY
44         access: Allow
45       - name: Main-console-ssh
46         access: Allow
47         source: 10.0.0.220
48         service: SSH
49         direction: inbound
50       - name: Main-console-ICMP
51         access: Allow
52         source: 10.0.0.220
53         service: ICMP
54         direction: inbound
55       - name: Deny-all-inbound
56         access: Deny
57         direction: inbound
```

G. Click on the OC-MySQL-Cloud-Sec-Grp resource

- This resource creates specific security rules that aply to virtual machines created by the OC—MySQL-Cloud resource.
- Notice the OC-MySQL-Cloud-FW resources uses a source of '${resource["OC-Apache-Cloud-Sec-Grp"].id}'
  - This sets the source to VM's created in the OC-Apache-Cloud-Sec-Grp.

```
57            direction: inbound
58    OC-MySQL-Cloud-Sec-Grp:
59      type: Cloud.SecurityGroup
60      properties:
61        securityGroupType: new
62        rules:
63          - name: OC-MySQL-Cloud-FW
64            ports: '3306'
65            access: Allow
66            source: '${resource["OC-Apache-Cloud-Sec-Grp"].id}'
67            protocol: TCP
68            direction: inbound
69          - name: Main-console-ssh
70            access: Allow
71            source: 10.0.0.220
72            service: SSH
73            direction: inbound
74          - name: Main-console-ICMP
75            access: Allow
76            source: 10.0.0.220
77            service: ICMP
78            direction: inbound
79          - name: Deny-all-inbound
80            access: Deny
81            direction: inbound
```

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

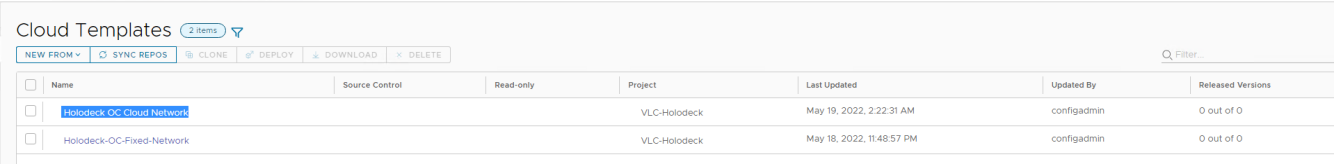
This exercise will deploy an instance of the Opencart demo application to the networks you created in the previous exercises.

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

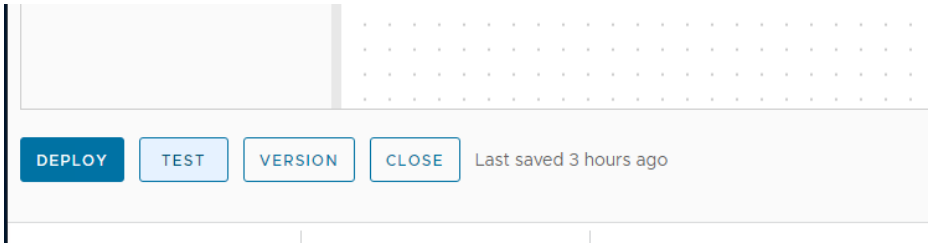
A. Click **+** in the Chrome browser to open a new window
B. Click the **vRealize** bookmark folder and select **vra.vcf.sddc.lab**
C. Click **GO TO LOGIN PAGE**
D. Login: Username: **configadmin** Password: **VMware123!**
E. Click **Cloud Assembly**

[Step 2] Test Cloud Template

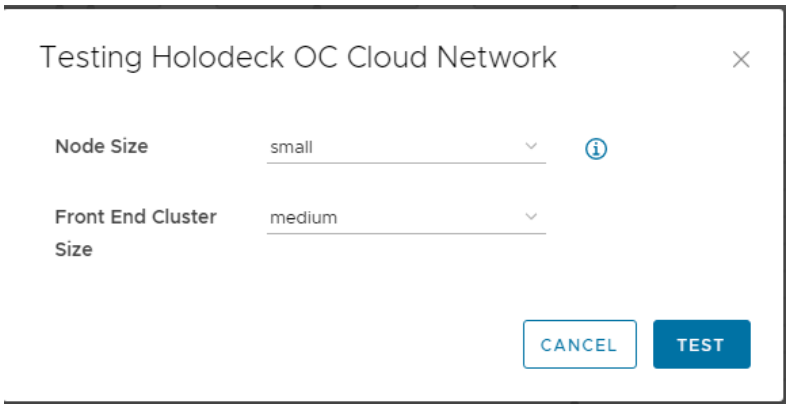
A. If necessary, click **Design**
B. Click on the **Holodeck OC Cloud Network link**



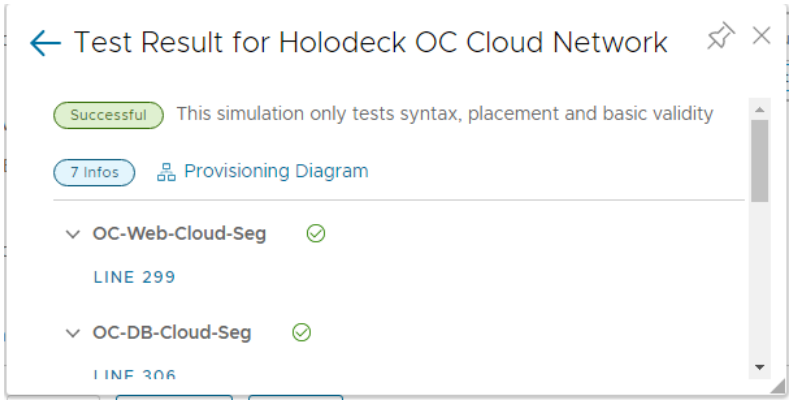
C. Click Test



D. Click test



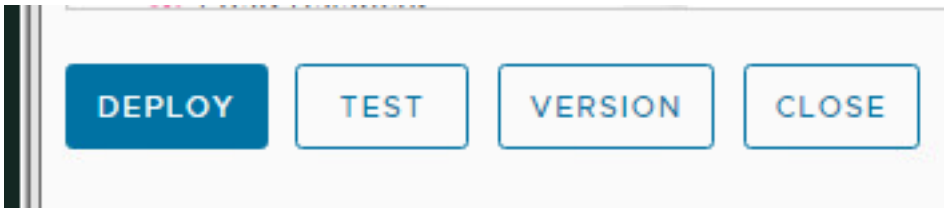
E. Your result should be



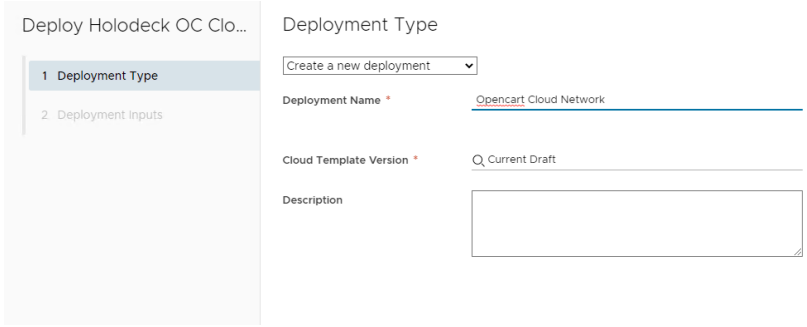
F. Click the X to close the test window

[Step 3] Deploy Cloud Template

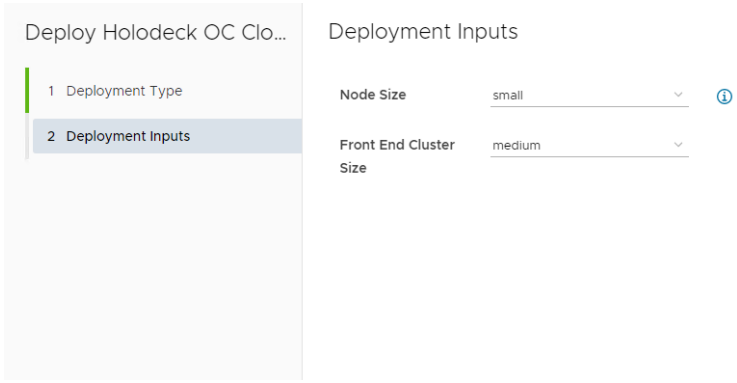
A. Click Deploy



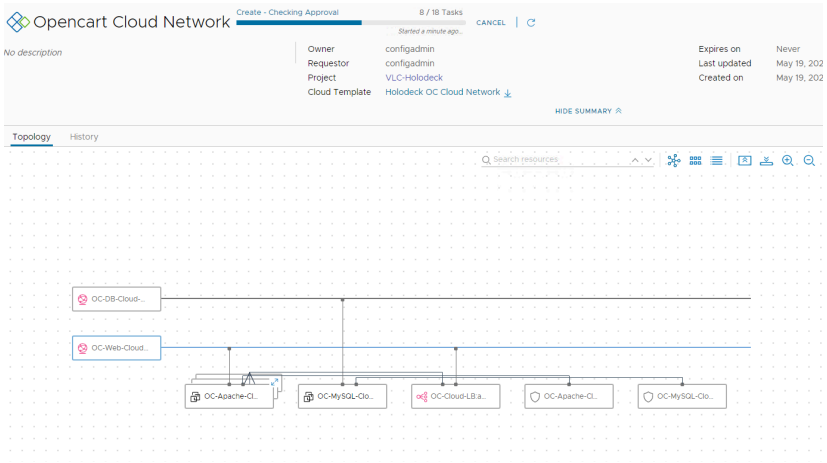
B. Leave as **Create a new deployment**
C. Name the deployment Opencart Cloud Network
D. Leave Cloud Template Version as Current Draft
E. Click Next



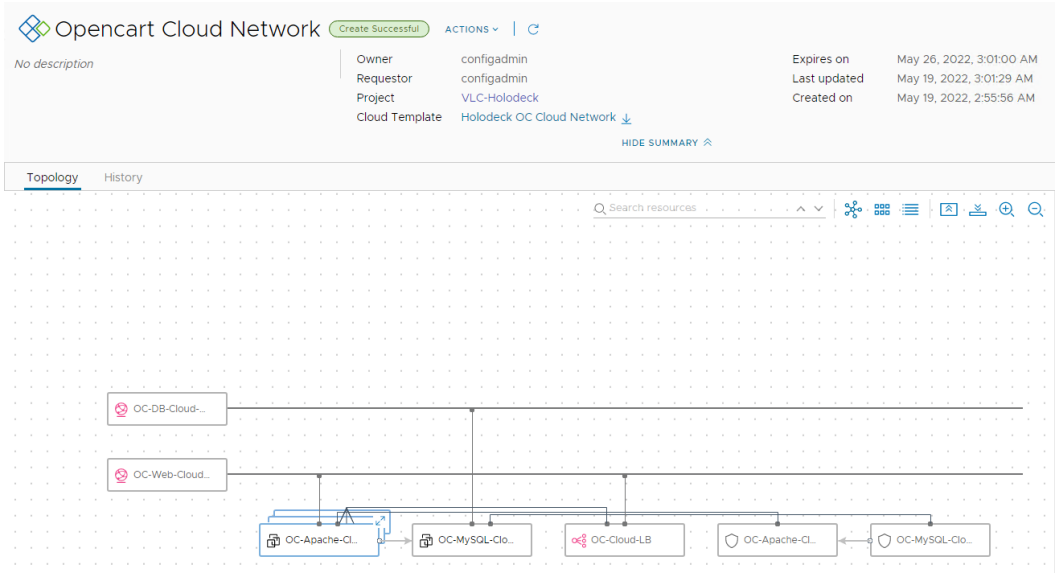
F. Leave Node Size as small
G. Leave Front End Cluster Size at medium
H. Click Deploy



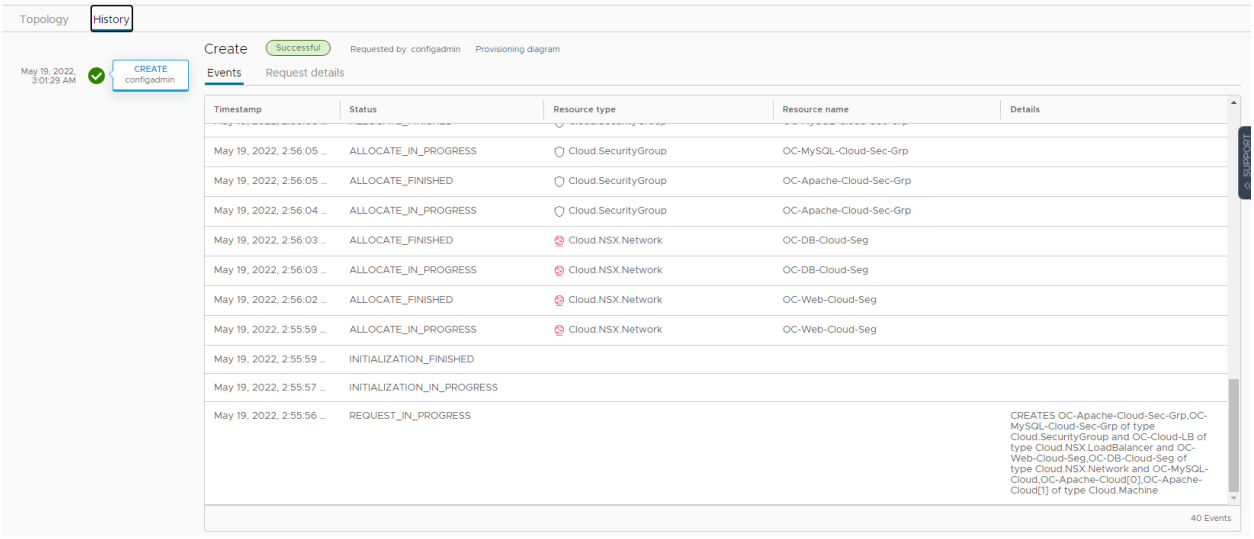
I. Observe the deployment process beginning



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

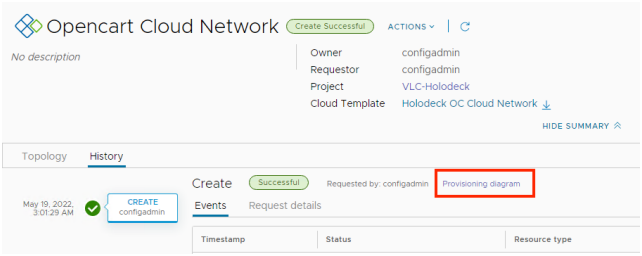


Exercise 7: Review Provisioning Diagram

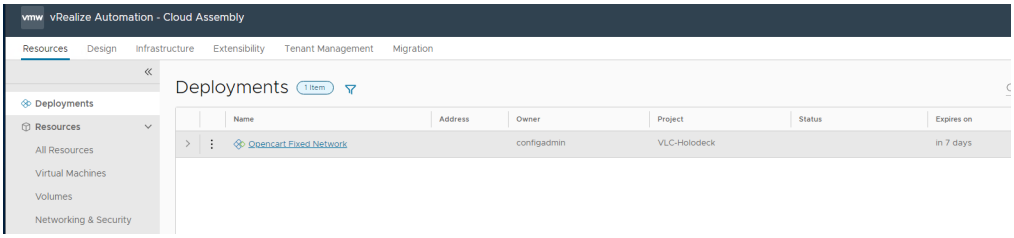
This exercise will review the Cloud Assembly Provisioning Diagram following a deployment. This is one of the best troubleshooting tools available for diagnosing failing deployments. This exercise will only show the initial network allocation to familiarize you with navigating the provisioning diagram

[Step 1] Access Provisioning diagram

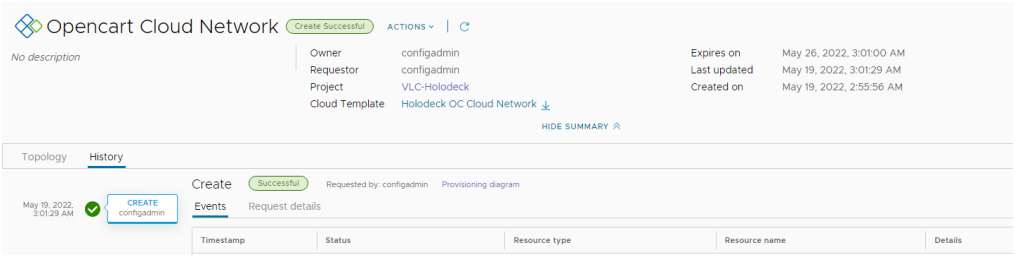
A. If your deployment history is still on screen, simply click on the Provisioning diagram link



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



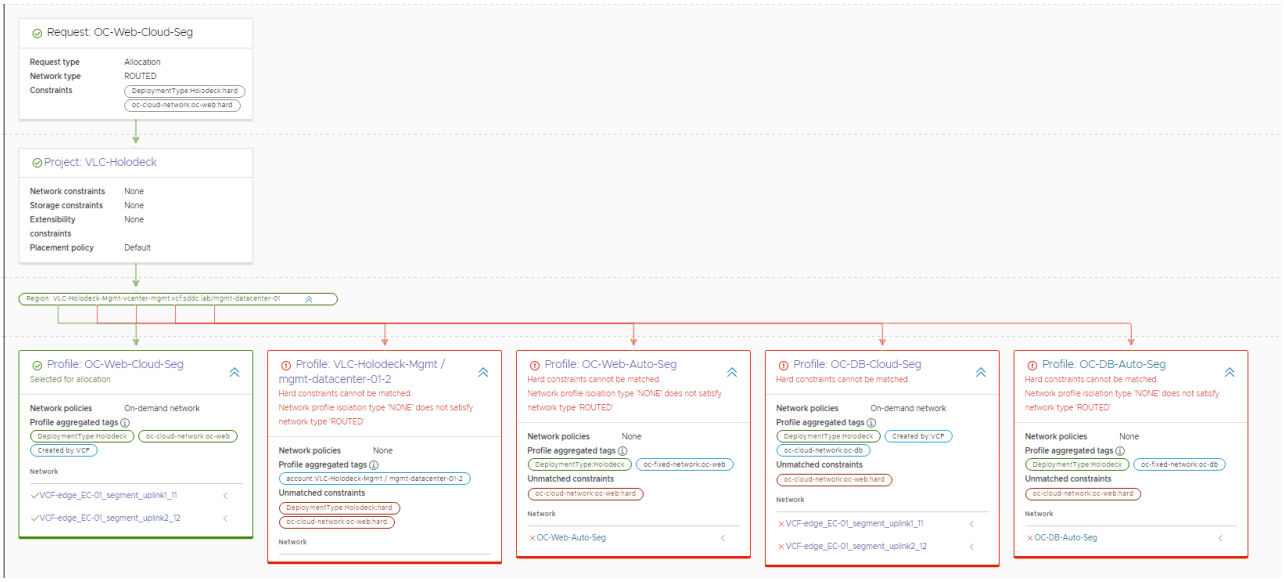
C. Then click History and Provisioning Diagram



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

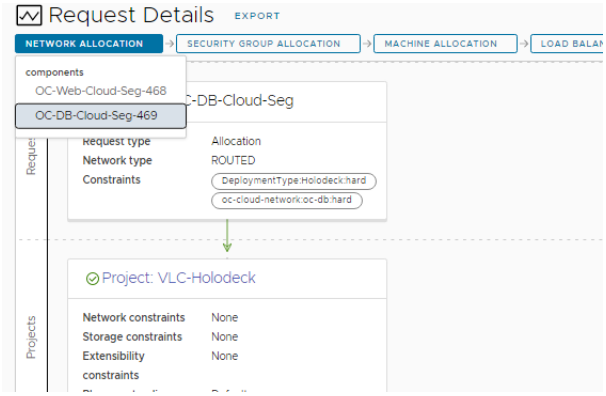
A. The initial screen presented will default to the first network provisioned, which in this lab is OC-Web-Cloud-Seg
B. The top most box describes the item to be created. In this case we are creating a new network space due to the type ROUTED
C. The second box shows the project that this template is 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-Cloud-Seg meets the constraints of this resource
- The remaining Network Profiles do not meet the constraints and are ineligible

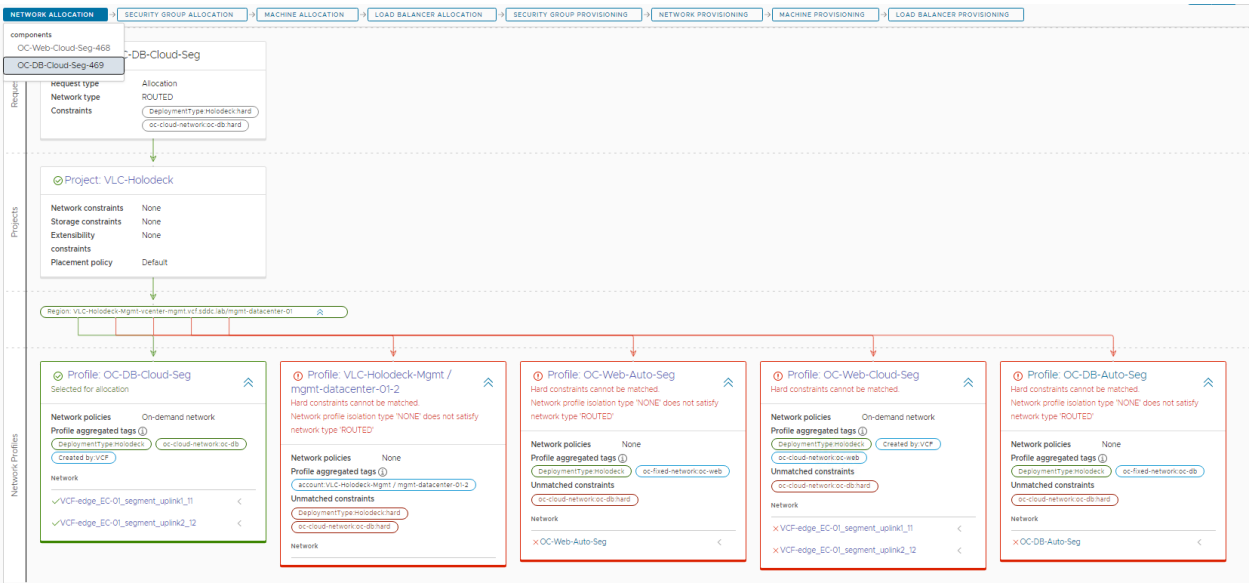


[Step 3] Review Network Allocation for OC-DB-Cloud-Seg

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



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



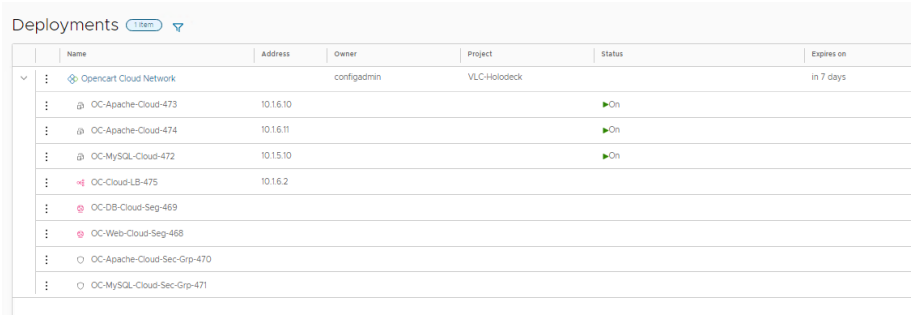
Exercise 8: Review deployed Opencart application

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

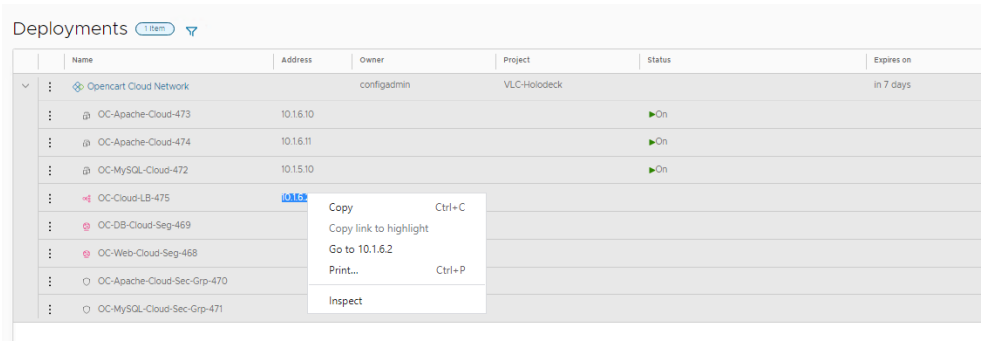
[Step 1] Test web servers

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

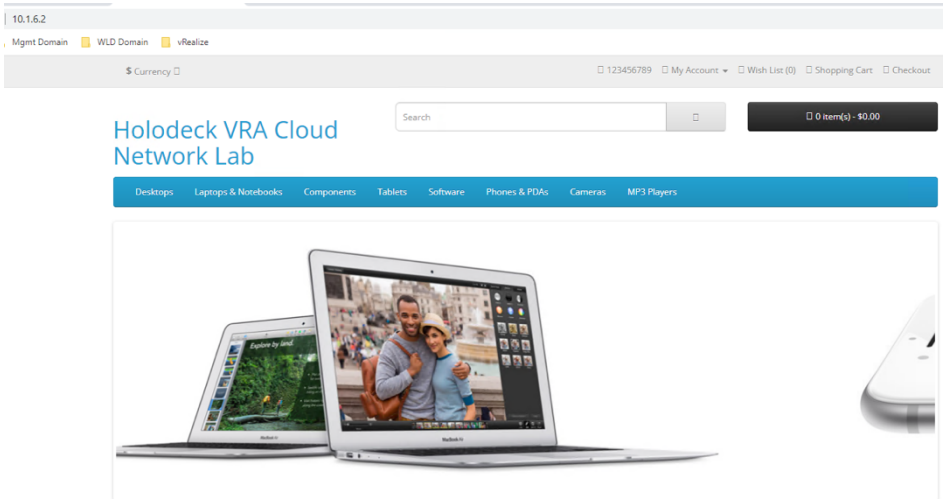
- Two deployed OC-Apache-Cloud-XXX web servers on the 10.1.6.x network, with IP addresses controlled by Cloud Assembly for DHCP on the OC-Web-Cloud-Seg. (Note: The numeric suffix after the resources name is set by Cloud Assembly to keep resource names unique. This naming mechanism was chosen during initial Cloud Assembly setup in this environment).
- An OC-MySQL-Cloud-XXX resource in the 10.1.5.x network
- An NSX Load Balancer on the 10.1.6.x network, with IP address in the range controlled by Cloud Assembly on the OC-Web-Cloud-Seg



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

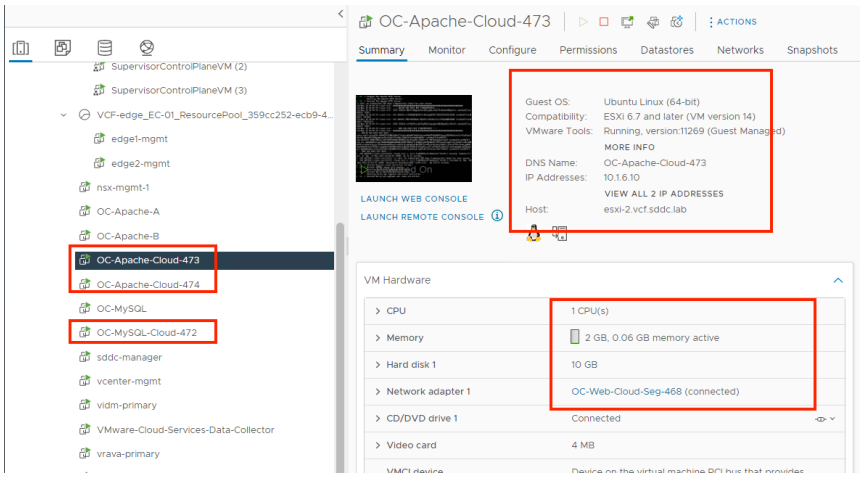


E. You should open a page that looks like this



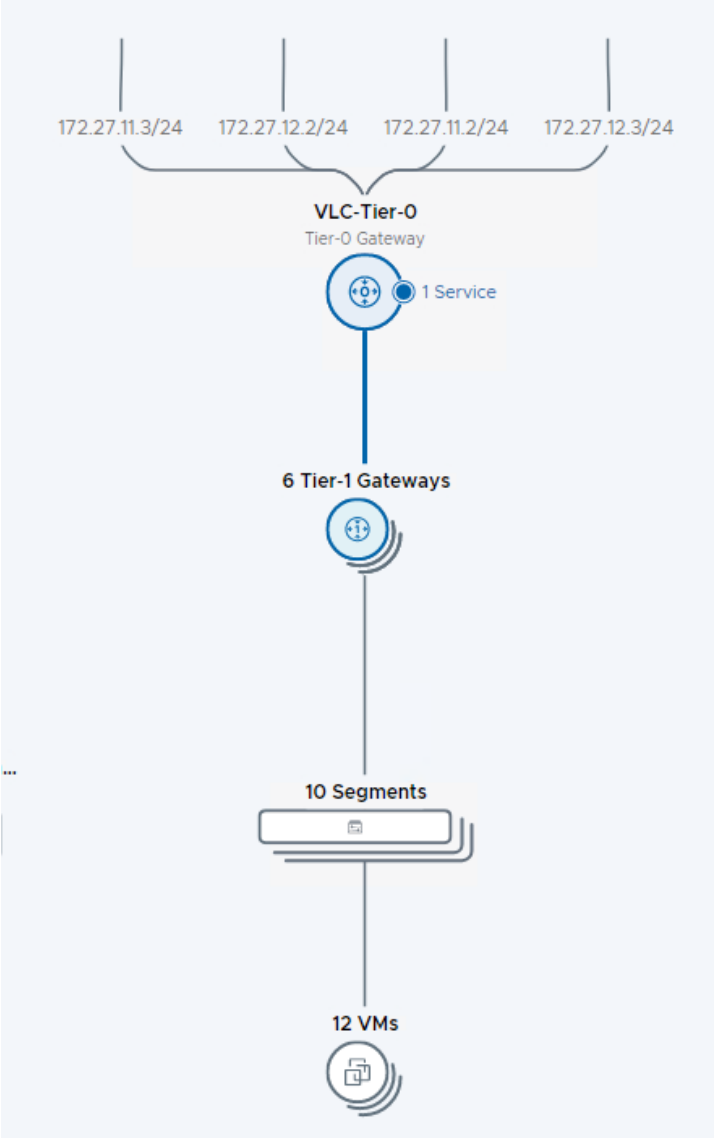
[Step 2] Review in vCenter Server

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-Cloud webservers identified in the Cloud Assembly Deployment Summary. In this example the machines are OC-Apache-Cloud-473 and OC-Apache-Cloud-474
   - Notice:
   - CPU and Memory sizes match “Flavor = Small” from Cloud Assembly Flavor Mapping
   - The VM is connected to OC-Web-Cloud-Seg based on the OC-Web-Cloud-Seg Network Profile selected for this VM. This was selected by the constraint oc-cloud-network:oc-web being matched in the network profile

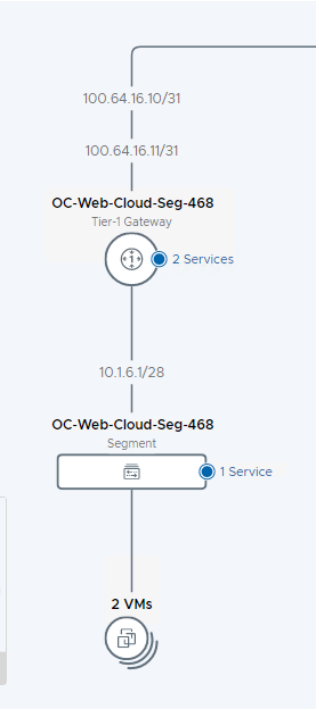


[Step 3] Review in NSX Manager

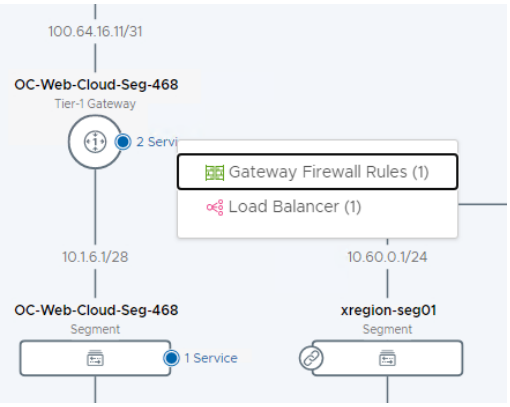
A. Open a new tab in the Chrome browser(If needed)
B. Click the Mgmt Domain folder and Mgmt NSX shortcut in the bookmark bar (click advanced / proceed to nsx-mgmt.vcf.sddc.lab, if required to accept the certificate)
C. Log into NSX Manager as user: **admin** with the password: **VMware123!VMware123!**
D. From the NSX-T Manager interface click the **Networking** tab
E. Select **Network Topology**
F. Click on to expand the Tier-1 gateways



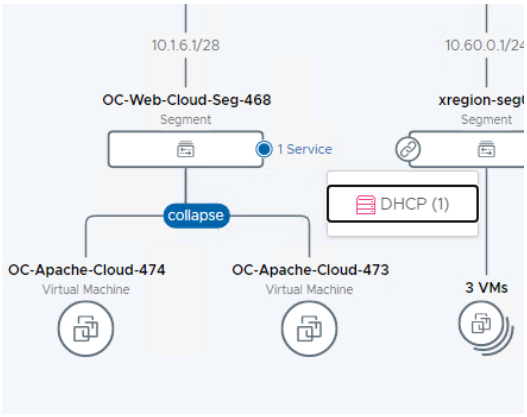
G. You should see the OC-Web-Cloud-Seg-XXX resources on the left. Note that when using a network of type ROUTED, Cloud Assembly dynamically allocates an NSX Tier-1 distributed router per segment created



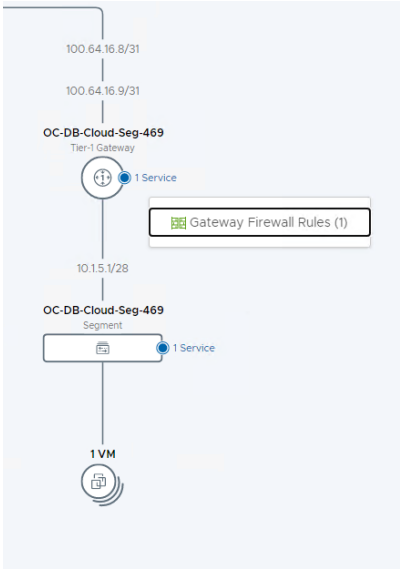
H. Click once on the 2 Services link. Note that Cloud Assembly has created a Load Balancer on this Tier-1



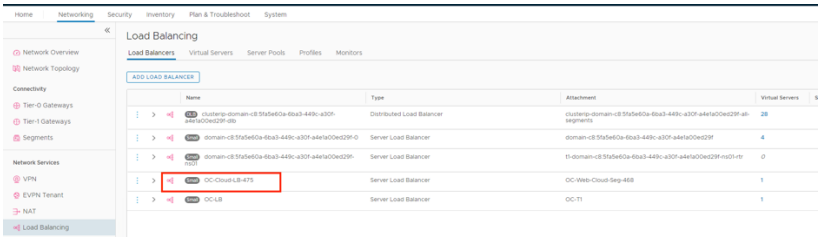
I. Expand the two virtual machines on the segment, and click on the 1 Service on the segment. Notice our two OC-Apache-Cloud-XXX virtual machines, and the DHCP service on the segment. In cases of network type ROUTED, Cloud Assembly takes care of DHCP for virtual machines on the segment (versus NSX in the fixed network case)



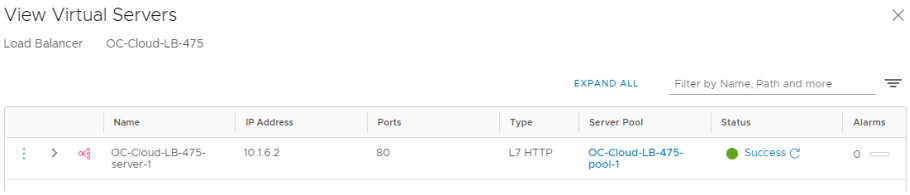
J. Scroll to right of network topology map to find the OC-DB-Cloud-Seg-XXX segment and associated Tier-1 router. Here we only have one service on thr Tier-1 router (default gateway firewall rules) and no load balancer



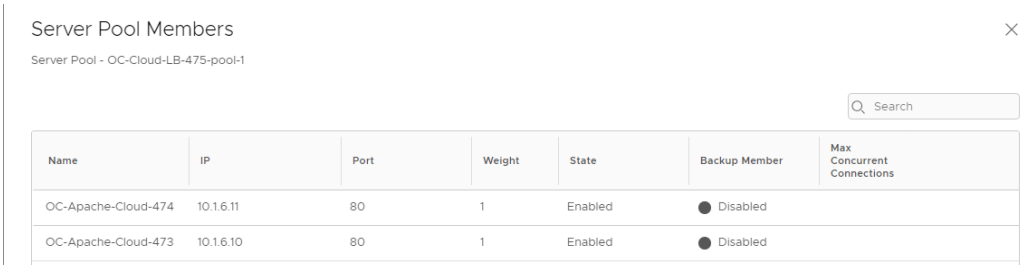
K. Click Networking -> Load Balancing. Notice the on demand OC-Cloud-LB-XXX resource



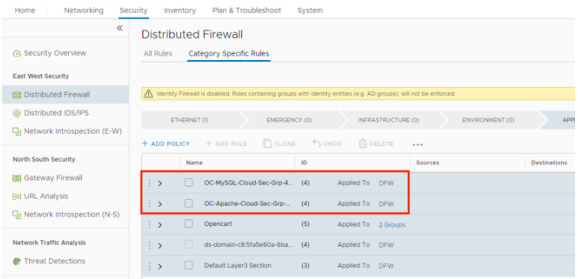
L. Click on the virtual servers link within this load balancer line. Note the Virtual Server IP address created on the 10.1.6.x network under Cloud Assembly control



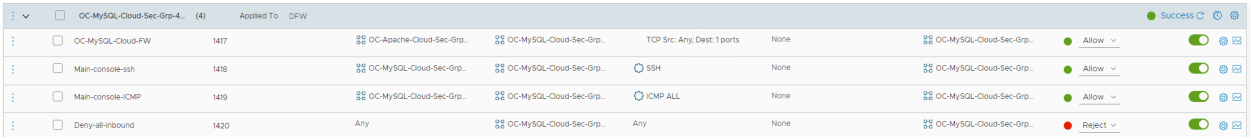
M. Click on the Server Pool link. Notice the dynamically created server pool created by Cloud Assembly



N. Close the server pool view
O. Click Security -> Distributed Firewall. Note the 2 On Demand security policies created by Cloud Assembly



P. Click the > next to the OC-MySQL-Cloud-Sec-Grp
Q. Notice the rules created based on the rules configured on the OC-MySQL-Cloud-Sec-Grp in the cloud template (Cloud template snippet included for reference)



```
OC-MySQL-Cloud-Sec-Grp:
  type: Cloud.SecurityGroup
  properties:
    securityGroupType: new
    rules:
      - name: OC-MySQL-Cloud-FW
        ports: '3306'
        access: Allow
        source: '${resource["OC-Apache-Cloud-Sec-Grp"].id}'
        protocol: TCP
        direction: inbound
      - name: Main-console-ssh
        access: Allow
        source: 10.0.0.220
        service: SSH
        direction: inbound
      - name: Main-console-ICMP
        access: Allow
        source: 10.0.0.220
        service: ICMP-ALL
        direction: inbound
      - name: Deny-all-inbound
        access: Deny
        direction: inbound
```

Exercise 8: Delete deployed Opencart application

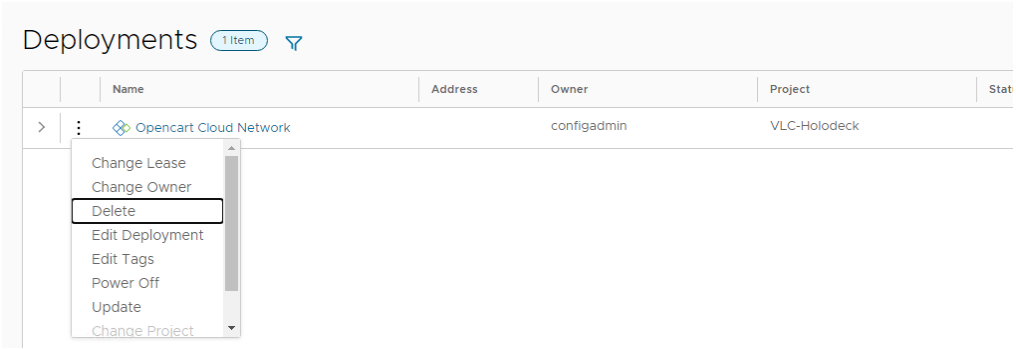
This exercise will delete the components deployed by Cloud Assembly.

[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**

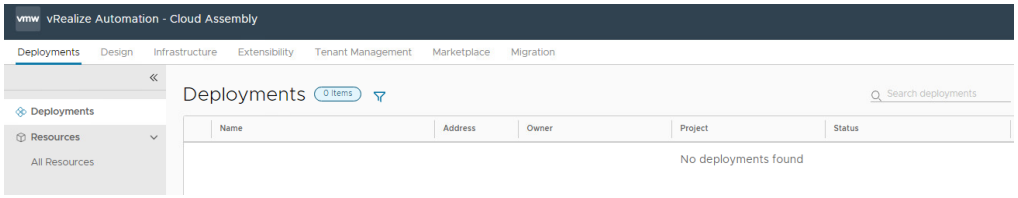
[Step 2] Delete Deployment

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

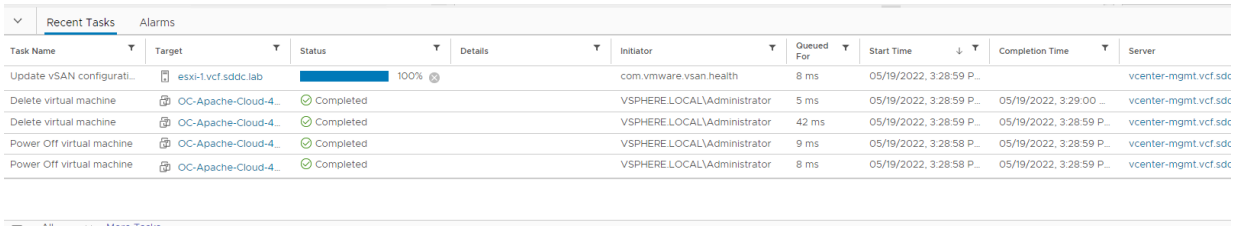


D. Click Submit

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