

**COS80001 – Cloud Engineering**

**Lab 7 Report:** Virtual Cloud Network (VCN) Peering and Compute Instance Deployment in Oracle Cloud Infrastructure (OCI)

**Student Name:** Arun Ragavendhar Arunachalam Palaniyappan

**Student ID:** 104837257

**Tutorial Time:** Friday – 04:30 PM to 06:30 PM

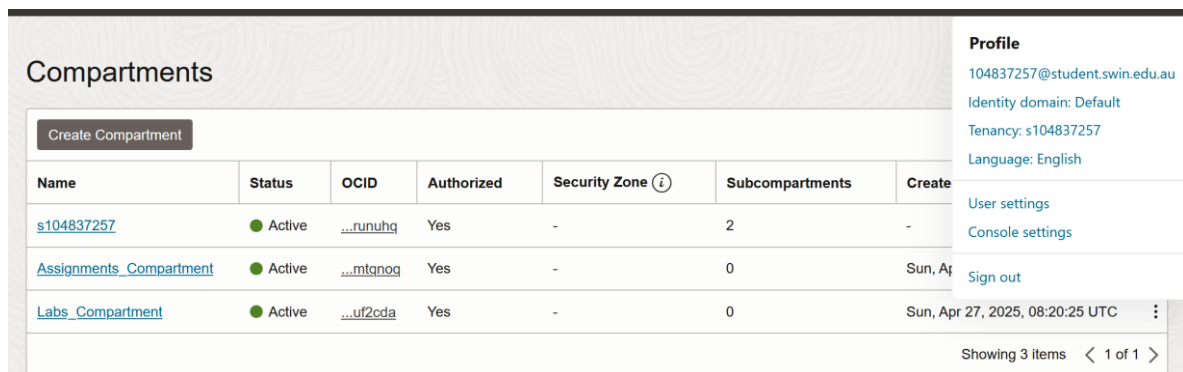
## 1. Introduction

This report documents the implementation of Virtual Cloud Network (VCN) peering and compute instance creation on Oracle Cloud Infrastructure (OCI). The aim of the lab was to create two separate VCNs, configure internet gateways, set up routing and security, deploy compute instances, establish a local peering connection, test the communication between instances using an ICMP ping, and finally delete the created resources and clean up the environment.

### 1.1 Creating Compartments

Two separate compartments were created under the (s104837257) root compartment.

- Assignments\_Compartment – for the upcoming assignments 2 and assignments 3.
- Labs\_Compartment – for the labs 7, 8, 9, 10.



Name	Status	OCID	Authorized	Security Zone ⓘ	Subcompartments	Create
<a href="#">s104837257</a>	Active	...runuhq	Yes	-	2	-
<a href="#">Assignments_Compartment</a>	Active	...mtanog	Yes	-	0	Sun, Apr 27, 2025, 08:20:25 UTC
<a href="#">Labs_Compartment</a>	Active	...uf2cda	Yes	-	0	Sun, Apr 27, 2025, 08:20:25 UTC

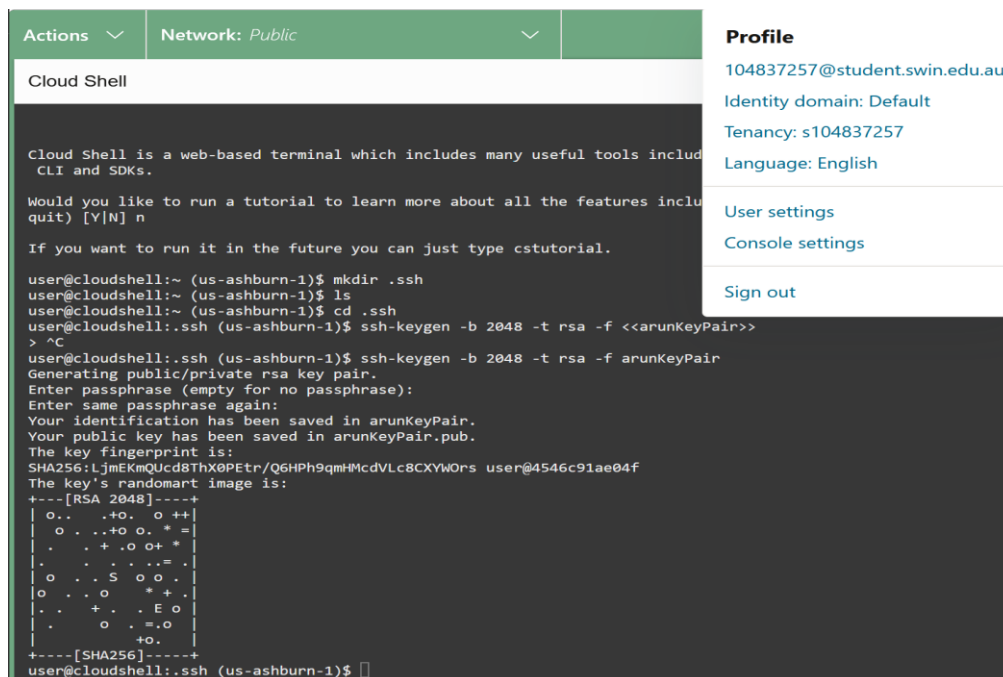
Showing 3 items < 1 of 1 >

**Profile**  
104837257@student.swin.edu.au  
Identity domain: Default  
Tenancy: s104837257  
Language: English  
[User settings](#)  
[Console settings](#)  
[Sign out](#)

Figure 1: Assignments and Labs – Compartments created

## 2. Task 1: Generating SSH Key pair

An SSH key pair was generated using Oracle Cloud Shell. The public key was later used during compute instance setup for secure SSH access.



```
Actions Network: Public Profile
Cloud Shell
Cloud Shell is a web-based terminal which includes many useful tools including CLI and SDKs.
Would you like to run a tutorial to learn more about all the features included (Y/N) n
If you want to run it in the future you can just type cstutorial.
user@cloudshell:~ (us-ashburn-1)$ mkdir .ssh
user@cloudshell:~ (us-ashburn-1)$ ls
user@cloudshell:~ (us-ashburn-1)$ cd .ssh
user@cloudshell:~ (us-ashburn-1)$ ssh-keygen -b 2048 -t rsa -f <arunKeyPair>
> ^C
user@cloudshell:~ (us-ashburn-1)$ ssh-keygen -b 2048 -t rsa -f arunKeyPair
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in arunKeyPair.
Your public key has been saved in arunKeyPair.pub.
The key fingerprint is:
SHA256:LjmEKmQUcd8ThX0PEtr/Q6HPH9qmHMcDVLc8CXYW0rs user@4546c91ae04f
The key's randomart image is:
+---[RSA 2048]---+
| o.. ..+o. o ++ |
| o.. ..+o o. * = |
| . . + .o o+ * |
| . . . . . . . |
| o . . S o o . |
| o . o + + . |
| . . + . E o |
| . o . =.o |
| +o. |
+---[SHA256]-----+
user@cloudshell:~ (us-ashburn-1)$
```

Figure 2: SSH Key Generation

```

user@cloudshell:~$ cat arunKeyPair.pub
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQCAz5kxd3RckTLMQUj/o8wadgeQDI5pyc91E3q+g6UR/An2txjAf0k90I12RtEoDqTPyOJ
dyP+QwnWUnI7e+PI7La+xYsi09oE0338vJmkWzm1I2u5+vVYxd2V/K39Lj6F1+sDK+79AS0KORq3Vpv70KzVpr1tk3ZnV31P0PAv1vGpJR
REq5FrYpc4yegT2fCRjTIupLYB55+KjjY2W0uVZwaJ8687KVws3FSgmLWcuiRFvxSfso3lhnLMAHrgSP1EhHC1XI+MxN3nMM1UL+2Adnso
owt0U9b2+GpLy19iXBm8NCgDRA6odkeOTj50EtXkECD1JzA0xTcbc0wc1FutQ1 user@4546c91ae04f

```

Figure 3: The encrypted SSH key Pair

## 3. Task 2: Configuring Virtual Cloud Network Peering

### 3.1 Creation of Virtual Cloud Networks

Two VCNs were created within the Labs\_Compartment. The first VCN, named "lab7\_vcn\_1", used the IPv4 CIDR block 10.0.0.0/16, while the second VCN, named "Peering\_vcn", used the CIDR block 172.16.0.0/16.

**Virtual Cloud Networks**

Virtual Cloud Networks (VCNs) are private virtual networks you set up in Oracle Cloud Infrastructure. You can attach gateways, route tables, and security rules.

To view service log metrics and additional information about service resources, click [View or manage logs](#).

[Create VCN](#) [Start VCN Wizard](#)

Name	State	IPv4 CIDR Block	IPv6 Prefix	Default Route Table	DNS Domain Name	Created
<a href="#">lab7_vcn_1</a>	Available	10.0.0.0/16	—	<a href="#">Default Route Table for lab7_vcn_1</a>	lab7vcn1.oraclevcn.com	Sun, Apr 27, 2025, 08:42:17 UTC

Showing 1 item < 1 of 1 >

**Profile**  
 104837257@student.swin.edu.au  
 Identity domain: Default  
 Tenancy: s104837257  
 Language: English  
[User settings](#)  
[Console settings](#)  
[Sign out](#)

Figure 4: lab7\_vcn\_1 Creation

**Virtual Cloud Networks**

Virtual Cloud Networks (VCNs) are private virtual networks you set up in Oracle Cloud Infrastructure. You can attach gateways, route tables, and security rules.

To view service log metrics and additional information about service resources, click [View or manage logs](#).

[Create VCN](#) [Start VCN Wizard](#)

Name	State	IPv4 CIDR Block	IPv6 Prefix	Default Route Table	DNS Domain Name	Created
<a href="#">Peering_vcn</a>	Available	172.16.0.0/16	—	<a href="#">Default Route Table for Peering_vcn</a>	peeringvcn.oraclevcn.com	Sun, Apr 27, 2025, 08:44:56 UTC

Showing 1 item < 1 of 1 >

**Profile**  
 104837257@student.swin.edu.au  
 Identity domain: Default  
 Tenancy: s104837257  
 Language: English  
[User settings](#)  
[Console settings](#)  
[Sign out](#)

Figure 5: Peering\_vcn Creation

### 3.2 Internet Gateways and Route Table Configuration

Internet Gateways were created for each VCN. In each VCN's default route table, a new route rule was added to send traffic destined for 0.0.0.0/0 through its respective Internet Gateway, allowing outbound Internet access.

**Internet Gateways**

Internet Gateways are virtual gateways that connect your VCN to the Internet. You can attach a route table to an Internet Gateway, and you can attach a security rule to an Internet Gateway.

[Create Internet Gateway](#)

Name	State	Route Table	Created
<a href="#">vcn_1_Internet_gateway</a>	Available	lab7_vcn_1	Sun, Apr 27, 2025, 08:44:56 UTC

Showing 1 item < 1 of 1 >

**Profile**  
 104837257@student.swin.edu.au  
 Identity domain: Default  
 Tenancy: s104837257  
 Language: English  
[User settings](#)  
[Console settings](#)  
[Sign out](#)

Figure 6: Internet Gateway created for lab7\_vcn\_1

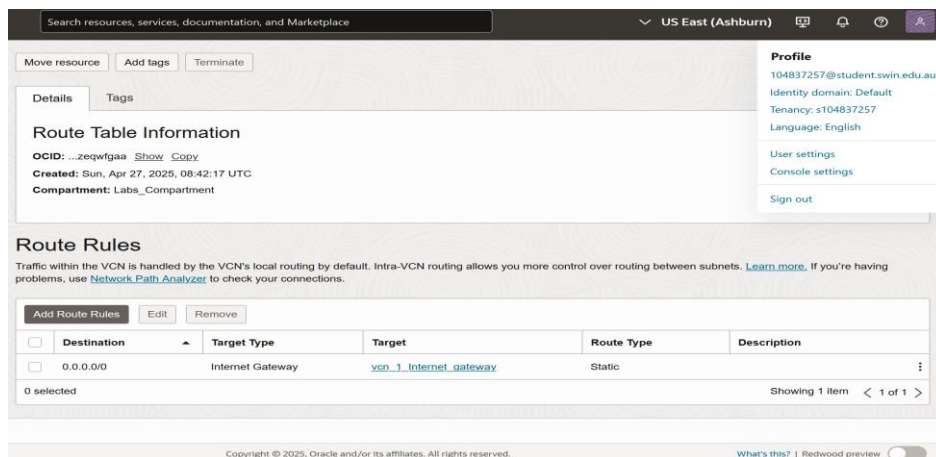


Figure 7: Route to internet gateway added in route table of lab7\_vcn\_1

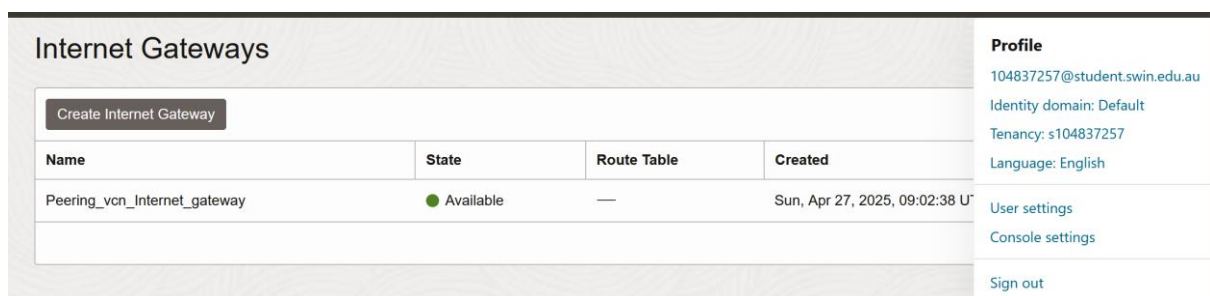


Figure 8: Internet Gateway created for Peering\_vcn

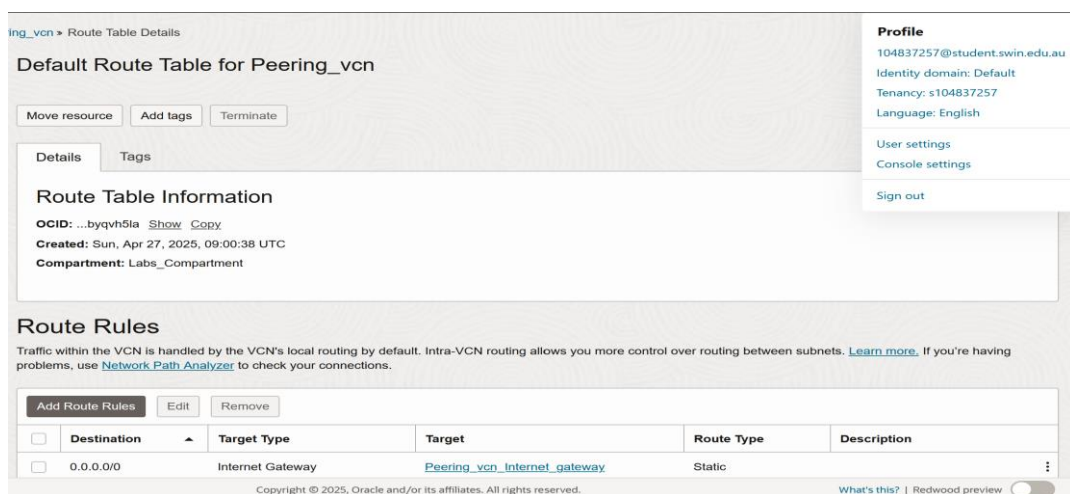


Figure 9: Route to internet gateway added in route table of Peering\_vcn

### 3.3 Subnet Creation

Each VCN was configured with one public regional subnet:

- lab7\_vcn\_1: Subnet CIDR block 10.0.0.0/24
- Peering\_vcn: Subnet CIDR block 172.16.0.0/24

Both subnets were associated with their VCN's default route table and default security list.

## Subnets

Create Subnet

Name	State	IPv4 CIDR Block	IPv6 Prefixes	Subnet Access	Created
<a href="#">subnet_01_vcn_1</a>	<div><div></div> Available</div>	10.0.0.0/24	—	Public (Regional)	Sun, Apr 27, 2020

Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

User settings

Console settings

Sign out

Figure 10: Subnet Creation for lab7\_vcn\_1

# Subnets

Create Subnet

Name	State	IPv4 CIDR Block	IPv6 Prefixes	Subnet Access	Created
<a href="#">subnet_01_Peering_vcn</a>	<div><div></div> Provisioning</div>	172.16.0.0/24	—	Public (Regional)	Sun, Apr 27, 2020

**Profile**

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

User settings

Console settings

Figure 11: Subnet Creation for Peering\_vcn

### 3.4 Local Peering Gateways

Local Peering Gateways (LPGs) were created for both VCNs. "lpg\_01\_vcn\_01" was associated with vcn\_1, and "lpg\_01\_Peering\_vcn" with Peering\_vcn. These gateways were required to enable private IP communication between the two compute instances located one each in the two VCNs.

# Local Peering Gateways

Create Local Peering Gateway

Name	State	Peering Status	Route Table	Peer Advertised CIDRs	Cross-Tenancy	Created
lpg_01_vcn_01	<div>● Available</div>	New - Not connected to a peer.	—	—	No	Sun, 10/10/2020 10:10:10 AM

Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

User settings

Console settings

Sign out

Figure 12: Local peering gateway created for lab7\_vcn\_1

Local Peering Gateways

Create Local Peering Gateway

Name	State	Peering Status	Route Table	Peer Advertised CIDRs	Cross-Tenancy	Created
lpg_01_Peering_vcn	<div>● Available</div>	New - Not connected to a peer.	—	—	No	Sun 10:48 AM UTC

Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

[User settings](#)

[Console settings](#)

Figure 13: Local peering gateway created for Peering\_vcn

## 4. Task 3: Creating Compute Instances and Configuring Routing

### 4.1 Compute Instance Deployment

Two compute instances were launched:

- instance01 in lab7\_vcn\_1
- instance02 in Peering\_vcn

Each instance used the latest Oracle Linux image, was assigned a public and private IP address, and SSH access was enabled using the generated public key. Network Security Groups were not used; only the default security lists controlled traffic.

### Instances in Labs\_Compartment compartment

An [instance](#) is a compute host. Choose between virtual machines (VMs) and bare metal instances. The image that you use to launch an instance determines the operating system and other software.

Create instance

Actions

<input type="checkbox"/>	Name	State	Public IP	Private IP	Shape	OCPU count	Memory (GB)
<input type="checkbox"/>	<a href="#">instance01</a>	Always Free	Running	129.213.53.195	10.0.0.203	VM.Standard.E2.1.Micro	1

#### Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

---

[User settings](#)

[Console settings](#)

Figure 14: instance01 creation

### Instances in Labs\_Compartment compartment

An [instance](#) is a compute host. Choose between virtual machines (VMs) and bare metal instances. The image that you use to launch an instance determines the operating system and other software.

Create instance

Actions

<input type="checkbox"/>	Name	State	Public IP	Private IP	Shape	OCPU count	Memory (GB)
<input type="checkbox"/>	<a href="#">instance02</a>	Always Free	Running	129.213.52.47	172.16.0.127	VM.Standard.E2.1.Micro	1

#### Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

---

[User settings](#)

[Console settings](#)

[Sign out](#)

Figure 15: instance02 creation

## 4.2 Establishing Peering Connection

The LPG in vcn\_1 (lpg\_01\_vcn\_01) was connected to the LPG in Peering\_vcn (lpg\_01\_Peering\_vcn) through an Establish Peering Connection operation. The peering status was verified to show "Peered".

### Local Peering Gateways

Create Local Peering Gateway

Name	State	Peering Status	Route Table	Peer Advertised CIDRs	Cross-Tenancy	Created
lpg_01_vcn_01	Available	Peered - Connected to a peer.	—	172.16.0.0/16	No	Sun, 10/1/2023 10:10:10 AM

#### Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

---

[User settings](#)

[Console settings](#)

[Sign out](#)

Figure 16: Peered status verified from lpg\_01\_vcn\_01

### Local Peering Gateways

Create Local Peering Gateway

Name	State	Peering Status	Route Table	Peer Advertised CIDRs	Cross-Tenancy	Created
lpg_01_Peering_vcn	Available	Peered - Connected to a peer.	—	10.0.0.0/16	No	Sun, 10/1/2023 10:10:10 AM

#### Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

---

[User settings](#)

[Console settings](#)

[Sign out](#)

Figure 17: Peered status verified from lpg\_01\_Peering\_vcn



### 4.3 Route Table and Security List Configuration

In lab7\_vcn\_1, a new route rule was added to send traffic to 172.16.0.0/24 via lpg\_01\_vcn\_01. Similarly, Peering\_vcn's route table was updated to send traffic to 10.0.0.0/24 via lpg\_01\_Peering\_vcn.

Security list ingress rules were updated in both VCNs:

- lab7\_vcn\_1 allowed ICMP traffic from 172.16.0.0/24
- Peering\_vcn allowed ICMP traffic from 10.0.0.0/24

Move resourceAdd tagsTerminate

DetailsTags

Route Table Information

OCID: ...zeqwfgea Show Copy

Created: Sun, Apr 27, 2025, 08:42:17 UTC

Compartment: Labs\_Compartment

Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

User settings

Console settings

Sign out

Route Rules

Traffic within the VCN is handled by the VCN's local routing by default. Intra-VCN routing allows you more control over routing between subnets. [Learn more](#). If you're having problems, use [Network Path Analyzer](#) to check your connections.

Add Route RulesEditRemove

<input type="checkbox"/>	Destination	Target Type	Target	Route Type	Description
<input type="checkbox"/>	0.0.0.0/0	Internet Gateway	<a href="#">vcn_1_Internet_gateway</a>	Static	⋮
<input type="checkbox"/>	172.16.0.0/24	Local Peering Gateway	<a href="#">lpg_01_vcn_01</a>	Static	⋮

0 selected

Showing 2 items < 1 of 1 >

Figure 18: Route rule added in lab7\_vcn\_1

Search resources, services, documentation, and Marketplace

US East (Ashburn)

Ingress Rules

Add Ingress RulesEditRemove

<input type="checkbox"/>	Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allow
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	22		TCP for p SSH Rem Logir Prot
<input type="checkbox"/>	No	0.0.0.0/0	ICMP			3, 4	ICMP traffic for: 3, 4 Destination Unreachable : Fragmentati on Needed and Don't Fragment was Set
<input type="checkbox"/>	No	10.0.0.0/16	ICMP			3	ICMP traffic for: 3 Destination Unreachable
<input type="checkbox"/>	No	172.16.0.0/24	ICMP			All	ICMP traffic for: All

Profile

104837257@student.swin.edu.au

Identity domain: Default

Tenancy: s104837257

Language: English

User settings

Console settings

Sign out

Figure 19: Ingress rule in lab7\_vcn\_1 to let in ICMP requests from Peering\_vcn

The screenshot shows the Oracle Cloud console interface. At the top, there's a search bar and a navigation menu. The main content area is titled "Route Table Information". It displays the OCID as "...byqvh5la", the creation time as "Sun, Apr 27, 2025, 09:00:38 UTC", and the compartment as "Labs\_Compartment". Below this, the "Route Rules" section is visible, showing a table with two rules. The first rule has a destination of "0.0.0.0/0", target type of "Internet Gateway", and target of "Peering\_vcn\_Internet\_gateway". The second rule has a destination of "10.0.0.0/24", target type of "Local Peering Gateway", and target of "lpg\_01\_Peering\_vcn". Both rules are static. A profile sidebar on the right shows the user's email as "104837257@student.swin.edu.au" and provides links for user settings, console settings, and sign out.

**Route Table Information**

OCID: ...byqvh5la [Show](#) [Copy](#)

Created: Sun, Apr 27, 2025, 09:00:38 UTC

Compartment: Labs\_Compartment

**Route Rules**

Traffic within the VCN is handled by the VCN's local routing by default. Intra-VCN routing allows you more control over routing between subnets. [Learn more](#). If you're having problems, use [Network Path Analyzer](#) to check your connections.

<input type="checkbox"/>	Destination	Target Type	Target	Route Type	Description
<input type="checkbox"/>	0.0.0.0/0	Internet Gateway	<a href="#">Peering_vcn_Internet_gateway</a>	Static	
<input type="checkbox"/>	10.0.0.0/24	Local Peering Gateway	<a href="#">lpg_01_Peering_vcn</a>	Static	

0 selected Showing 2 items < 1 of 1 >

Figure 20: Route rule added in Peering\_vcn

The screenshot shows the Oracle Cloud console interface for "Ingress Rules". It displays a table with four rules. The first rule is for TCP traffic on port 22 from source "0.0.0.0/0". The second rule is for ICMP traffic with code "3, 4" from source "0.0.0.0/0". The third rule is for ICMP traffic with code "3" from source "172.16.0.0/16". The fourth rule is for ICMP traffic with code "All" from source "10.0.0.0/24". All rules are set to "No" for stateless. A profile sidebar on the right shows the user's email as "104837257@student.swin.edu.au" and provides links for user settings, console settings, and sign out.

**Ingress Rules**

<input type="checkbox"/>	Stateless	Source	IP Protocol	Source Port Range	Destination Port Range	Type and Code	Allow
<input type="checkbox"/>	No	0.0.0.0/0	TCP	All	22		TCP for p... SSH Rem Logir Prot
<input type="checkbox"/>	No	0.0.0.0/0	ICMP			3, 4	ICMP traffic for: 3, 4 Destination Unreachable : Fragmentati on Needed and Don't Fragment was Set
<input type="checkbox"/>	No	172.16.0.0/16	ICMP			3	ICMP traffic for: 3 Destination Unreachable
<input type="checkbox"/>	No	10.0.0.0/24	ICMP			All	ICMP traffic for: All

0 selected Showing 4 items < 1 of 1 >

Figure 21: Ingress rule in Peering\_vcn to let in ICMP requests from lab7\_vcn\_1

## 5. Task 4: SSH to Compute Instance and Test VCN Peering

Using Oracle Cloud Shell, an SSH connection was established to instance01 using the following command:

```
ssh -i arunKeyPair opc@129.213.53.195
```

Upon successful login, a ping command was issued from instance01 using the private IP of instance02.

```
ping 172.16.0.127
```

The ping was successful, verifying that the peering connection was functional, and the routing and security configurations were correct.



Instances in Labs_Compartment compartment								Profile	
An <a href="#">instance</a> is a compute host. Choose between virtual machines (VMs) and bare metal instances. The image that you use to launch an instance determines the operating system and other software.								104837257@student.swin.edu.au	
								Identity domain: Default	
								Tenancy: s104837257	
								Language: English	
								User settings	
								Console settings	
								Sign out	
								AD-3	
2 selected								Showing 2 items < 1 of 1 >	

Figure 22: Public and Private IP addresses of instance1 and instance2

```
user@cloudshell:~ (us-ashburn-1)$ cd .ssh
user@cloudshell:~ (us-ashburn-1)$ ls
arunKeyPair  arunKeyPair.pub
user@cloudshell:~ (us-ashburn-1)$ ssh -i arunKeyPair opc@129.213.53.195
The authenticity of host '129.213.53.195 (129.213.53.195)' can't be established.
ECDSA key fingerprint is SHA256:d+NYAyOVWF+NtqDoXlZS0HfgcN/xDNX8Ln6/5BdCTx8.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '129.213.53.195' (ECDSA) to the list of known hosts.
Activate the web console with: systemctl enable --now cockpit.socket

[opc@instance01 ~]$
```

Figure 23: SSH login to instance1 using its Public IP address using the key pair for authentication

```
[opc@instance01 ~]$ ping 172.16.0.127
PING 172.16.0.127 (172.16.0.127) 56(84) bytes of data.
64 bytes from 172.16.0.127: icmp_seq=1 ttl=64 time=13.8 ms
64 bytes from 172.16.0.127: icmp_seq=2 ttl=64 time=10.6 ms
64 bytes from 172.16.0.127: icmp_seq=3 ttl=64 time=17.5 ms
64 bytes from 172.16.0.127: icmp_seq=4 ttl=64 time=7.42 ms
64 bytes from 172.16.0.127: icmp_seq=5 ttl=64 time=0.767 ms
64 bytes from 172.16.0.127: icmp_seq=6 ttl=64 time=62.7 ms
64 bytes from 172.16.0.127: icmp_seq=7 ttl=64 time=0.436 ms
64 bytes from 172.16.0.127: icmp_seq=8 ttl=64 time=15.1 ms
64 bytes from 172.16.0.127: icmp_seq=9 ttl=64 time=15.9 ms
64 bytes from 172.16.0.127: icmp_seq=10 ttl=64 time=12.3 ms
^C
--- 172.16.0.127 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 9100ms
rtt min/avg/max/mdev = 0.436/15.655/62.694/16.666 ms
[opc@instance01 ~]$
```

Figure 24: ICMP ping from instance1 to instance 2 using the private Ip address of instance2

## 6. Task 5: Deleting and Terminating Resources

After verification, both compute instances were terminated along with their associated boot volumes. Both VCNs were deleted to clean up all cloud resources, following best practices to avoid unnecessary costs and clutter.

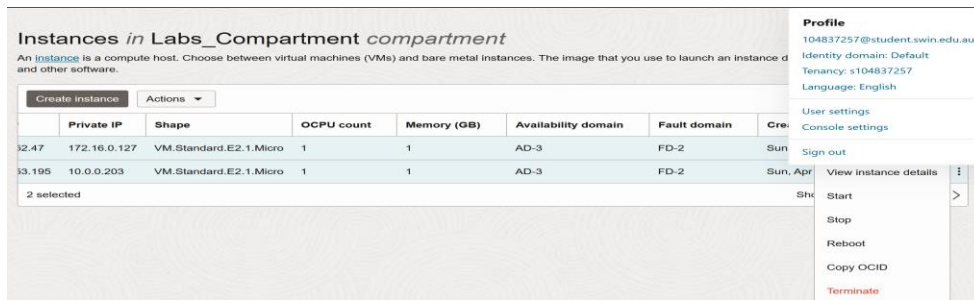


Figure 25: selecting both instances and opening the action button to access the Terminate option

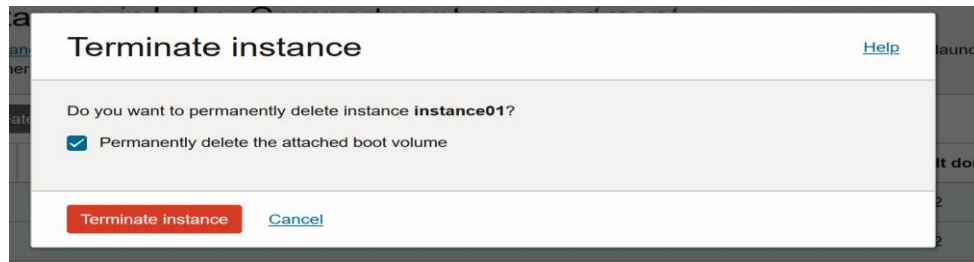


Figure 26: Terminating the Compute instances

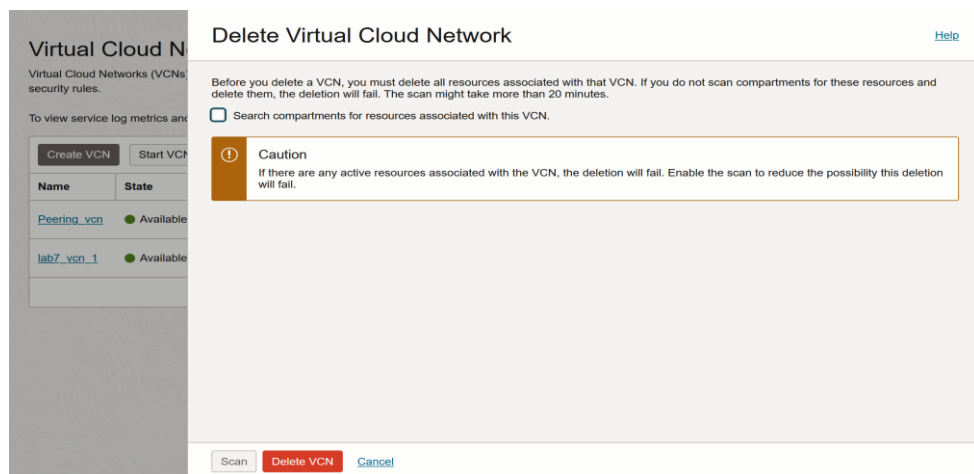


Figure 27: Deleting both the VCNs which were created

## 7. Conclusion

This lab showed how to create two Virtual Cloud Networks (VCNs) in Oracle Cloud, connect them using local peering, set up routing and security, and check if the instances could talk to each other privately using ICMP ping. It helped in understanding basic cloud networking concepts like how VCNs, subnets, routes, gateways, and security settings work together in the Oracle cloud environment.

## 8. References

- [1] Oracle Cloud Infrastructure Documentation. "Virtual Cloud Networks (VCNs)." [Online]. Available: <https://docs.oracle.com/en-us/iaas/Content/Network/Concepts/overview.htm>
- [2] Oracle Cloud Infrastructure Documentation. "Local VCN Peering." [Online]. Available: <https://docs.oracle.com/en-us/iaas/Content/Network/Tasks/localVCNpeering.htm>