CS 530 INTERNET WEB & CLOUD SYSTEMS

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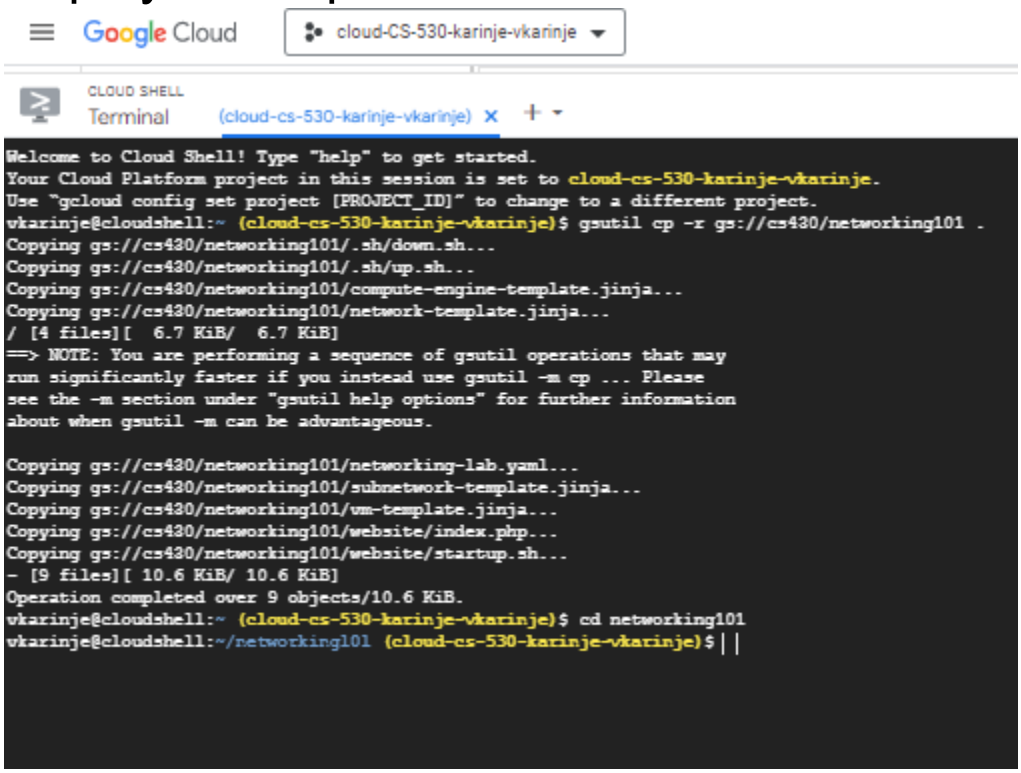
10.1g: CDN

Deployment specification

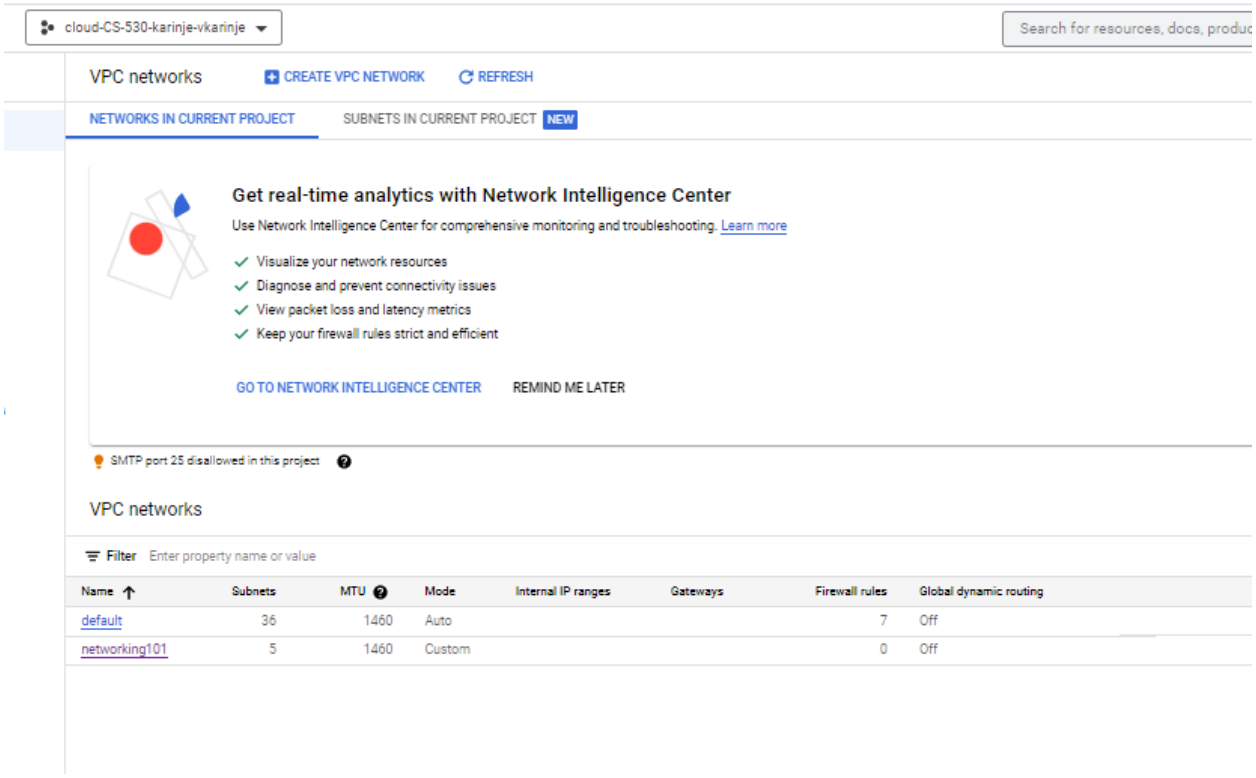


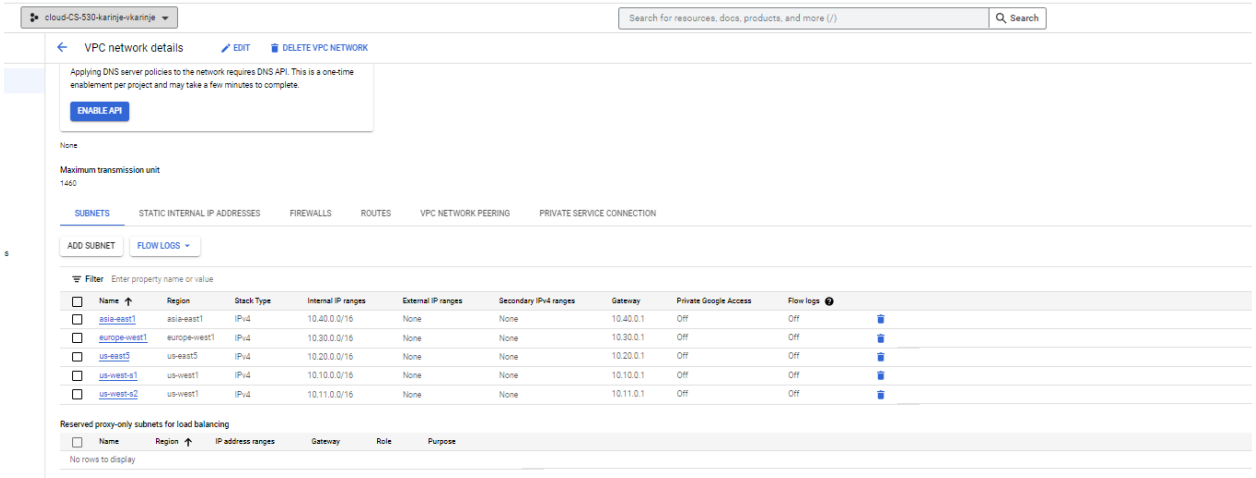
Deployment

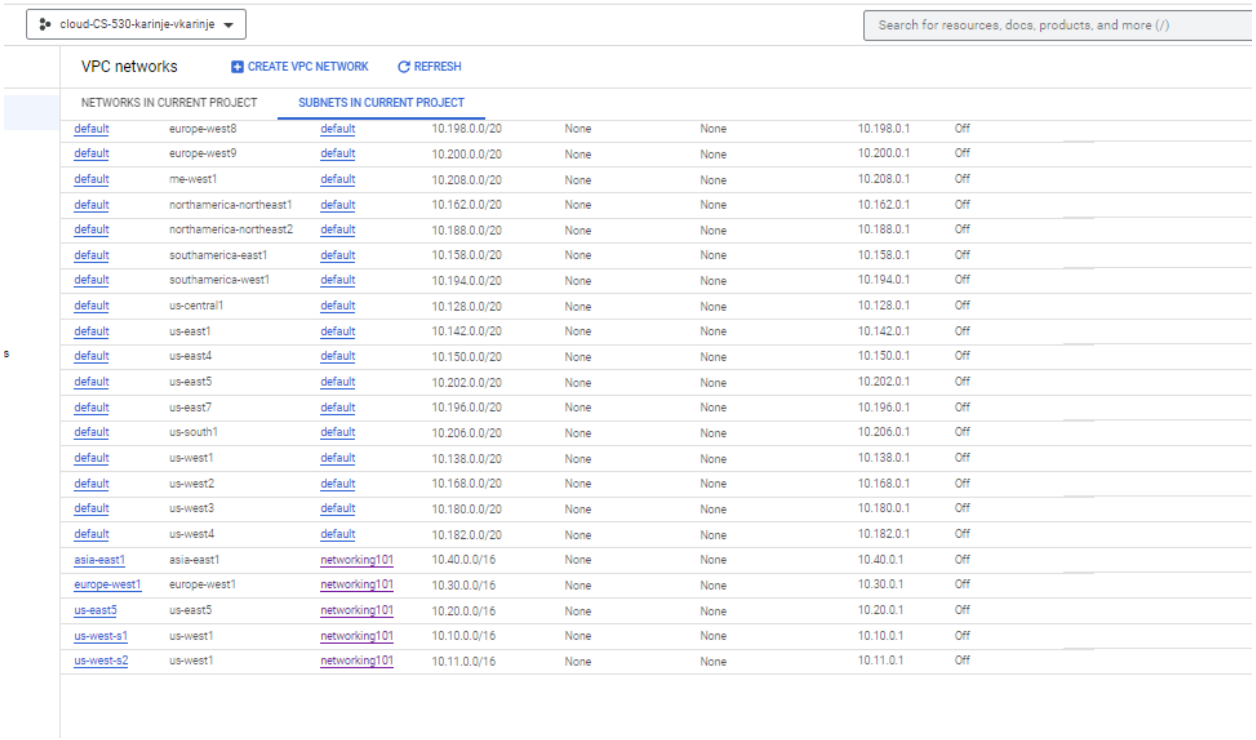
- Take a screenshot of the output to include in your lab notebook. How many networks, subnetworks, and VM instances have been created?

  We have created 1 network, 5 subnetworks and 5 VM instances

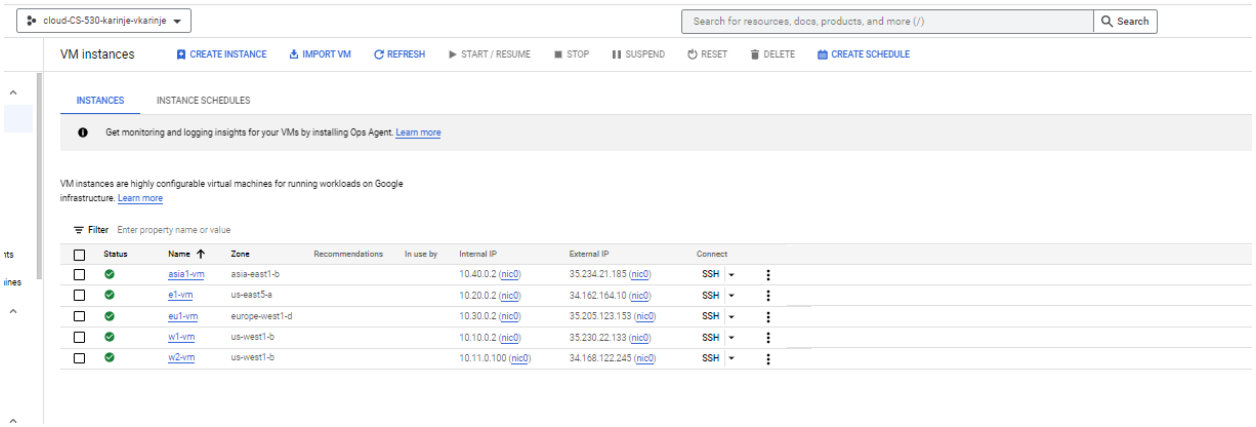
- Visit the web console for VPC network and show the network and the subnetworks that have been created. Validate that it has created the infrastructure in the initial figure. Note the lack of firewall rules that have been created.


cloud-CS-530-karinje-vkarinje
Search for resources, docs, produc
VPC networks
CREATE VPC NETWORK
REFRESH
NETWORKS IN CURRENT PROJECT
SUBNETS IN CURRENT PROJECT
NEW
Get real-time analytics with Network Intelligence Center
Use Network Intelligence Center for comprehensive monitoring and troubleshooting. Learn more
Visualize your network resources
Diagnose and prevent connectivity issues
View packet loss and latency metrics
Keep your firewall rules strict and efficient
GO TO NETWORK INTELLIGENCE CENTER
REMIND ME LATER
SMTP port 25 disallowed in this project
VPC networks
Filter
Enter property name or value
Name
Subnets
MTU
Mode
Internal IP ranges
Gateways
Firewall rules
Global dynamic routing
default
36
1460
Auto
7
Off
networking101
5
1460
Custom
0
Off


cloud-CS-530-karinje-vkarinje
Search for resources, docs, products, and more (/)
Search
VPC network details
EDIT
DELETE VPC NETWORK
Applying DNS server policies to the network requires DNS API. This is a one-time enablement per project and may take a few minutes to complete.
ENABLE API
None
Maximum transmission unit
1460
SUBNETS
STATIC INTERNAL IP ADDRESSES
FIREWALLS
ROUTES
VPC NETWORK PEERING
PRIVATE SERVICE CONNECTION
ADD SUBNET
FLOW LOGS
Filter
Enter property name or value
Name
Region
Stack Type
Internal IP ranges
External IP ranges
Secondary IPv4 ranges
Gateway
Private Google Access
Flow logs
asia-east1
asia-east1
IPv4
10.40.0.0/16
None
None
10.40.0.1
Off
Off
europe-west1
europe-west1
IPv4
10.30.0.0/16
None
None
10.30.0.1
Off
Off
us-east5
us-east5
IPv4
10.20.0.0/16
None
None
10.20.0.1
Off
Off
us-west-s1
us-west1
IPv4
10.10.0.0/16
None
None
10.10.0.1
Off
Off
us-west-s2
us-west1
IPv4
10.11.0.0/16
None
None
10.11.0.1
Off
Off
Reserved proxy-only subnets for load balancing
Name
Region
IP address ranges
Gateway
Role
Purpose
No rows to display

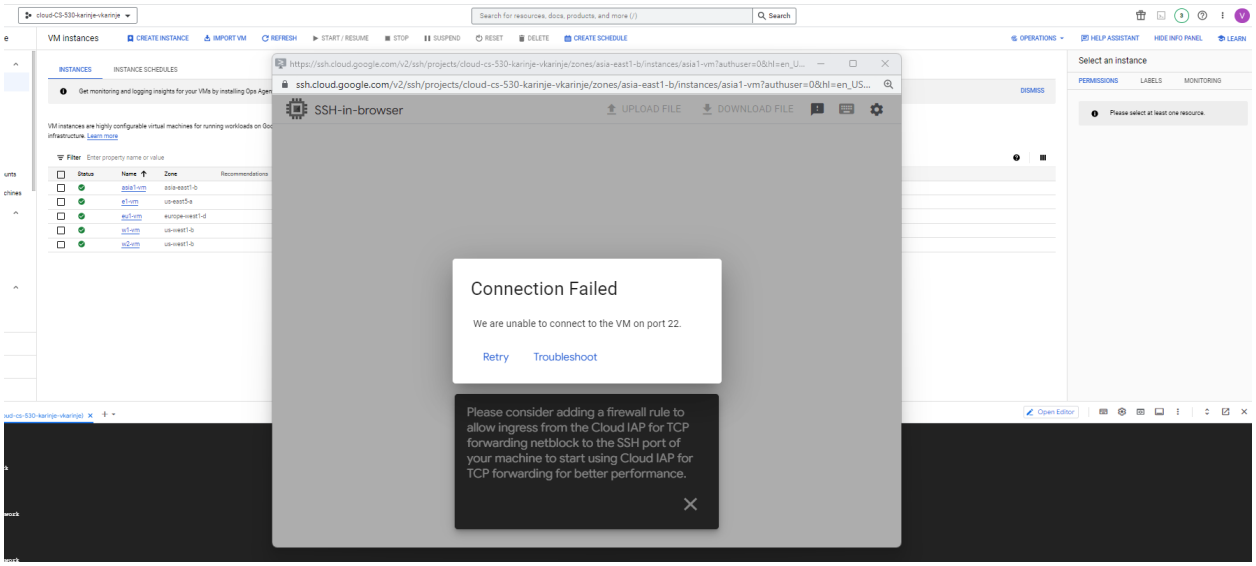


- Visit the web console for Compute Engine and show all VMs that have been created, their internal IP addresses and the subnetworks they have been instantiated on. Validate that it has created the infrastructure shown in the initial figure.

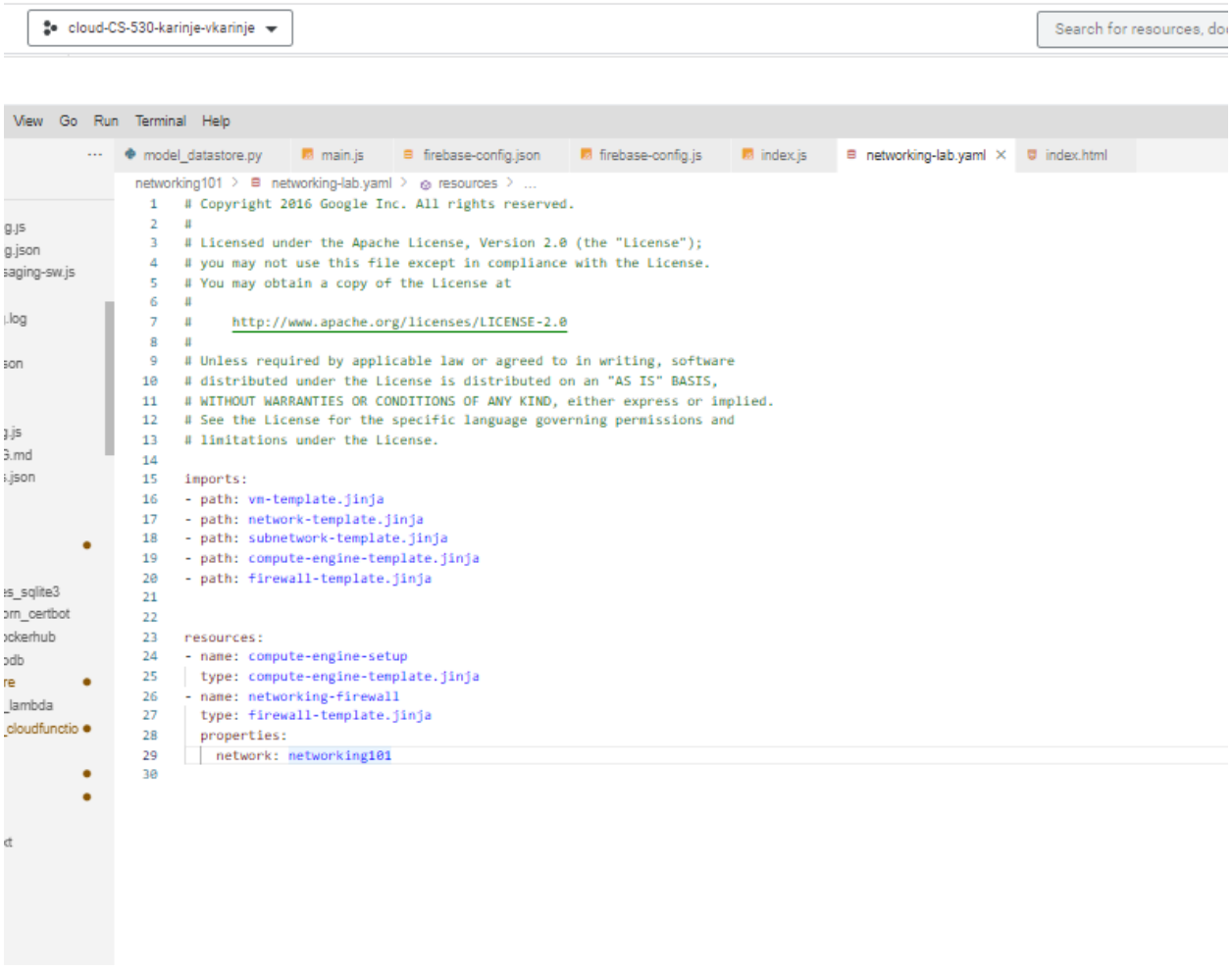


- Click on the ssh button for one of the VMs and attempt to connect. Did it succeed?

  No. It did not succeed.



Firewall deployment specification


cloud-CS-530-karinje-vkarinje
View Go Run Terminal Help
model_datastore.py
main.js
firebase-config.json
firebase-config.js
index.js
networking-lab.yaml
index.html
networking101 > networking-lab.yaml > resources > ...
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http://www.apache.org/licenses/LICENSE-2.0
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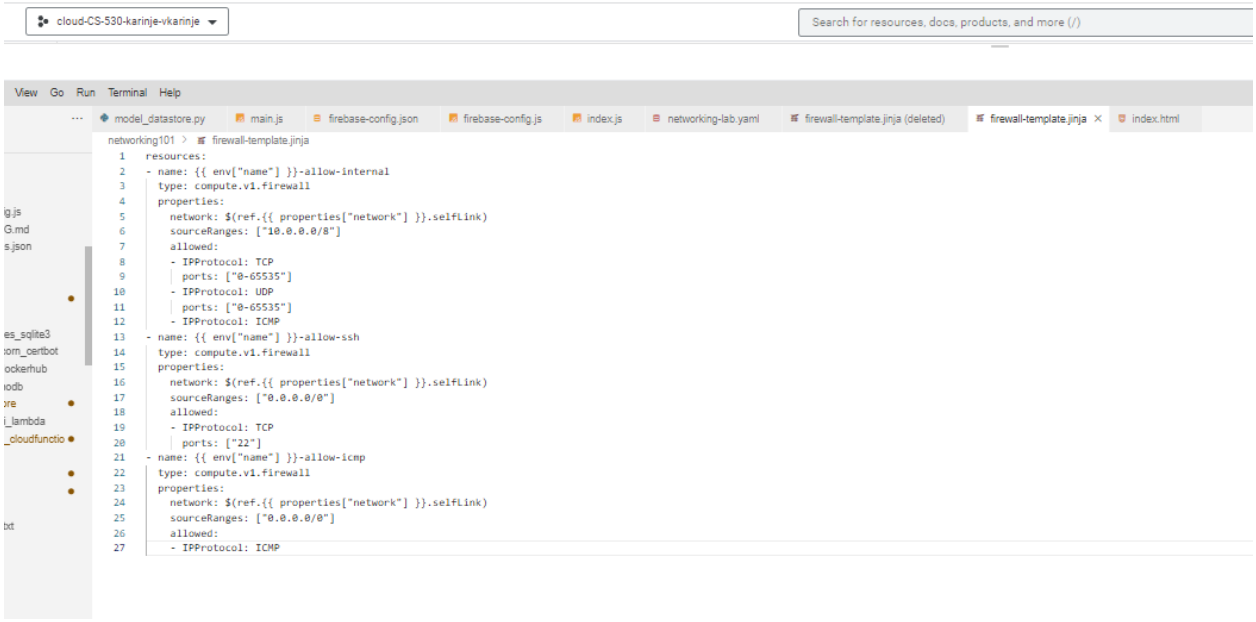
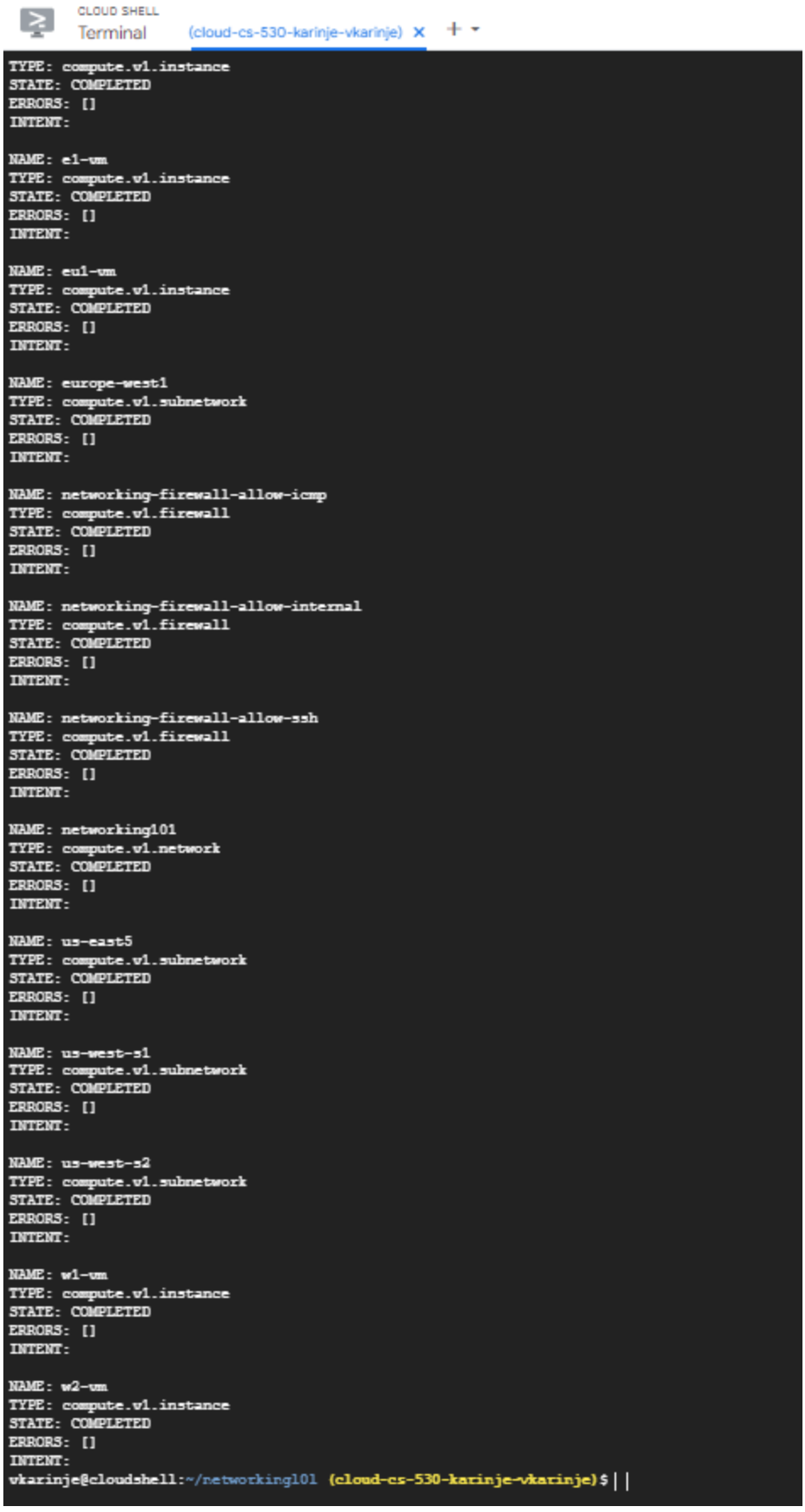
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.
imports:
- path: vm-template.jinja
- path: network-template.jinja
- path: subnetwork-template.jinja
- path: compute-engine-template.jinja
- path: firewall-template.jinja
resources:
- name: compute-engine-setup
type: compute-engine-template.jinja
- name: networking-firewall
type: firewall-template.jinja
properties:
network: networking101

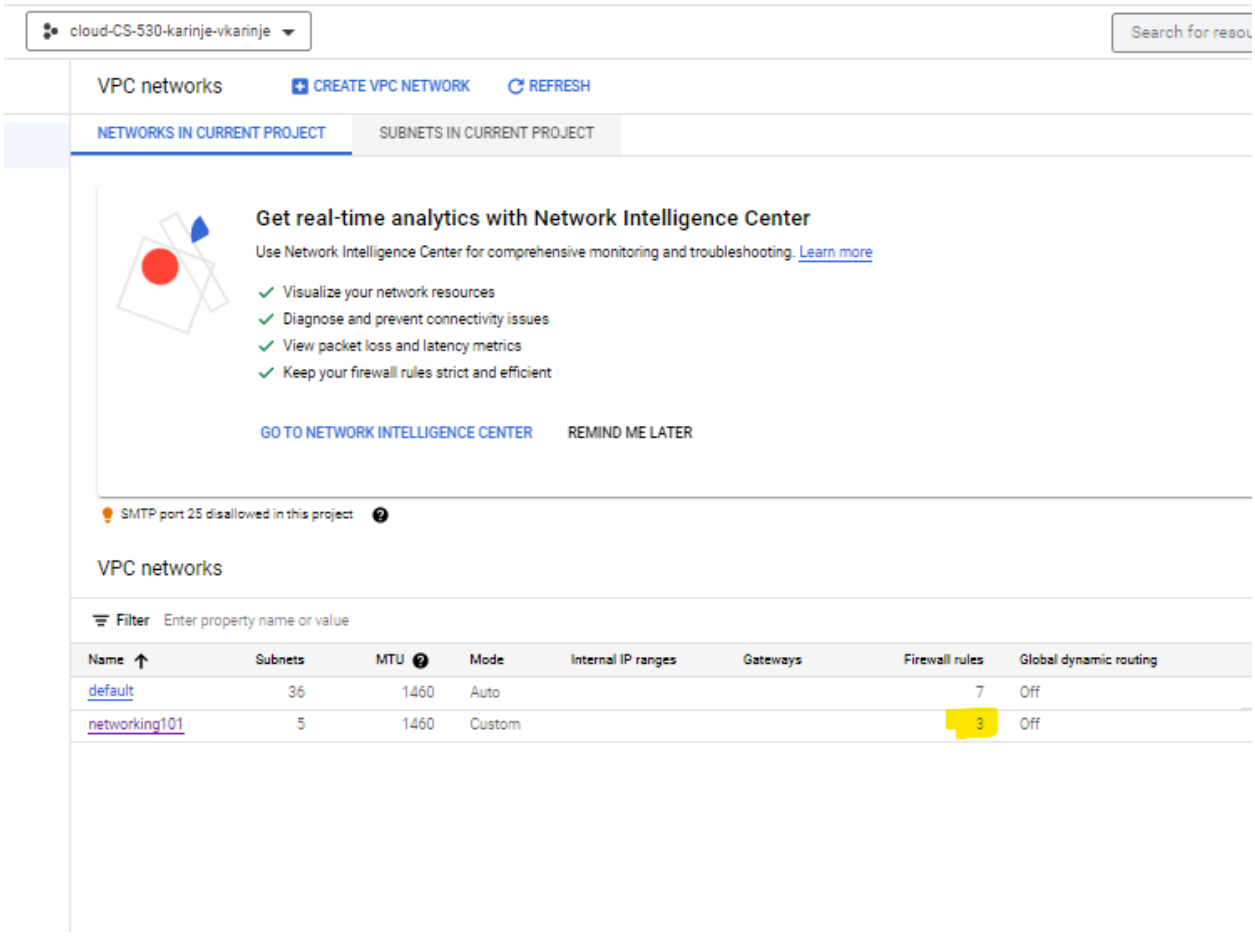

cloud-CS-530-karinje-vkarinje
Search for resources, docs, products, and more (/)
View Go Run Terminal Help
model_datastore.py
main.js
firebase-config.json
firebase-config.js
index.js
networking-lab.yaml
firewall-template.jinja (deleted)
firewall-template.jinja
index.html
networking101 > firewall-template.jinja
resources:
- name: {{ env["name"] }}-allow-internal
type: compute.v1.firewall
properties:
network: $(ref.{{ properties["network"] }}.selfLink)
sourceRanges: ["10.0.0.0/8"]
allowed:
- IPProtocol: TCP
ports: ["0-65535"]
- IPProtocol: UDP
ports: ["0-65535"]
- IPProtocol: ICMP
- name: {{ env["name"] }}-allow-ssh
type: compute.v1.firewall
properties:
network: $(ref.{{ properties["network"] }}.selfLink)
sourceRanges: ["0.0.0.0/0"]
allowed:
- IPProtocol: TCP
ports: ["22"]
- name: {{ env["name"] }}-allow-icmp
type: compute.v1.firewall
properties:
network: $(ref.{{ properties["network"] }}.selfLink)
sourceRanges: ["0.0.0.0/0"]
allowed:
- IPProtocol: ICMP

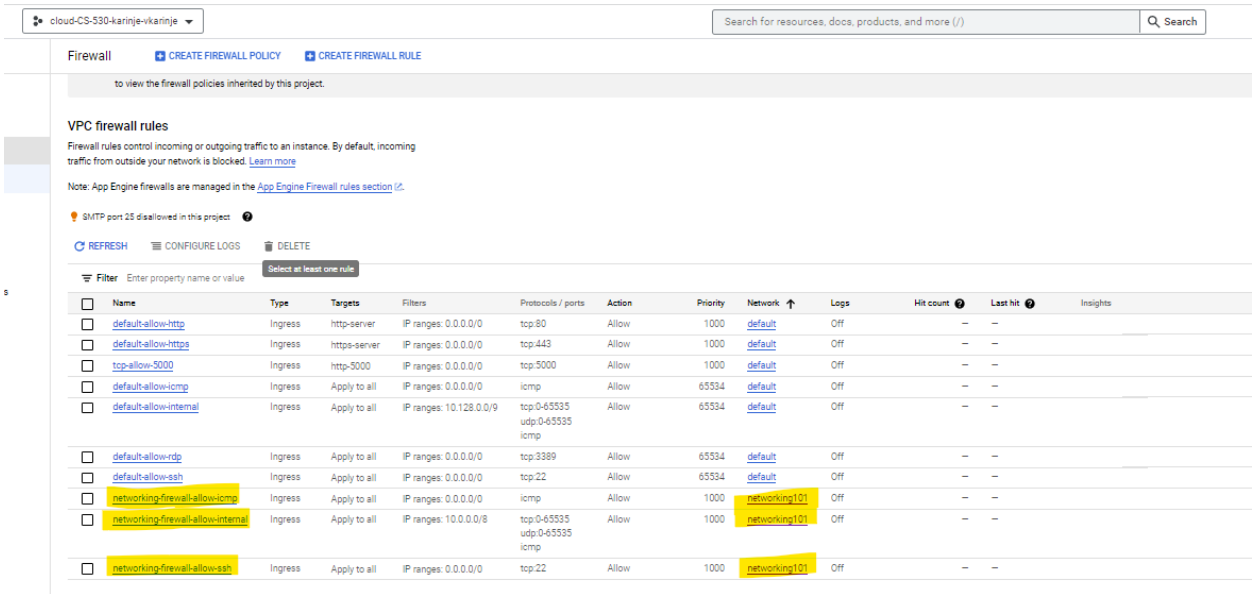
Update deployment

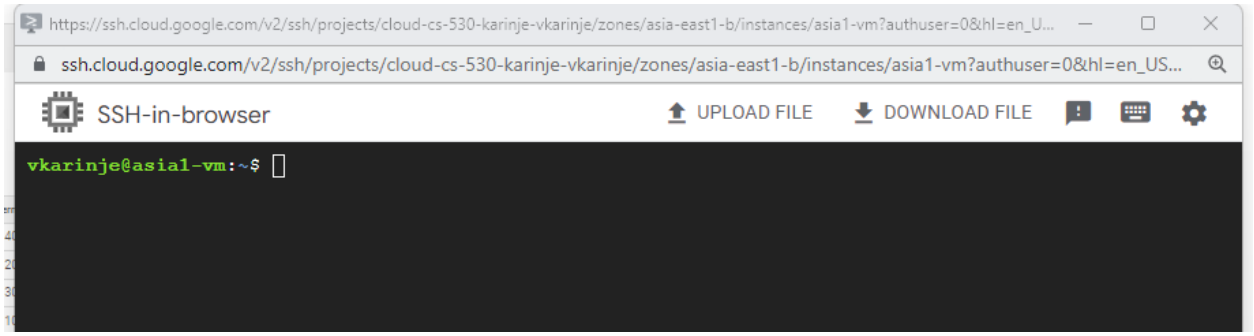
```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud deployment-manager deployments update networking101 --config networking-lab.yaml
The fingerprint of the deployment is b'XOyBSweCWaWpY5T0bc-pgQ=='
Waiting for update [operation-1669977632837-5eed5f7969151-515759bb-61ee2dc9]...done.
Update operation operation-1669977632837-5eed5f7969151-515759bb-61ee2dc9 completed successfully.
NAME: asia-east1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: asia1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: e1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: eu1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: europe-west1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: networking-firewall-allow-icmp
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: networking-firewall-allow-internal
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: networking-firewall-allow-ssh
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: networking101
TYPE: compute.v1.network
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-east5
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-west-s1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-west-s2
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:
```

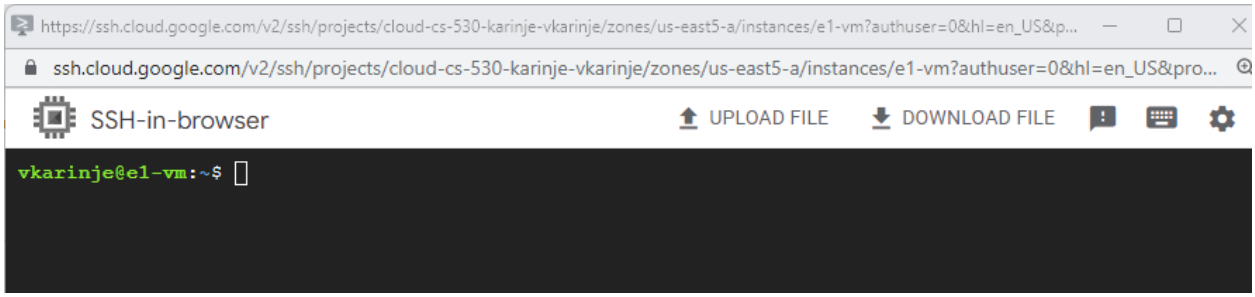

CLOUD SHELL
Terminal
(cloud-cs-530-karinje-vkarinje)
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: e1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: eu1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: europe-west1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: networking-firewall-allow-icmp
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: networking-firewall-allow-internal
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: networking-firewall-allow-ssh
TYPE: compute.v1.firewall
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: networking101
TYPE: compute.v1.network
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: us-east5
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: us-west-s1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: us-west-s2
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: w1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
NAME: w2-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$

- Take a screenshot that indicates the new rules have been deployed

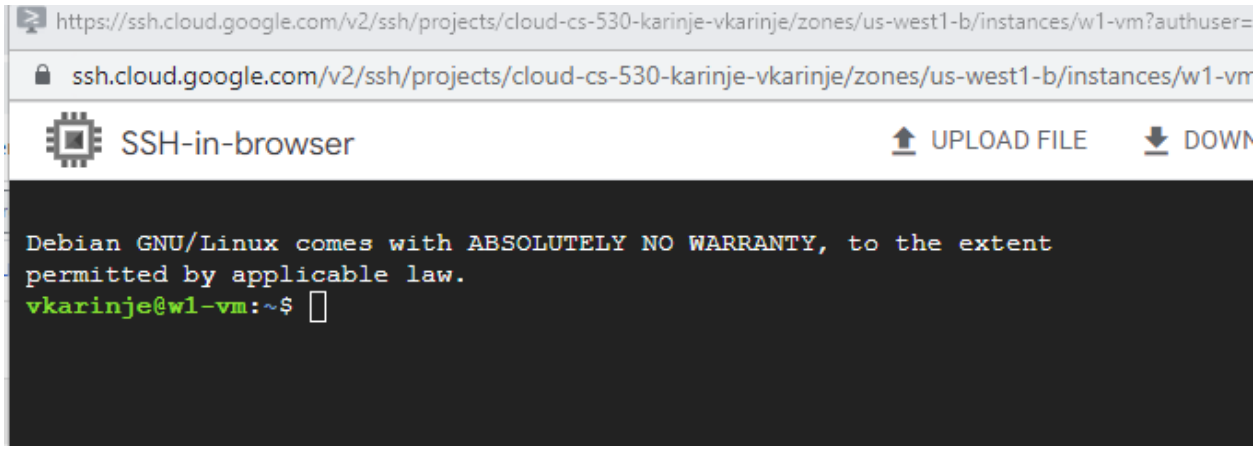


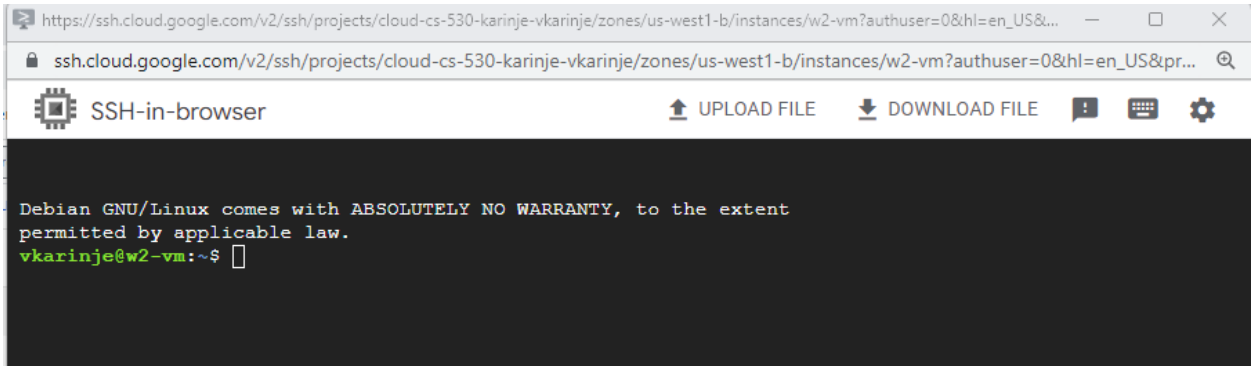



https://ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/asia-east1-b/instances/asia1-vm?authuser=0&hl=en_U...
ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/asia-east1-b/instances/asia1-vm?authuser=0&hl=en_US...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
vkarinje@asia1-vm:~$


https://ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/us-east5-a/instances/e1-vm?authuser=0&hl=en_US&p...
ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/us-east5-a/instances/e1-vm?authuser=0&hl=en_US&pro...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
vkarinje@e1-vm:~$

https://ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/europe-west1-d/instances/eu1-vm?authuser=0&hl=en...
ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/europe-west1-d/instances/eu1-vm?authuser=0&hl=en_...
SSH-in-browser
UPLOAD FILE
DOWNLOAD FILE
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
vkarinje@eu1-vm:~$


https://ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/us-west1-b/instances/w1-vm?authuser=
ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/us-west1-b/instances/w1-vm
SSH-in-browser
UPLOAD FILE
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
vkarinje@w1-vm:~$



Latency measurements

Location pair	Ideal latency	Measured latency
us-west1 us-east5	~45 ms	50
us-west1 europe-west1	~93 ms	135
us-west1 asia-east1	~114 ms	115
us-east5 europe-west1	~76 ms	97
us-east5 asia-east1	~141 ms	170
europe-west1 asia-east1	~110 ms	251

```
vkarinje@w1-vm:~$ ping -c 3 e1-vm
PING e1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.20.0.2) 56(84) bytes of data.
64 bytes from e1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.20.0.2): icmp_seq=1 ttl=64 time=51.
2 ms
64 bytes from e1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.20.0.2): icmp_seq=2 ttl=64 time=49.
7 ms
64 bytes from e1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.20.0.2): icmp_seq=3 ttl=64 time=49.
7 ms

--- e1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 49.655/50.161/51.170/0.713 ms
vkarinje@w1-vm:~$
```

ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/us-west1-b/instances/w2-vm?authuser=0&hl=en_US&pr...

SSH-in-browser UPLOAD FILE DOWNLOAD FILE

```
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Dec  2 10:55:28 2022 from 172.253.194.160
vkarinje@w2-vm:~$ ping -c 3 eu1-vm
PING eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2) 56(84) bytes of data.
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=1 ttl=64 time=13
6 ms
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=2 ttl=64 time=13
4 ms
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=3 ttl=64 time=13
4 ms

--- eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 134.139/134.719/135.742/0.725 ms
vkarinje@w2-vm:~$
```

```
vkarinje@w2-vm:~$ ping -c 3 asia1-vm
PING asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2) 56(84) bytes of data.
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=1 ttl=64 time=
118 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=2 ttl=64 time=
114 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=3 ttl=64 time=
114 ms

--- asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 113.836/115.095/117.611/1.800 ms
vkarinje@w2-vm:~$
```

```
vkarinje@e1-vm:~$ ping -c 3 eu1-vm
PING eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2) 56(84) bytes of data.
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=1 ttl=64 time=98
.0 ms
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=2 ttl=64 time=96
.7 ms
64 bytes from eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.30.0.2): icmp_seq=3 ttl=64 time=96
.7 ms

--- eu1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 96.714/97.139/97.976/0.692 ms
vkarinje@e1-vm:~$
```

```
vkarinje@e1-vm:~$ ping -c 3 asia1-vm
PING asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2) 56(84) bytes of data.
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=1 ttl=64 time=
171 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=2 ttl=64 time=
169 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=3 ttl=64 time=
169 ms

--- asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 4ms
rtt min/avg/max/mdev = 168.992/169.609/170.829/0.925 ms
vkarinje@e1-vm:~$
```

https://ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/europe-west1-d/instances/eu1-vm?authuser=0&hl=en...

ssh.cloud.google.com/v2/ssh/projects/cloud-cs-530-karinje-vkarinje/zones/europe-west1-d/instances/eu1-vm?authuser=0&hl=en_...

SSH-in-browser UPLOAD FILE DOWNLOAD FILE

```
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Dec  2 10:52:25 2022 from 173.194.169.157
vkarinje@eu1-vm:~$ ping -c 3 asia1-vm
PING asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2) 56(84) bytes of data.
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=1 ttl=64 time=
252 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=2 ttl=64 time=
250 ms
64 bytes from asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal (10.40.0.2): icmp_seq=3 ttl=64 time=
250 ms

--- asia1-vm.c.cloud-cs-530-karinje-vkarinje.internal ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 5ms
rtt min/avg/max/mdev = 249.921/250.580/251.790/1.033 ms
vkarinje@eu1-vm:~$
```

Firewall rule for HTTP

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute firewall-rules create networking-firewall-allow-http \
  --allow tcp:80 --network networking101 --source-ranges 0.0.0.0/0 \
  --target-tags http-server
Creating firewall...working..Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/firewalls/networking-firewall-allow-http].
Creating firewall...done.
NAME: networking-firewall-allow-http
NETWORK: networking101
DIRECTION: INGRESS
PRIORITY: 1000
ALLOW: tcp:80
DENY:
DISABLED: False
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Instance templates

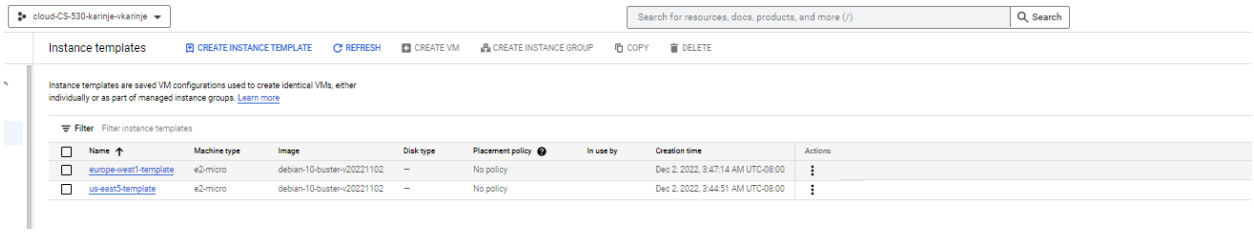
```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-templates create "us-east5-template" \
  --image-project debian-cloud \
  --image debian-10-buster-v20221102 \
  --machine-type e2-micro \
  --subnet "us-east5" \
  --metadata "startup-script-url=gs://cs430/networking101/website/startup.sh" \
  --region "us-east5" \
  --tags "http-server"
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/instanceTemplates/us-east5-template].
NAME: us-east5-template
MACHINE_TYPE: e2-micro
PREEMPTIBLE:
CREATION_TIMESTAMP: 2022-12-02T03:44:51.544-08:00
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-templates create "europe-west1-template" \
  --image-project debian-cloud \
  --image debian-10-buster-v20221102 \
  --machine-type e2-micro \
  --subnet "europe-west1" \
  --metadata "startup-script-url=gs://cs430/networking101/website/startup.sh" \
  --region "europe-west1" \
  --tags "http-server"
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/instanceTemplates/europe-west1-template].
NAME: europe-west1-template
MACHINE_TYPE: e2-micro
PREEMPTIBLE:
CREATION_TIMESTAMP: 2022-12-02T03:47:14.533-08:00
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Then, see that both templates have been created by listing them.

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-templates list
NAME: europe-west1-template
MACHINE_TYPE: e2-micro
PREEMPTIBLE:
CREATION_TIMESTAMP: 2022-12-02T03:47:14.533-08:00

NAME: us-east5-template
MACHINE_TYPE: e2-micro
PREEMPTIBLE:
CREATION_TIMESTAMP: 2022-12-02T03:44:51.544-08:00
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

They should also show up in the web console of Compute Engine under "Instance Templates".



Health check

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute health-checks create http instance-health-check \
  --check-interval=10s \
  --port=80 \
  --timeout=5s \
  --unhealthy-threshold=3
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/healthChecks/instance-health-check].
NAME: instance-health-check
PROTOCOL: HTTP
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Managed Instance Group (europe-west1-mig)

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed create europe-west1-mig \
  --size 3 \
  --region europe-west1 \
  --template europe-west1-template
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/europe-west1/instanceGroupManagers/europe-west1-mig].
NAME: europe-west1-mig
LOCATION: europe-west1
SCOPE: region
BASE_INSTANCE_NAME: europe-west1-mig
SIZE: 0
TARGET_SIZE: 3
INSTANCE_TEMPLATE: europe-west1-template
AUTOSCALED: no
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed create europe-west1-mig \
  --size 3 \
  --region europe-west1 \
  --template europe-west1-template
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/europe-west1/instanceGroupManagers/europe-west1-mig].
NAME: europe-west1-mig
LOCATION: europe-west1
SCOPE: region
BASE_INSTANCE_NAME: europe-west1-mig
SIZE: 0
TARGET_SIZE: 3
INSTANCE_TEMPLATE: europe-west1-template
AUTOSCALED: no
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed update europe-west1-mig \
  --health-check instance-health-check \
  --initial-delay 120 \
  --region europe-west1
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/europe-west1/instanceGroupManagers/europe-west1-mig].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups set-named-ports europe-west1-mig \
  --named-ports=http:80 --region europe-west1
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/europe-west1/instanceGroups/europe-west1-mig].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Managed Instance Group (us-east5-mig)

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed create us-east5-mig \
  --size 1 \
  --region us-east5 \
  --template us-east5-template
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/instanceGroupManagers/us-east5-mig].
NAME: us-east5-mig
LOCATION: us-east5
SCOPE: region
BASE_INSTANCE_NAME: us-east5-mig
SIZE: 0
TARGET_SIZE: 1
INSTANCE_TEMPLATE: us-east5-template
AUTOSCALED: no
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed update us-east5-mig \
  --health-check instance-health-check \
  --initial-delay 120 \
  --region us-east5
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/instanceGroupManagers/us-east5-mig].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

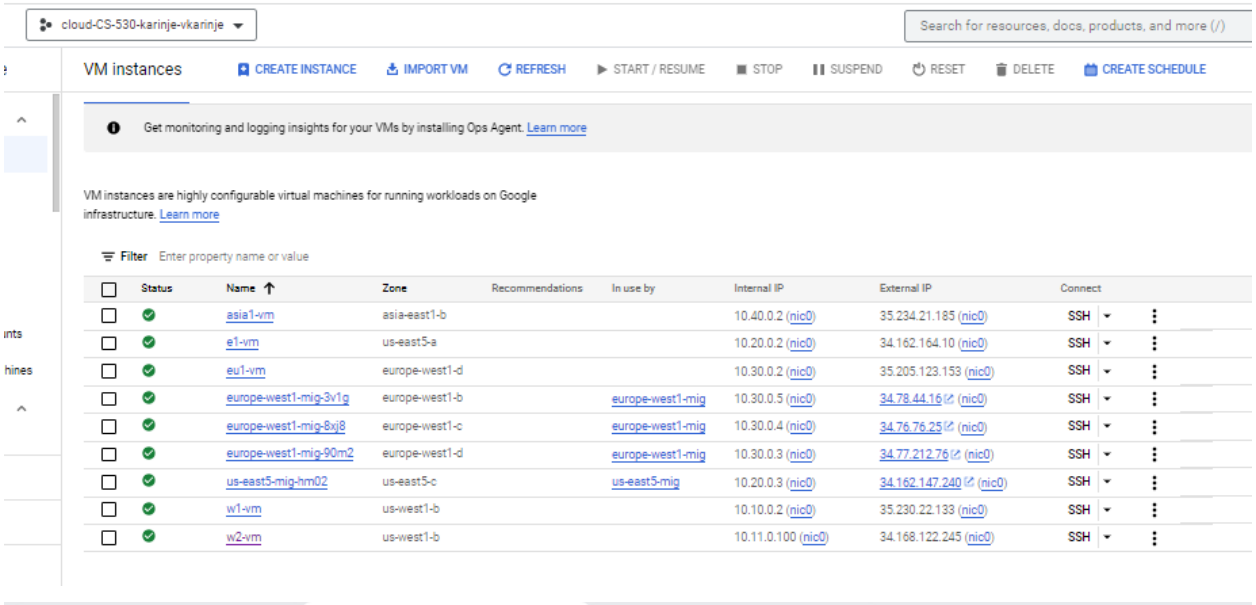
```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed set-autoscaling us-east5-mig \
  --mode on \
  --region us-east5 \
  --min-num-replicas=1 --max-num-replicas=5 \
  --cool-down-period=45 \
  --scale-based-on-load-balancing \
  --target-load-balancing-utilization=0.8
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/autoscalers/us-east5-mig-r5j4].
---
autoscalingPolicy:
  coolDownPeriodSec: 45
  loadBalancingUtilization:
    utilizationTarget: 0.8
  maxNumReplicas: 5
  minNumReplicas: 1
  mode: ON
creationTimestamp: '2022-12-02T03:58:15.629-08:00'
id: '6085718406745839288'
kind: compute#autoscaler
name: us-east5-mig-r5j4
region: https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5
selfLink: https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/autoscalers/us-east5-mig-r5j4
status: PENDING
target: https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/instanceGroupManagers/us-east5-mig
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

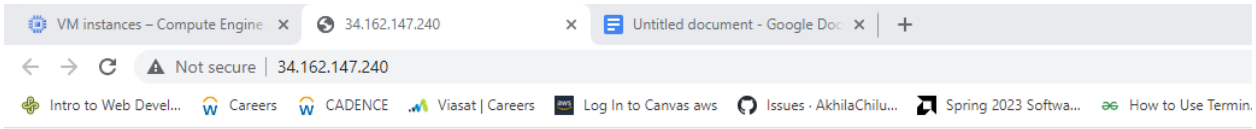
```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups set-named-ports us-east5-mig \
  --named-ports=http:80 --region us-east5
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/instanceGroups/us-east5-mig].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Test groups

Ensure that the groups and their associated instances have been created properly via:

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups list
NAME: europe-west1-mig
LOCATION: europe-west1
SCOPE: region
NETWORK: networking101
MANAGED: Yes
INSTANCES: 3

NAME: us-east5-mig
LOCATION: us-east5
SCOPE: region
NETWORK: networking101
MANAGED: Yes
INSTANCES: 1
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

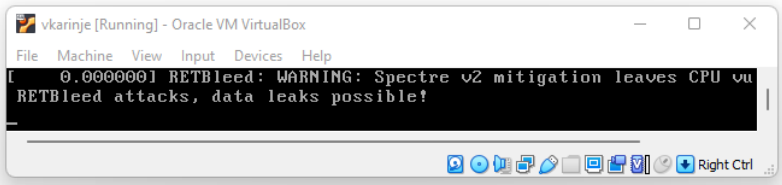




Networking 101 Lab

Client IP

Your IP address : 73.11.13.21

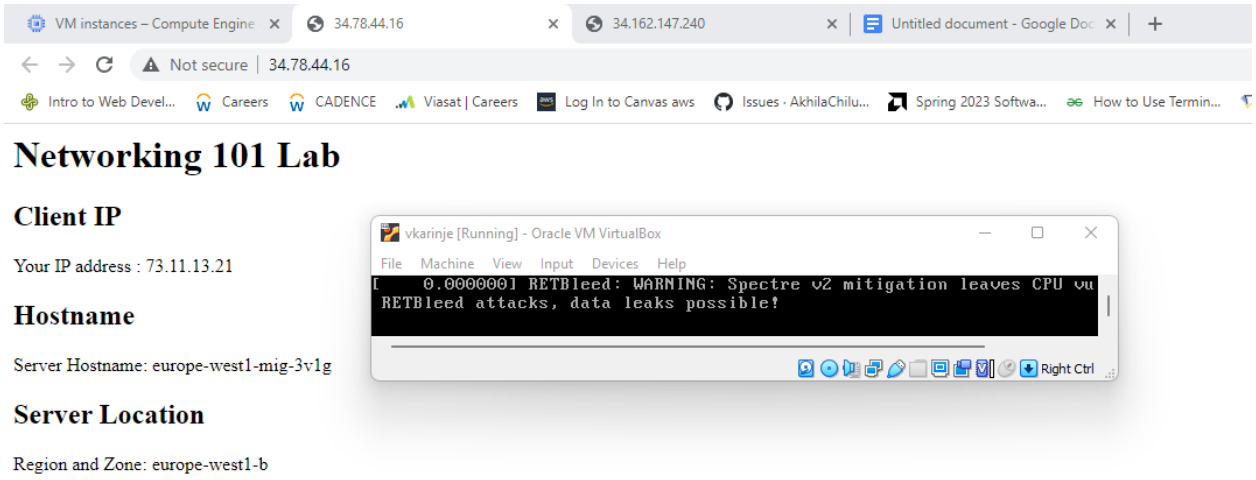


Hostname

Server Hostname: us-east5-mig-hm02

Server Location

Region and Zone: us-east5-c



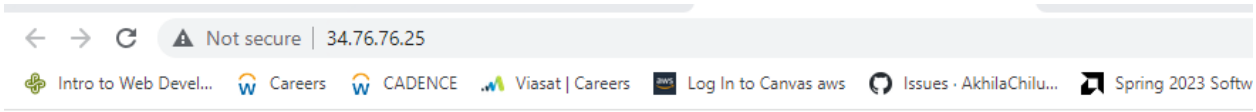
Answer the following questions for your lab notebook

- Are the instances in the same availability zone or in different ones?

The instances are in the different availability zones

- List all availability zones that your servers show up in for your lab notebook.

  europe-west1-d, europe-west1-c, europe-west1-b, us-east5-c



Networking 101 Lab

Client IP

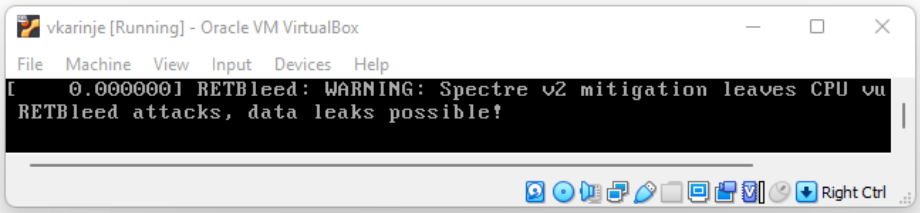
Your IP address : 73.11.13.21

Hostname

Server Hostname: europe-west1-mig-8xj8

Server Location

Region and Zone: europe-west1-c



HTTP load balancer

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute backend-services create webserver-backend-migs \
  --protocol=http --port-name=http --timeout=30s \
  --health-checks=instance-health-check \
  --global
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/backendServices/webserver-backend-migs].
NAME: webserver-backend-migs
BACKENDS:
PROTOCOL: HTTP
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute backend-services add-backend webserver-backend-migs \
  --instance-group=europe-west1-mig --instance-group-region=europe-west1 \
  --balancing-mode=utilization --max-utilization=0.8 \
  --global
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/backendServices/webserver-backend-migs].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute backend-services add-backend webserver-backend-migs \
  --instance-group=us-east5-mig --instance-group-region=us-east5 \
  --balancing-mode=rate --max-rate-per-instance=50 \
  --global
Updated [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/backendServices/webserver-backend-migs].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute url-maps create webserver-frontend-lb \
  --default-service webserver-backend-migs
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/urlMaps/webserver-frontend-lb].
NAME: webserver-frontend-lb
DEFAULT_SERVICE: backendServices/webserver-backend-migs
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

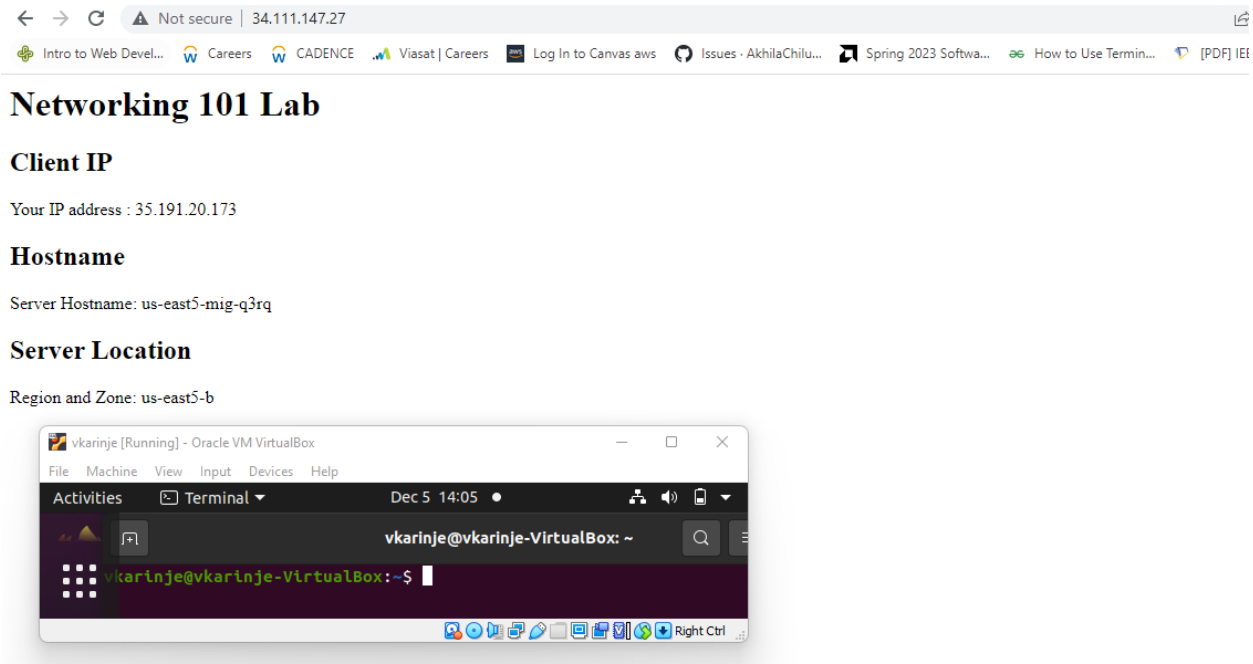
```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute target-http-proxies create webserver-proxy \
  --url-map webserver-frontend-lb
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/targetHttpProxies/webserver-proxy].
NAME: webserver-proxy
URL_MAP: webserver-frontend-lb
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute addresses create webserver-frontend-ip --ip-version=ipv4 --global
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/addresses/webserver-frontend-ip].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute forwarding-rules create webserver-frontend-fwrule \
  --ip-protocol=tcp --ports=80 --address=webserver-frontend-ip \
  --target-http-proxy webserver-proxy \
  --global
Created [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/forwardingRules/webserver-frontend-fwrule].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```

Test load balancer

Show a screenshot of the page that is returned



- Which availability zone does the server handling your request reside in?

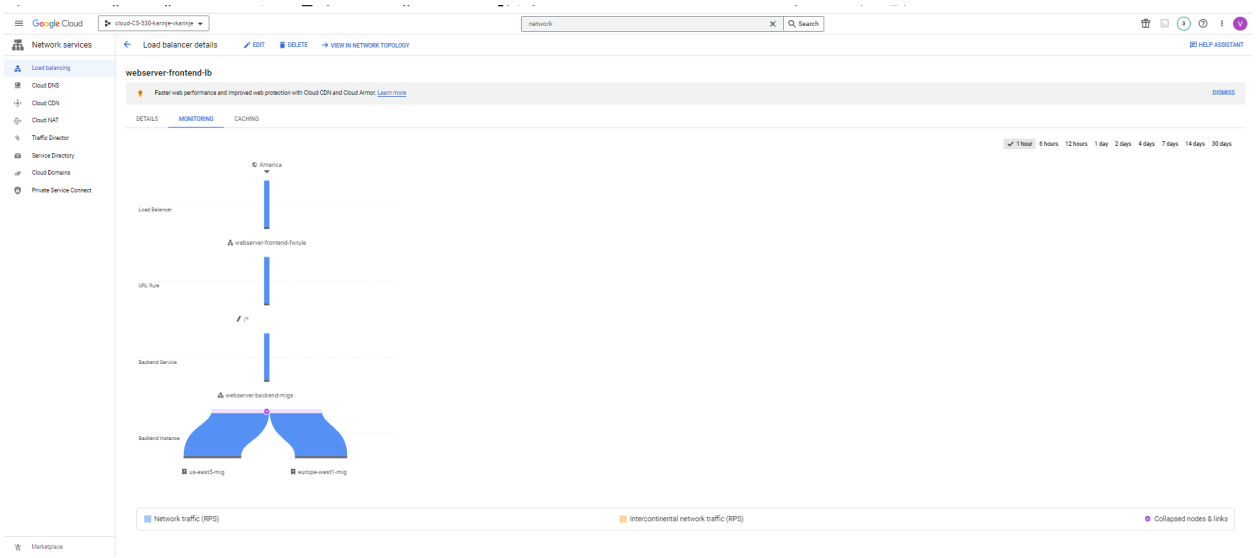
us-east5-b

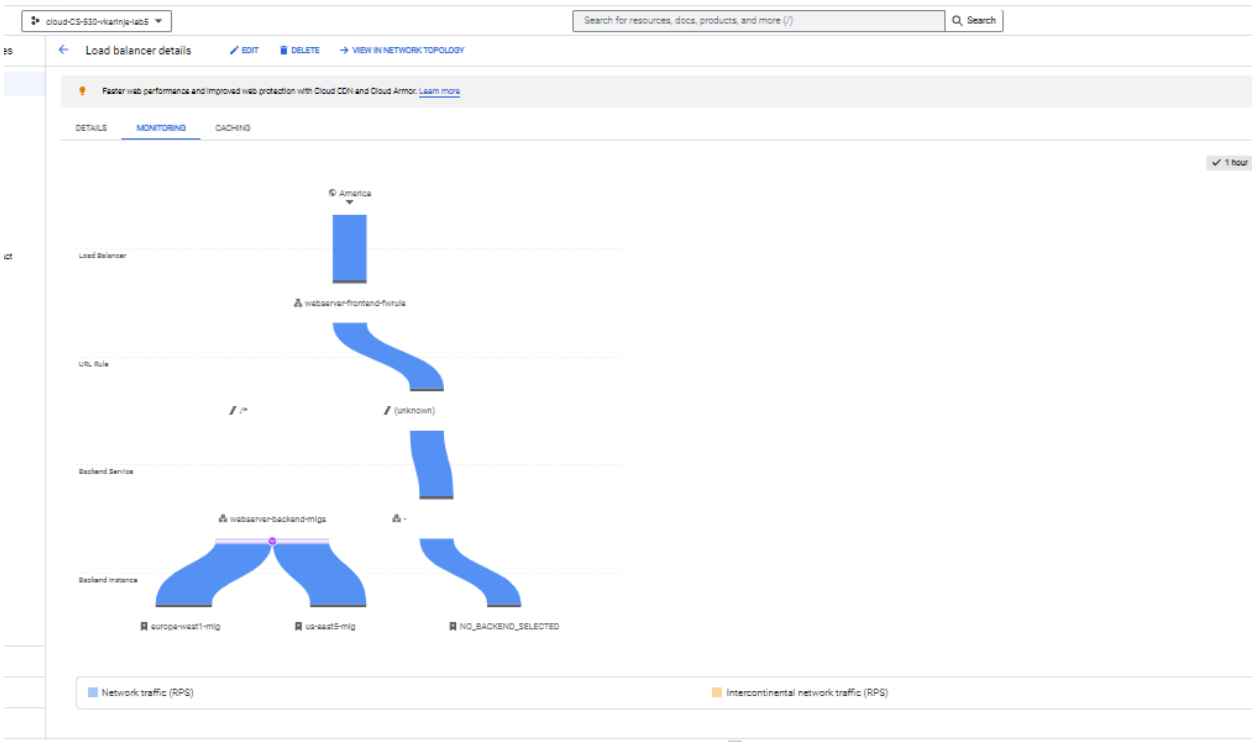
Siege! (Part 1)

SSH-in-browser UPLOAD FILE DOWNLOAD FILE

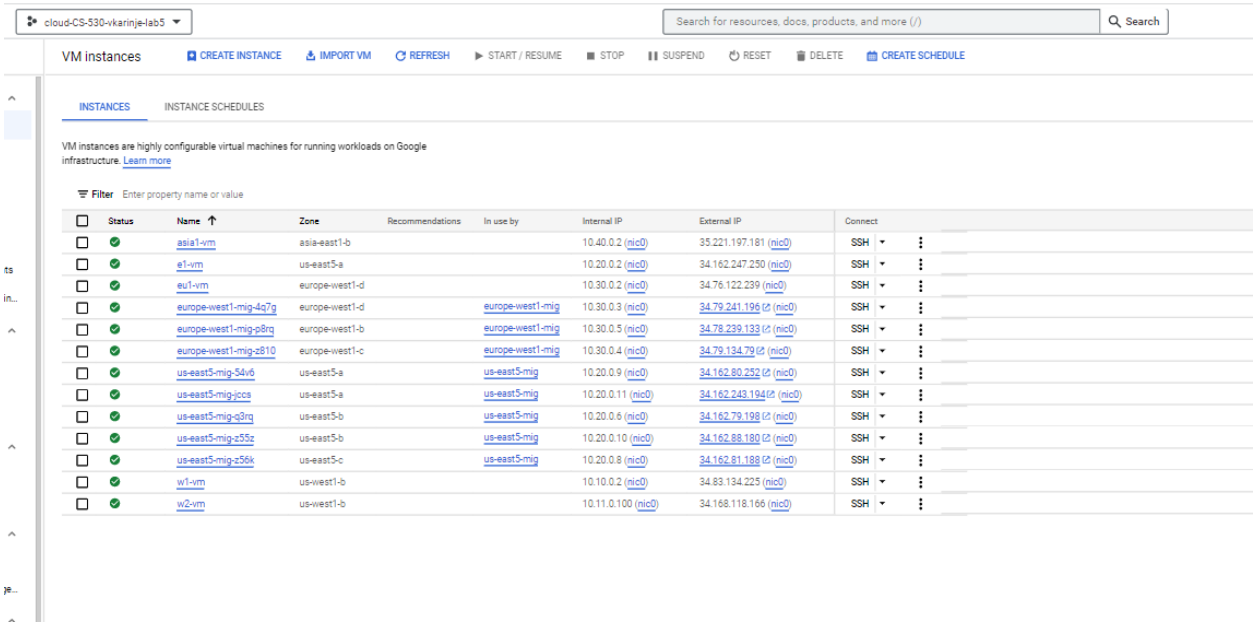
```
Linux w1-vm 4.19.0-22-cloud-amd64 #1 SMP Debian 4.19.260-1 (2022-09-29) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Mon Dec  5 21:04:15 2022 from 35.235.241.65
vkarinje@w1-vm:~$ siege -c 200 http://34.111.147.27
** SIEGE 4.0.4
** Preparing 200 concurrent users for battle.
```

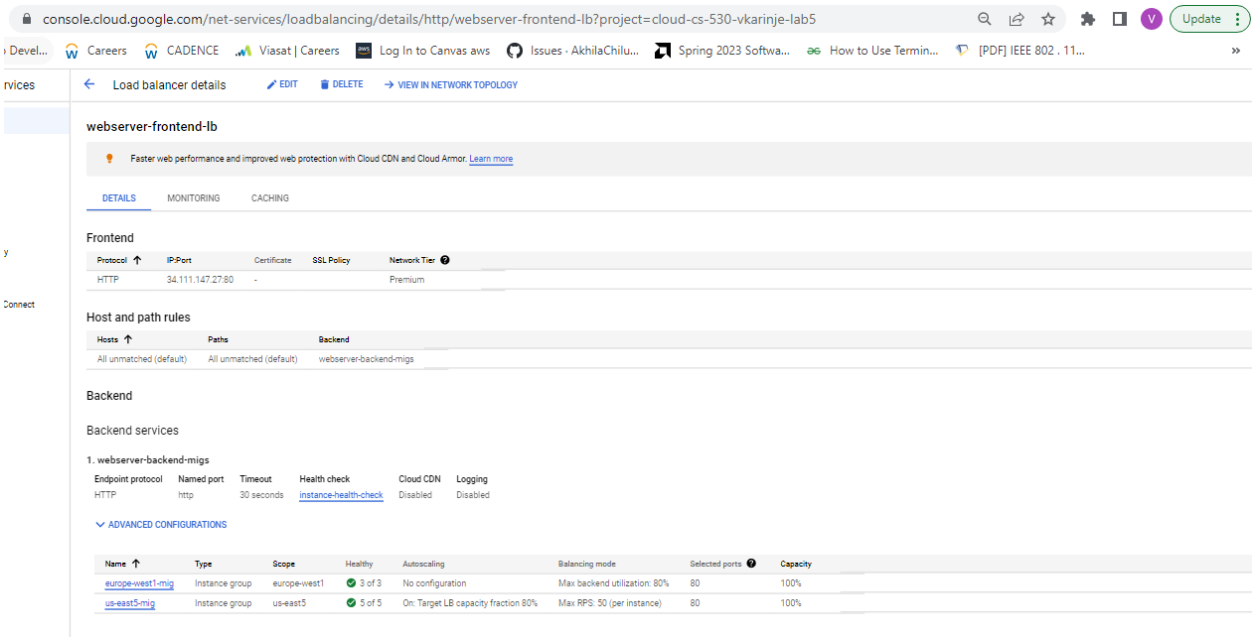
- Take a screenshot of the initial traffic distribution

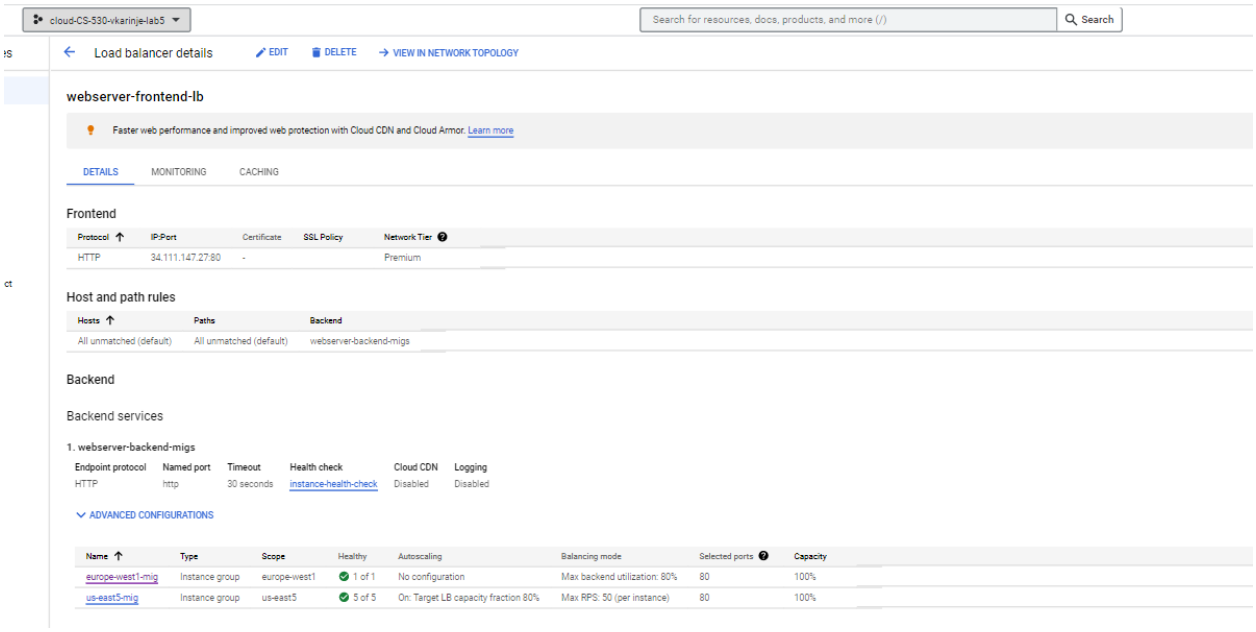



cloud-CS-930-vkarinja-lab5
Search for resources, docs, products, and more (/)
Search
Load balancer details
EDIT
DELETE
VIEW IN NETWORK TOPOLOGY
Faster web performance and improved web protection with Cloud CDN and Cloud Armor. Learn more
DETAILS
MONITORING
CACHING
1 hour
America
Load Balancer
webserver-frontend-fwrule
URL Rule
/*
(unknown)
Backend Service
webserver-backend-migs
-
Backend Instance
europe-west1-mig
us-east5-mig
NO_BACKEND_SELECTED
Network traffic (RPS)
Intercontinental network traffic (RPS)

- Take a screenshot of the UI as additional instances are brought up and show that the traffic distribution shifts


cloud-CS-530-vkarinje-lab5
Search for resources, docs, products, and more (/)
Search
VM instances
CREATE INSTANCE
IMPORT VM
REFRESH
START / RESUME
STOP
SUSPEND
RESET
DELETE
CREATE SCHEDULE
INSTANCES
INSTANCE SCHEDULES
VM instances are highly configurable virtual machines for running workloads on Google infrastructure. Learn more
Filter Enter property name or value
Status Name Zone Recommendations In use by Internal IP External IP Connect
asia1-vm asia-east1-b 10.40.0.2 (nic0) 35.221.197.181 (nic0) SSH
e1-vm us-east5-a 10.20.0.2 (nic0) 34.162.247.250 (nic0) SSH
eu1-vm europe-west1-d 10.30.0.2 (nic0) 34.76.122.239 (nic0) SSH
europe-west1-mig-4q7g europe-west1-d europe-west1-mig 10.30.0.3 (nic0) 34.79.241.196 (nic0) SSH
europe-west1-mig-p8rq europe-west1-b europe-west1-mig 10.30.0.5 (nic0) 34.78.239.133 (nic0) SSH
europe-west1-mig-z810 europe-west1-c europe-west1-mig 10.30.0.4 (nic0) 34.79.134.79 (nic0) SSH
us-east5-mig-54v6 us-east5-a us-east5-mig 10.20.0.9 (nic0) 34.162.80.252 (nic0) SSH
us-east5-mig-jccs us-east5-a us-east5-mig 10.20.0.11 (nic0) 34.162.243.194 (nic0) SSH
us-east5-mig-q3rq us-east5-b us-east5-mig 10.20.0.6 (nic0) 34.162.79.198 (nic0) SSH
us-east5-mig-z55z us-east5-b us-east5-mig 10.20.0.10 (nic0) 34.162.88.180 (nic0) SSH
us-east5-mig-z56k us-east5-c us-east5-mig 10.20.0.8 (nic0) 34.162.81.188 (nic0) SSH
w1-vm us-west1-b 10.10.0.2 (nic0) 34.83.134.225 (nic0) SSH
w2-vm us-west1-b 10.11.0.100 (nic0) 34.168.118.166 (nic0) SSH


console.cloud.google.com/net-services/loadbalancing/details/http/webserver-frontend-lb?project=cloud-cs-530-vkarinje-lab5
Update
Careers
CADENCE
Viasat | Careers
Log In to Canvas aws
Issues · AkhilaChilu...
Spring 2023 Softwa...
How to Use Termin...
[PDF] IEEE 802 . 11...
Load balancer details
EDIT
DELETE
VIEW IN NETWORK TOPOLOGY
webserver-frontend-lb
Faster web performance and improved web protection with Cloud CDN and Cloud Armor. Learn more
DETAILS
MONITORING
CACHING
Frontend
Protocol IP:Port Certificate SSL Policy Network Tier
HTTP 34.111.147.27:80 - Premium
Host and path rules
Hosts Paths Backend
All unmatched (default) All unmatched (default) webserver-backend-migs
Backend
Backend services
1. webserver-backend-migs
Endpoint protocol Named port Timeout Health check Cloud CDN Logging
HTTP http 30 seconds instance-health-check Disabled Disabled
ADVANCED CONFIGURATIONS
Name Type Scope Healthy Autoscaling Balancing mode Selected ports Capacity
europe-west1-mig Instance group europe-west1 3 of 3 No configuration Max backend utilization: 80% 80 100%
us-east5-mig Instance group us-east5 5 of 5 On: Target LB capacity fraction 80% Max RPS: 50 (per instance) 80 100%


cloud-CS-530-vkarinje-lab5
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Load balancer details
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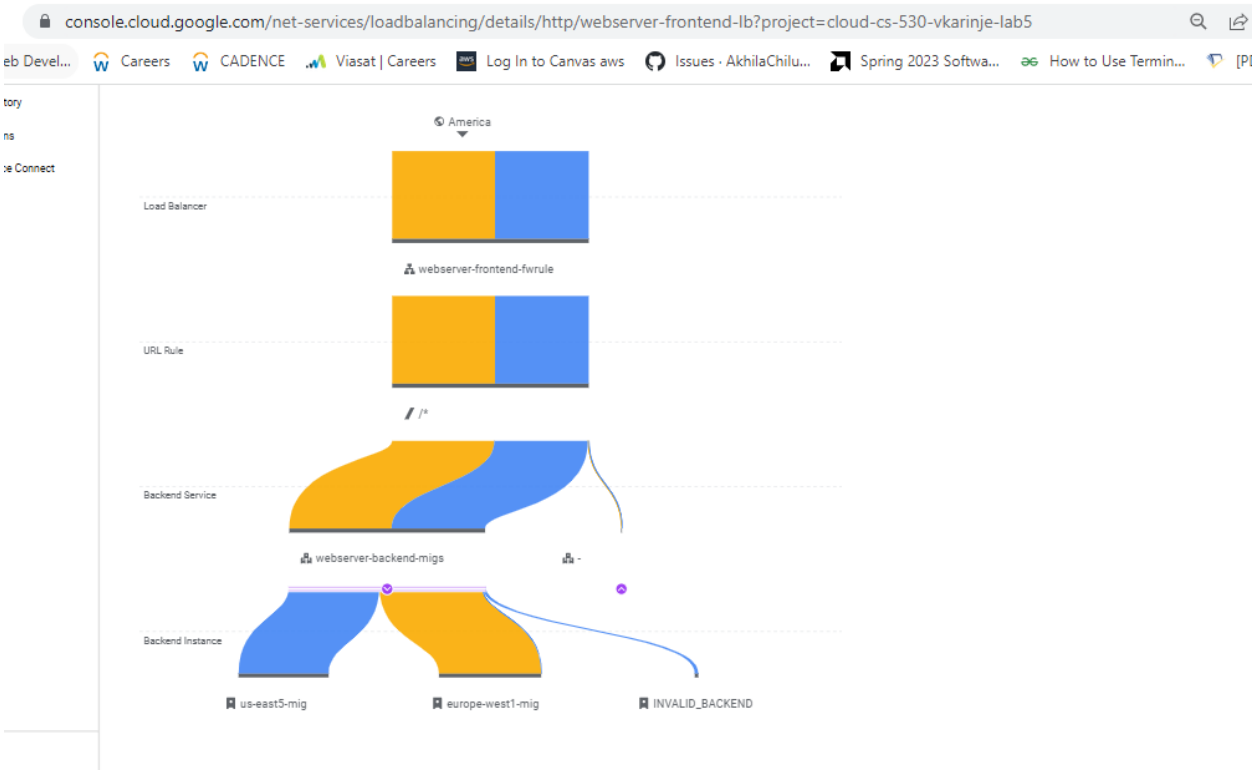
Hosts
Paths
Backend
All unmatched (default)
All unmatched (default)
webserver-backend-migs
Backend
Backend services
1. webserver-backend-migs
Endpoint protocol
Named port
Timeout
Health check
Cloud CDN
Logging
HTTP
http
30 seconds
instance-health-check
Disabled
Disabled
ADVANCED CONFIGURATIONS
Name
Type
Scope
Healthy
Autoscaling
Balancing mode
Selected ports
Capacity
europe-west1-mig
Instance group
europe-west1
1 of 1
No configuration
Max backend utilization: 80%
80
100%
us-east5-mig
Instance group
us-east5
5 of 5
On: Target LB capacity fraction 80%
Max RPS: 50 (per instance)
80
100%


console.cloud.google.com/net-services/loadbalancing/details/http/webserver-frontend-lb?project=cloud-cs-530-vkarinje-lab5
Careers
CADENCE
Viasat | Careers
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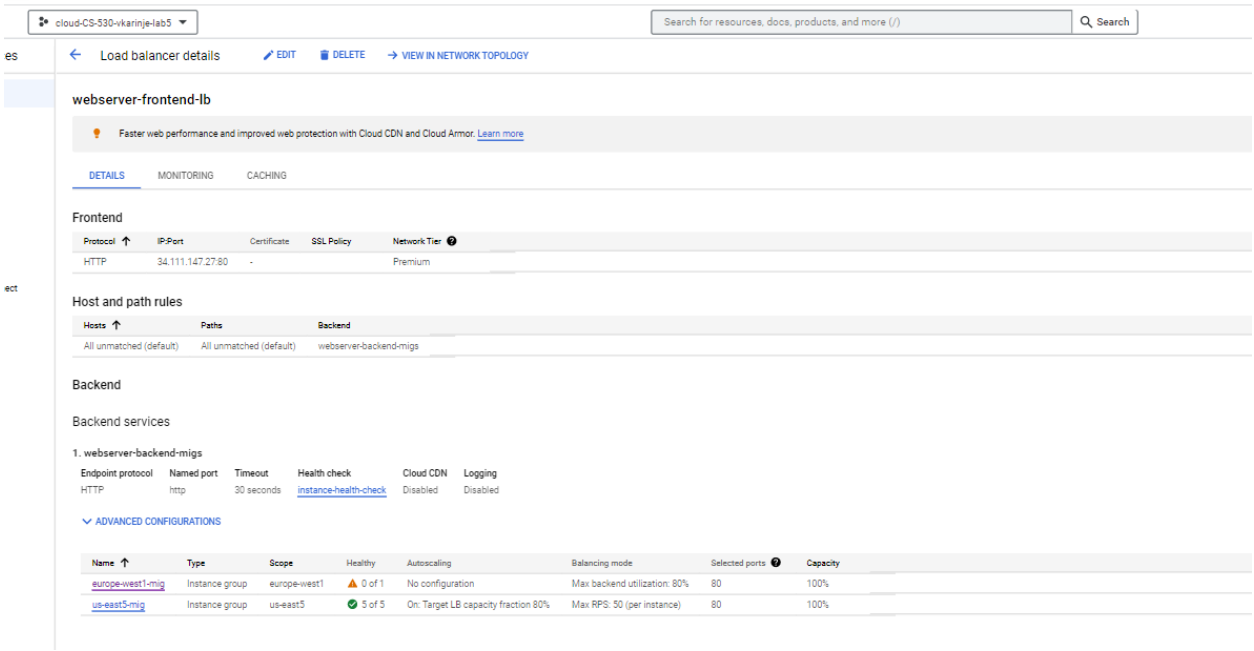
America
Load Balancer
webserver-frontend-fwrule
URL Rule
/*
Backend Service
webserver-backend-migs
-
Backend Instance
us-east5-mig
europe-west1-mig
INVALID_BACKEND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Endpoint protocol
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Name
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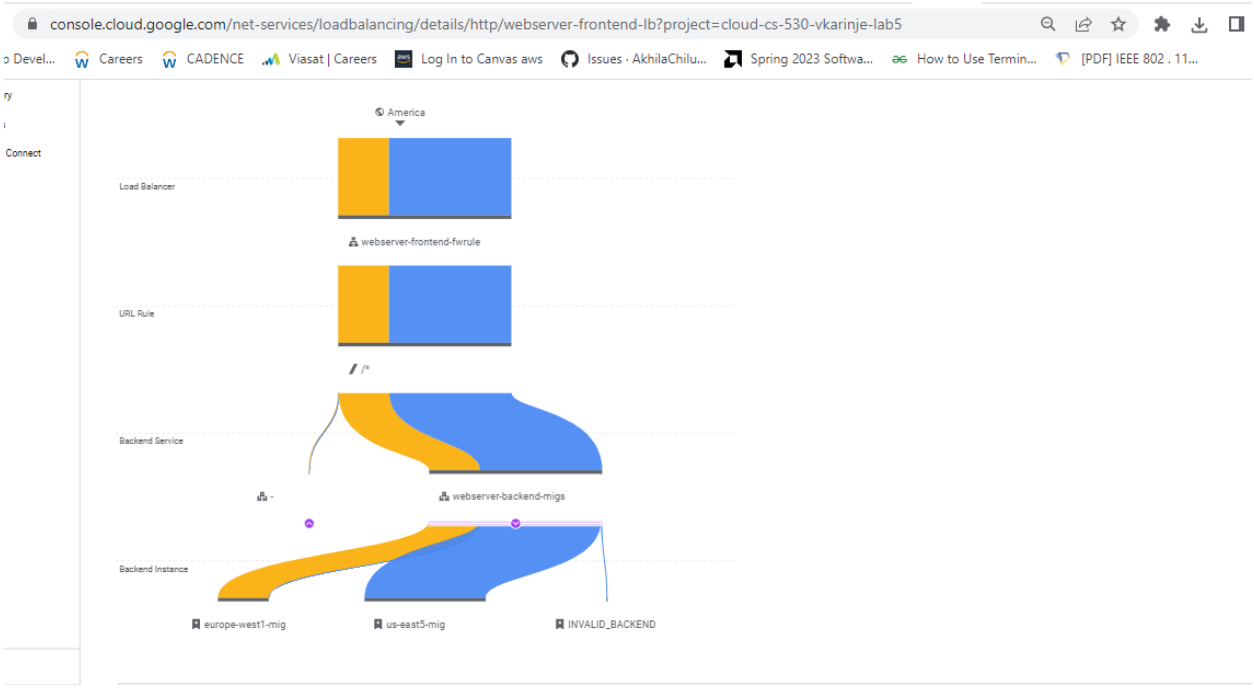
europe-west1-mig
Instance group
europe-west1
0 of 1
No configuration
Max backend utilization: 80%
80
100%
us-east5-mig
Instance group
us-east5
5 of 5
On: Target LB capacity fraction 80%
Max RPS: 50 (per instance)
80
100%


console.cloud.google.com/net-services/loadbalancing/details/http/webserver-frontend-lb?project=cloud-cs-530-vkarinje-lab5
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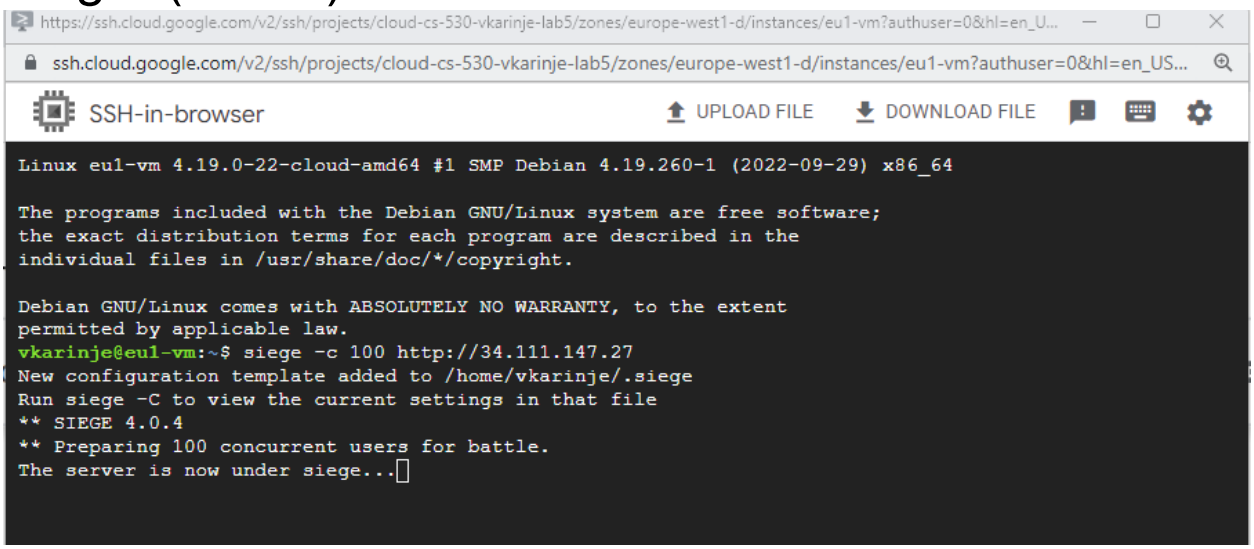
Connect
America
Load Balancer
webserver-frontend-fwrule
URL Rule
/*
Backend Service
webserver-backend-migs
Backend Instance
europe-west1-mig
us-east5-mig
INVALID_BACKEND

Siege! (Part 2)



- Show a screenshot of the final traffic distribution.

console.cloud.google.com/net-services/loadbalancing/details/http/webserver-frontend-lb?project=cloud-cs-530-vkarinje-lab5
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Europe
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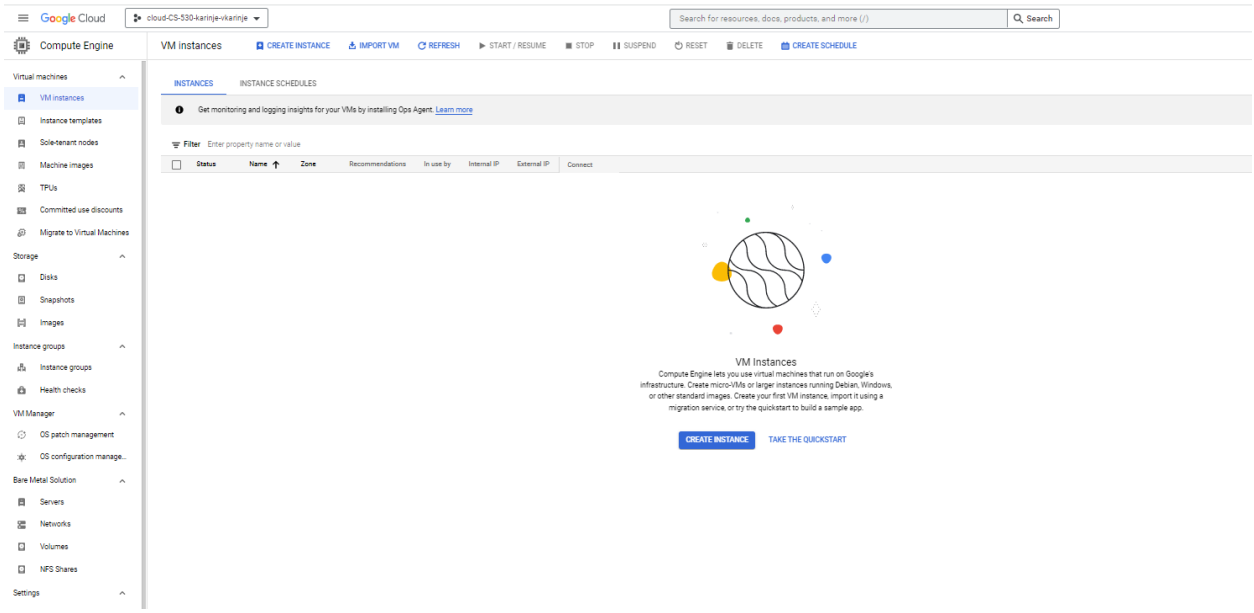
webserver-frontend-fwrule
URL Rule
/*
Backend Service
webserver-backend-migs
Backend Instance
europe-west1-mig
us-east5-mig
INVALID_BACKEND

Clean-up

```
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed delete us-east5-mig --region us-east5
The following region instance group managers will be deleted:
 - [us-east5-mig] in [us-east5]

Do you want to continue (Y/n)?  Y

Deleting autoscaler...working..Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/autoscalers/us-east5-mig-x5j4].
Deleting autoscaler...done.
Deleting Managed Instance Group...working..Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/us-east5/instanceGroupManagers/us-east5-mig].
Deleting Managed Instance Group...done.
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-groups managed delete europe-west1-mig --region europe-west1
The following region instance group managers will be deleted:
 - [europe-west1-mig] in [europe-west1]

Do you want to continue (Y/n)?  Y

Deleting Managed Instance Group...working..Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/regions/europe-west1/instanceGroupManagers/europe-west1-mig].
Deleting Managed Instance Group...done.
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute health-checks delete instance-health-check
The following health checks will be deleted:
 - [instance-health-check]

Do you want to continue (Y/n)?  Y

Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/healthChecks/instance-health-check].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-templates delete us-east5-template
The following instance templates will be deleted:
 - [us-east5-template]

Do you want to continue (Y/n)?  Y

Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/instanceTemplates/us-east5-template].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute instance-templates delete europe-west1-template
The following instance templates will be deleted:
 - [europe-west1-template]

Do you want to continue (Y/n)?  Y

Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/instanceTemplates/europe-west1-template].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud compute firewall-rules delete networking-firewall-allow-http
The following firewalls will be deleted:
 - [networking-firewall-allow-http]

Do you want to continue (Y/n)?  Y

Deleted [https://www.googleapis.com/compute/v1/projects/cloud-cs-530-karinje-vkarinje/global/firewalls/networking-firewall-allow-http].
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$ gcloud deployment-manager deployments delete networking101
The following deployments will be deleted:
- networking101

Do you want to continue (y/N)?  y

Waiting for delete [operation-1669987422494-5eed83fb17449-c21e5d0e-8a74fec9]...done.
Delete operation operation-1669987422494-5eed83fb17449-c21e5d0e-8a74fec9 completed successfully.
vkarinje@cloudshell:~/networking101 (cloud-cs-530-karinje-vkarinje)$
```