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Perform a netstat -rn to find the default router's IP address 3

Ping the default router and use arp to find its hardware address 4

Which hardware manufacturer does the destination hardware address of the packet indicate? (REQUEST) REALTEK 4

Which hardware manufacturer does the destination hardware address of the packet indicate? (RESPONSE) PcsCompu_f8 5

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01.2: ARP, Wireshark, Netsim

ARP #1

Use the IP command to find the IP address and hardware address of the local virtual ethernet card interface.

```
ashfaq@ashfaq-VirtualBox:~$ ifconfig -a
docker0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        inet 172.17.0.1  netmask 255.255.0.0  broadcast 172.17.255.255
        ether 02:42:2c:6d:60:d0  txqueuelen 0  (Ethernet)
        RX packets 0  bytes 0 (0.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

enp0s3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::1d25:6172:6704:88b6  prefixlen 64  scopeid 0x20<link>
        ether 08:00:27:f8:ab:4e  txqueuelen 1000  (Ethernet)
        RX packets 27883  bytes 41384325 (41.3 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 13767  bytes 885178 (885.1 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 381  bytes 33511 (33.5 KB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 381  bytes 33511 (33.5 KB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

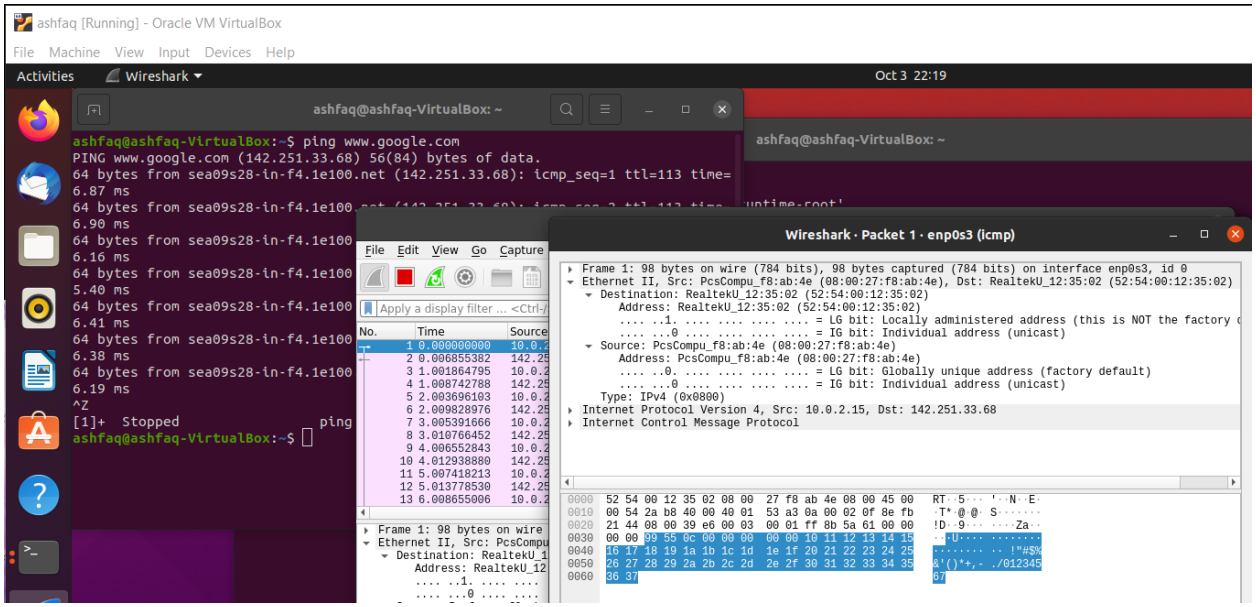
Perform a `netstat -rn` to find the default router's IP address

```
ashfaq@ashfaq-VirtualBox:~$ netstat -rn
Kernel IP routing table
Destination     Gateway         Genmask         Flags   MSS Window  irtt Iface
0.0.0.0         10.0.2.2        0.0.0.0         UG        0 0          0 enp0s3
10.0.2.0        0.0.0.0         255.255.255.0   U         0 0          0 enp0s3
169.254.0.0     0.0.0.0         255.255.0.0     U         0 0          0 enp0s3
172.17.0.0      0.0.0.0         255.255.0.0     U         0 0          0 docker0
ashfaq@ashfaq-VirtualBox:~$ ip route
default via 10.0.2.2 dev enp0s3 proto dhcp metric 100
10.0.2.0/24 dev enp0s3 proto kernel scope link src 10.0.2.15 metric 100
169.254.0.0/16 dev enp0s3 scope link metric 1000
172.17.0.0/16 dev docker0 proto kernel scope link src 172.17.0.1 linkdown
ashfaq@ashfaq-VirtualBox:~$
```

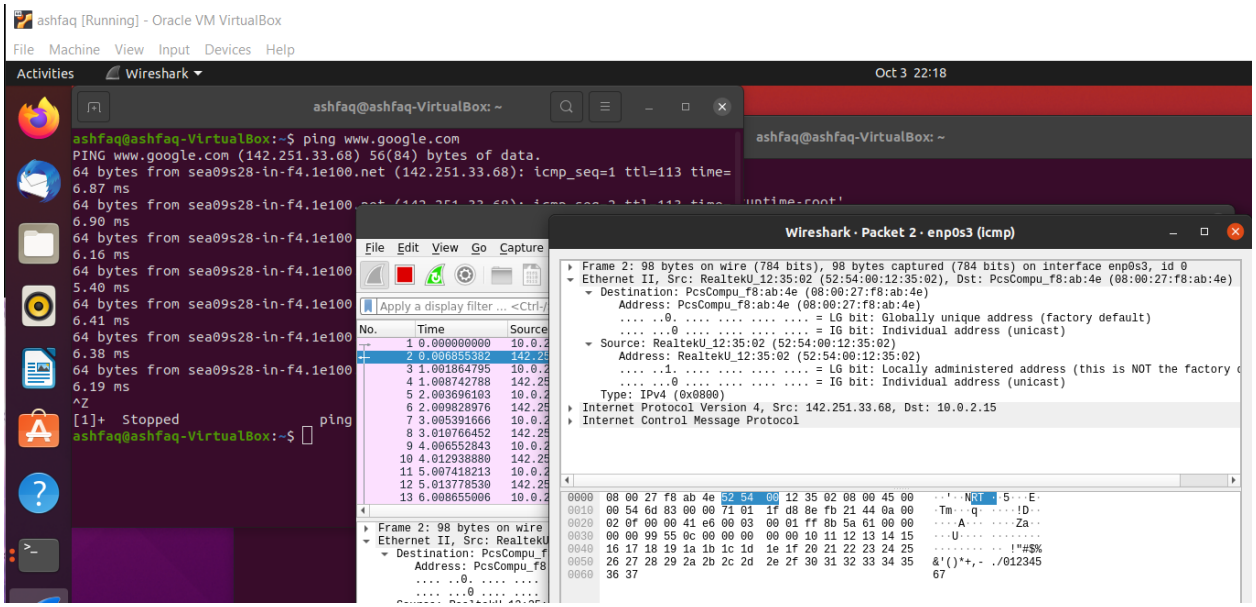
Ping the default router and use arp to find its hardware address.

```
64 bytes from 10.0.2.2: icmp_seq=84 ttl=64 time=0.094 ms
64 bytes from 10.0.2.2: icmp_seq=85 ttl=64 time=0.096 ms
64 bytes from 10.0.2.2: icmp_seq=86 ttl=64 time=0.100 ms
64 bytes from 10.0.2.2: icmp_seq=87 ttl=64 time=0.097 ms
64 bytes from 10.0.2.2: icmp_seq=88 ttl=64 time=0.120 ms
64 bytes from 10.0.2.2: icmp_seq=89 ttl=64 time=0.130 ms
64 bytes from 10.0.2.2: icmp_seq=90 ttl=64 time=0.113 ms
^Z
[2]+  Stopped                 ping 10.0.2.2
ashfaq@ashfaq-VirtualBox:~$ arp -a
_gateway (10.0.2.2) at 52:54:00:12:35:02 [ether] on enp0s3
ashfaq@ashfaq-VirtualBox:~$
```

Which hardware manufacturer does the destination hardware address of the packet indicate? (REQUEST) REALTEK

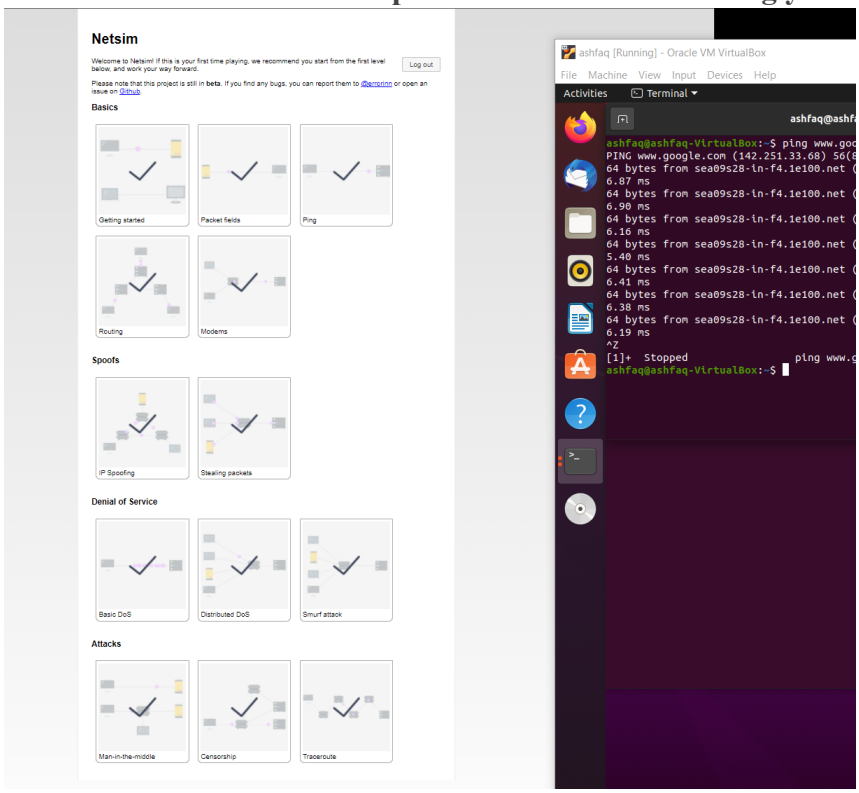


Which hardware manufacturer does the destination hardware address of the packet indicate? (RESPONSE) PcsCompu_f8



Netsim #2

Take a screenshot of the completed list of levels including your OdinID

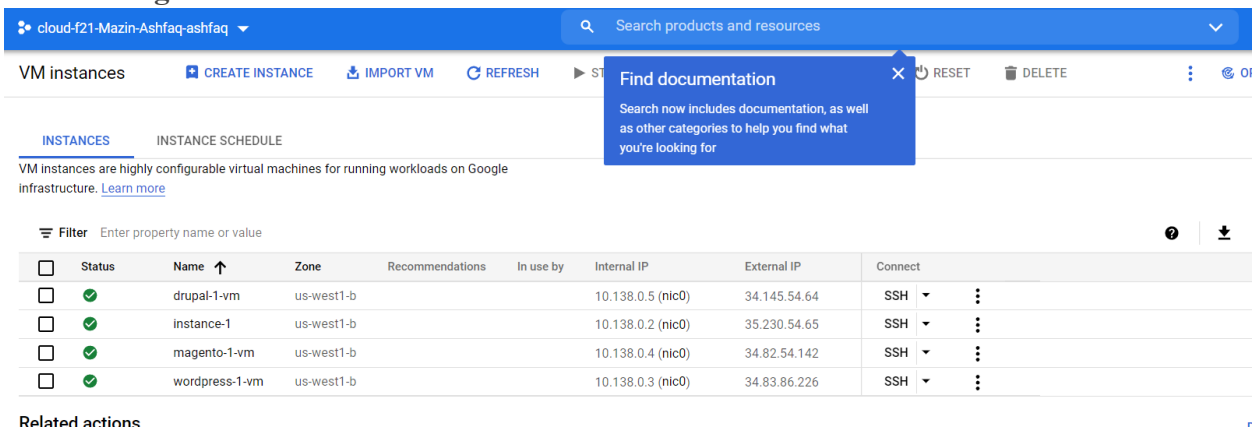


01.3: Cloud networking

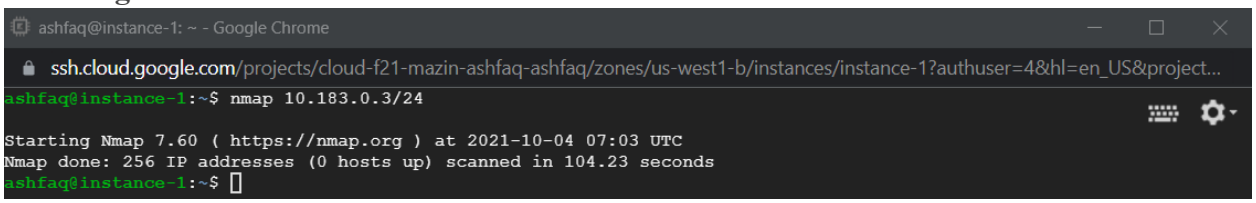
Launch a Compute Engine using the f1-micro machine type and place it in us-west1-b

```
Get:2 http://us-west1.gce.archive.ubuntu.com/ubuntu bionic/main amd64
Get:3 http://us-west1.gce.archive.ubuntu.com/ubuntu bionic-updates/mai
4.1 [115 kB]
Get:4 http://us-west1.gce.archive.ubuntu.com/ubuntu bionic/main amd64
Fetched 5467 kB in 0s (29.0 MB/s)
Selecting previously unselected package libblas3:amd64.
(Reading database ... 65612 files and directories currently installed.
Preparing to unpack .../libblas3_3.7.1-4ubuntu1_amd64.deb ...
Unpacking libblas3:amd64 (3.7.1-4ubuntu1) ...
Selecting previously unselected package liblinear3:amd64.
Preparing to unpack .../liblinear3_2.1.0+dfsg-2_amd64.deb ...
Unpacking liblinear3:amd64 (2.1.0+dfsg-2) ...
Selecting previously unselected package liblua5.3-0:amd64.
Preparing to unpack .../liblua5.3-0_5.3.3-1ubuntu0.18.04.1_amd64.deb .
Unpacking liblua5.3-0:amd64 (5.3.3-1ubuntu0.18.04.1) ...
Selecting previously unselected package nmap.
Preparing to unpack .../nmap_7.60-1ubuntu5_amd64.deb ...
Unpacking nmap (7.60-1ubuntu5) ...
Setting up libblas3:amd64 (3.7.1-4ubuntu1) ...
update-alternatives: using /usr/lib/x86_64-linux-gnu/blas/libblas.so.3
.so.3 (libblas.so.3-x86_64-linux-gnu) in auto mode
Setting up liblinear3:amd64 (2.1.0+dfsg-2) ...
Setting up liblua5.3-0:amd64 (5.3.3-1ubuntu0.18.04.1) ...
Setting up nmap (7.60-1ubuntu5) ...
Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.4) ...
ashfaq@instance-1:~$
```

Launch targets



Scan targets for services



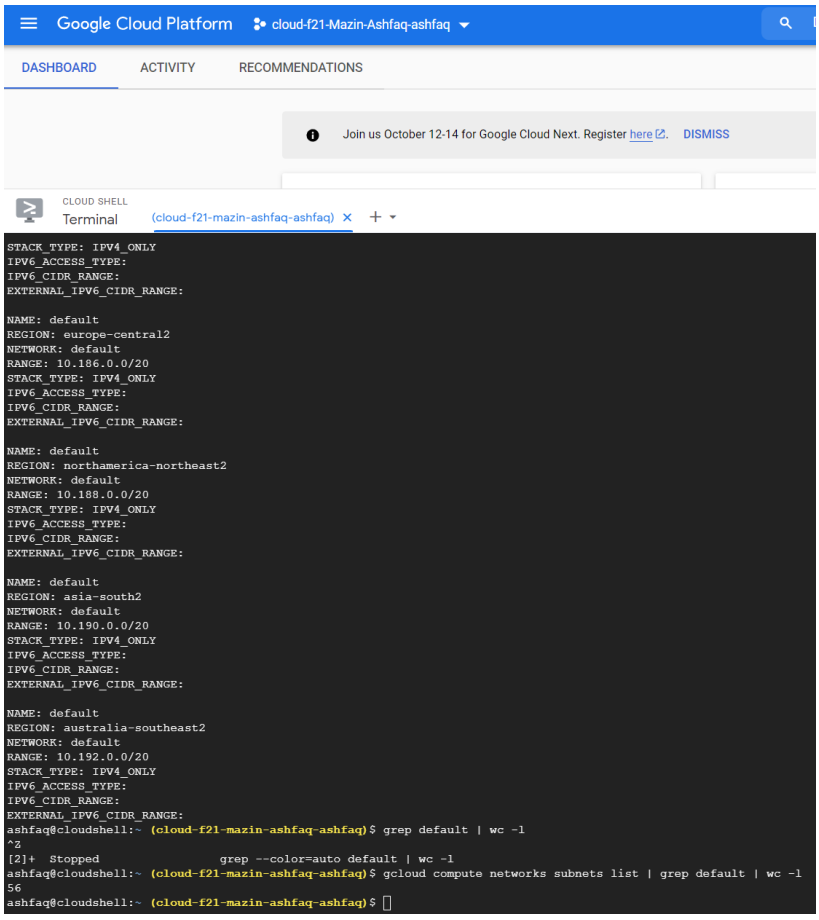
CIDR and subnets #2

How many subnetworks are created initially on the default network?

56

Given the CIDR prefix associated with each subnetwork, how many hosts does each subnetwork support?

/20 Hosts = $2^{32-20} - 2 = 4{,}094$



Navigating default networks

Which CIDR subnetworks are these instances brought up in? Do they correspond to the appropriate region based on the prior commands?

10.150.0.2 for the east and 10.182.0.2 for the west. They correspond to the previous command.

From the figure in the previous step. What facilitates this connectivity: the virtual switch or the VPN Gateway?

The virtual switch facilitates.

```
ashfaq@instance-1:~$ ping 10.182.0.2
PING 10.182.0.2 (10.182.0.2) 56(84) bytes of data.
```

Take a screenshot of the new subnets created in custom-network1 alongside the default subnetworks in those regions assigned to the default network.

```
ashfaq@cloudshell:~ (cloud-f21-mazin-ashfaq-ashfaq)$ gcloud compute networks subnets list
NAME: default
REGION: us-central1
NETWORK: default
RANGE: 10.128.0.0/20
STACK_TYPE: IPV4_ONLY
IPV6_ACCESS_TYPE:
IPV6_CIDR_RANGE:
EXTERNAL_IPV6_CIDR_RANGE:

NAME: subnet-us-central-192
REGION: us-central1
NETWORK: custom-network1
RANGE: 192.168.1.0/24
STACK_TYPE: IPV4_ONLY
IPV6_ACCESS_TYPE:
IPV6_CIDR_RANGE:
EXTERNAL_IPV6_CIDR_RANGE:

NAME: default
REGION: europe-west1
NETWORK: default
RANGE: 10.132.0.0/20
STACK_TYPE: IPV4_ONLY
IPV6_ACCESS_TYPE:
IPV6_CIDR_RANGE:
EXTERNAL_IPV6_CIDR_RANGE:

NAME: subnet-europe-west-192
REGION: europe-west1
NETWORK: custom-network1
RANGE: 192.168.5.0/24
STACK_TYPE: IPV4_ONLY
IPV6_ACCESS_TYPE:
IPV6_CIDR_RANGE:
EXTERNAL_IPV6_CIDR_RANGE:
```

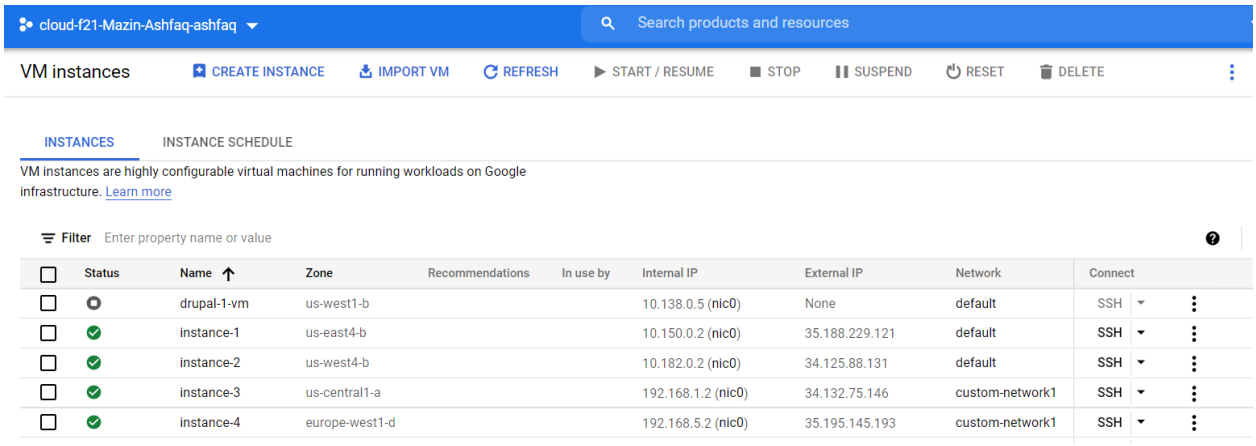
Creating custom networks

```
ashfaq@cloudshell:~ (cloud-f21-mazin-ashfaq-ashfaq)$ gcloud compute networks create custom-network1 --subnet-mode custom
Created [https://www.googleapis.com/compute/v1/projects/cloud-f21-mazin-ashfaq-ashfaq/global/networks/custom-network1].
NAME: custom-network1
SUBNET_MODE: CUSTOM
BGP_ROUTING_MODE: REGIONAL
IPV4_RANGE:
GATEWAY_IPV4:

Instances on this network will not be reachable until firewall rules
are created. As an example, you can allow all internal traffic between
instances as well as SSH, RDP, and ICMP by running:

$ gcloud compute firewall-rules create <FIREWALL_NAME> --network custom-network1 --allow tcp,udp,icmp --source-ranges <IP_RANGE>
$ gcloud compute firewall-rules create <FIREWALL_NAME> --network custom-network1 --allow tcp:22,tcp:3389,icmp

ashfaq@cloudshell:~ (cloud-f21-mazin-ashfaq-ashfaq)$
```

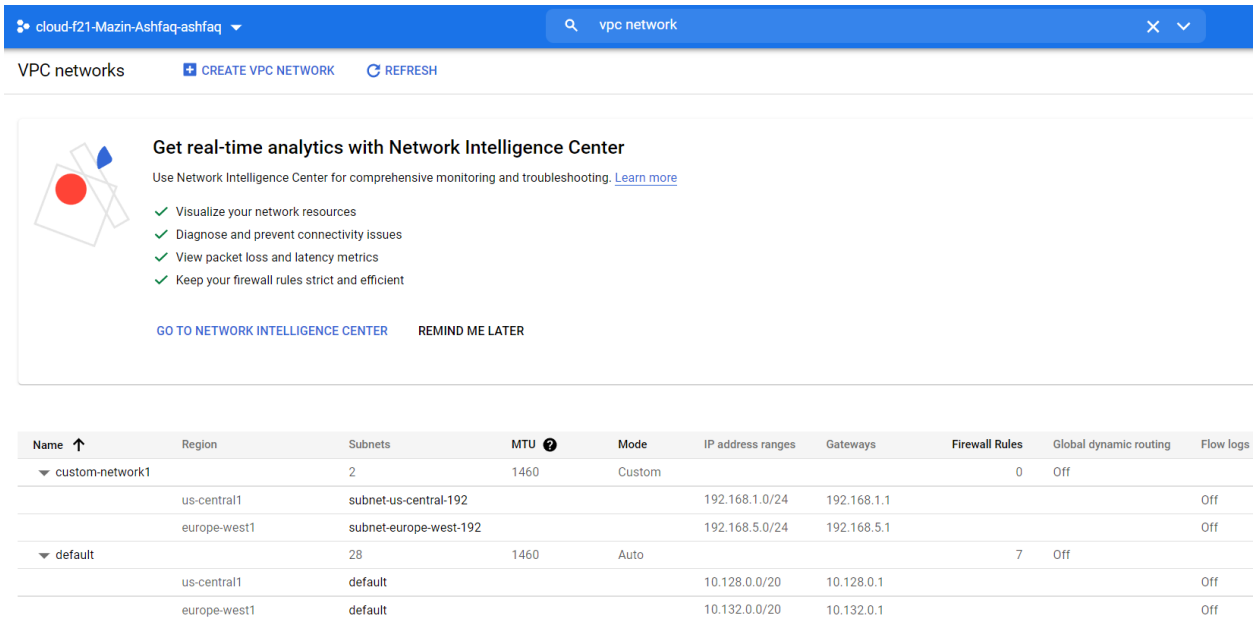
Explain why the result is different from instance-2.

Instance 1 is not able to get into the other VPC.

Take screenshots of all 4 instances in the UI including the network they belong to.



Then visit "VPC Network" and take a screenshot of the subnetworks created.



Name	Region	Subnets	MTU	Mode	IP address ranges	Gateways	Firewall Rules	Global dynamic routing	Flow logs
custom-network1		2	1460	Custom			0	Off	
	us-central1	subnet-us-central-192			192.168.1.0/24	192.168.1.1			Off
	europe-west1	subnet-europe-west-192			192.168.5.0/24	192.168.5.1			Off
default		28	1460	Auto			7	Off	
	us-central1	default			10.128.0.0/20	10.128.0.1			Off
	europe-west1	default			10.132.0.0/20	10.132.0.1			Off