



DevOps Lab

CLOUD COMPUTE - GCP

NETWORKING

Home tasks

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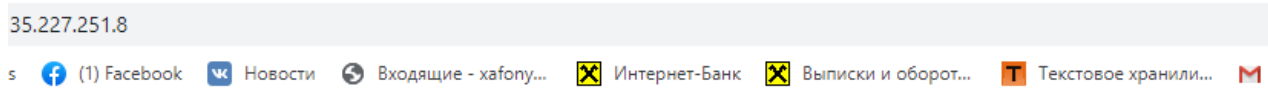
It's aiming to gain knowledge about Networking in Google Cloud.

TASK 1

Learn about two types of [load balancers in Google Cloud Platform](#):

- a L3 [Network Load Balancer](#) and
- a L7 [HTTP\(s\) Load Balancer](#).

Lab Link: [codelabs: LoadBalancers](#)

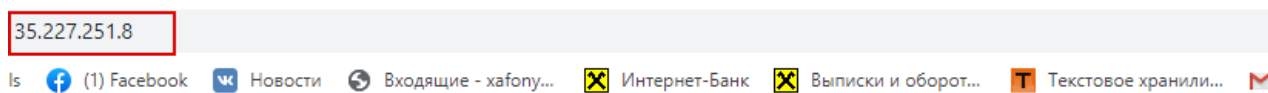


Welcome to Google Cloud Platform - **nginx-ffvz!**

If you see this page, the Google Cloud Platform - nginx-ffvz web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to [nginx.org](#).
Commercial support is available at [nginx.com](#).

Thank you for using Google Cloud Platform - **nginx-ffvz.**



Welcome to Google Cloud Platform - **nginx-dp0b!**

If you see this page, the Google Cloud Platform - nginx-dp0b web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to [nginx.org](#).
Commercial support is available at [nginx.com](#).

Thank you for using Google Cloud Platform - **nginx-dp0b.**

My Project 78845

Search products and resources

Load balancer details
EDIT
DELETE

web-map

Details
Monitoring
Caching

Frontend

Protocol
IP:Port
Network Tier

HTTP	35.227.251.8:80	Premium
------	-----------------	---------

Host and path rules

Hosts
Paths
Backend

All unmatched (default)	All unmatched (default)	nginx-backend
-------------------------	-------------------------	---------------

Backend
Backend services
1. nginx-backend
Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Traffic policy: disabled Health check: http-basic-check
Advanced configurations

Name
Type
Zone
Healthy
Autoscaling
Balancing mode
Capacity
Selected ports

nginx-group	Instance group	us-central1	2 / 2	No configuration		100%	80
-------------	----------------	-------------	-------	------------------	--	------	----

Instance groups
EDIT GROUP
ROLLING UPDATE
ROLLING RESTART/REPLACE
DELETE GROUP
REMOVE FROM GR

nginx-group

Members
Details
Monitoring
Errors

Instance templates
nginx-template

Instances by status
2 in total
2

Location
us-central1
2 zones

Instances by health
Autohealing needs to be configured to get instances health.

Autohealing
Autohealing is not c

Filter group members
Columns

<input type="checkbox"/>	Name	Creation time	Template	Per instance config	Zone	Health check status	Internal IP	External IP	Connect
<input type="checkbox"/>	nginx-dp0b	Sep 1, 2020, 5:14:40 PM	nginx-template		us-central1-b		10.128.0.9 (nic0)	34.123.97.229	SSH
<input type="checkbox"/>	nginx-ffvz	Sep 1, 2020, 5:14:43 PM	nginx-template		us-central1-f		10.128.0.10 (nic0)	35.202.11.75	SSH

TASK 2

The Objectives are to learn:

- How to measure latency between Google Compute Engine [regions and zones](#)
- How to test network connectivity and performance using open source tools
- How to set up basic firewalling to secure your networks
- How to set up a global HTTP Load Balancer with Managed Instance Groups to automatically scale your resources up and down based on request load
- How to test and monitor your HTTP Load Balancer setup

These exercises are ordered to reflect a common cloud developer experience as follows:

1. Set up your lab environment and learn how to work with your GCP environment.
2. Use of common open source tools to explore your network around the world.
3. Deploy a common use case: use of HTTP Load Balancing and Managed Instance Groups to host a scalable, multi-region web server.
4. Testing and monitoring your network and instances.
5. Cleanup.

Lab Link: [codelabs: Networking 101](#)

my-gclb

[Details](#) [Monitoring](#) [Caching](#)

Frontend

Protocol ^	IP:Port	Network Tier ?
HTTP	35.227.251.8:80	Premium

Host and path rules

Hosts ^	Paths	Backend
All unmatched (default)	All unmatched (default)	my-backend-service

Backend

Backend services

1. my-backend-service

Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Traffic policy: disabled Health check: my-http-hc

[Advanced configurations](#)

Name ^	Type	Zone	Healthy	Autoscaling	Balancing mode	Capacity	Selected ports ?
europe-west1-mig	Instance group	europe-west1	3 / 3	No configuration	Max backend utilization: 80%	100%	80
us-east1-mig	Instance group	us-east1	3 / 3	On: Target LB capacity fraction 80%	Max RPS: 50 (per instance)	100%	80

● europe-west1-mig(europe-west1): 0.13/s ● us-east1-mig(us-east1): 2.72/s

Frontend Location
(Total inbound traffic)

Backend

us-east1-mig us-east1	3 of 3 instances healthy ⚠ Backend 5xx errors: 0.60 RPS	Rate: 46.20 RPS
europe-west1-mig europe-west1	3 of 3 instances healthy ⚠ Backend 5xx errors: 0.10 RPS	Backend utilization: Rate: 20.35 RPS

Cloud CDN cache hit: 0.00 RPS (0%)

TASK 3

The Objectives are to learn:

- Setting up NAT gateways
- How to restrict network traffic that certain tiers of an app cannot talk to each other
- Setting up alternate connectivity options to instances
- Map an external service to look like an internal service
- How to setup an Egress proxy limiting access to specific resources

Lab Link: [codelabs: Networking 102](#)

```
[xafonya_gmail_com@nat-node-gcp-eu ~]$ curl google.com | tail
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left   Speed
100 3509 100 3509    0     0  114k      0 --:--:-- --:--:-- --:--:-- 118k
<p>Your cache administrator is <a href="mailto:root?subject=CacheErrorInfo%20-%20ERR_ACCESS_DENIED&body=none%5D%0D%0ATimeStamp%3A%20Wed,%2002%20Sep%202020%2010%3A32%3A35%20GMT%0D%0A%0D%0AClientIP%3A%20192.168.1.1%0D%0AAccept%3A%20*%2F*%0D%0AProxy-Connection%3A%20Keep-Alive%0D%0AHost%3A%20google.com%0D%0A" >root</a>
<br>
</div>

<hr>
<div id="footer">
<p>Generated Wed, 02 Sep 2020 10:32:35 GMT by nat-gw-eu (squid/3.5.20)</p>
<!-- ERR_ACCESS_DENIED -->
</div>
</body></html>
[xafonya_gmail_com@nat-node-gcp-eu ~]$
```

```
[xafonya_gmail_com@nat-node-gcp-eu ~]$ curl 35.184.83.171 | tail -n 20
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload   Total   Spent    Left   Speed
100 10701 100 10701    0     0  743k      0 --:--:-- --:--:-- --:--:-- 803k
Apache2 package with Debian. However, check <a href="http://bugs.debian.org/cgi-bin/pkgreport.cgi?ordering=normal;archive=0&rel=noFollow">existing bug reports</a> before reporting a new bug.

</p>
<p>
Please report bugs specific to modules (such as PHP and others)
to respective packages, not to the web server itself.

</p>
</div>

</div>
</div>
<div class="validator">
</div>
</body>
</html>
```

```
[xafonya_gmail_com@nat-gw-eu ~]$ ssh nat-node-gcp-eu
Last login: Wed Sep 2 10:07:25 2020 from nat-gw-eu.europe-west1-c.c.smooth-era-287810.internal
[xafonya_gmail_com@nat-node-gcp-eu ~]$ gcloud compute instances list
```

NAME	ZONE	MACHINE_TYPE	PREEMPTIBLE	INTERNAL_IP	EXTERNAL_IP	STATUS
nat-gw-eu	europe-west1-c	n1-standard-1		192.168.20.2	34.77.219.174	RUNNING
nat-node-eu	europe-west1-c	n1-standard-1		192.168.20.3		RUNNING
nat-node-gcp-eu	europe-west1-c	n1-standard-1		192.168.20.5		RUNNING
nat-node-w-eu	europe-west1-c	n1-standard-1		192.168.20.4		RUNNING
faux-on-prem-svc	us-central1-f	n1-standard-1		10.128.0.12	35.184.83.171	RUNNING
nat-gw-us	us-central1-f	n1-standard-1		192.168.10.2	34.121.45.5	RUNNING
nat-node-us	us-central1-f	n1-standard-1		192.168.10.3		RUNNING
nat-node-w-us	us-central1-f	n1-standard-1		192.168.10.4		RUNNING

```
[xafonya_gmail_com@nat-node-gcp-eu ~]$
```

TASK 4

The Objectives are to learn:

- Secure app in custom network

Lab Link: [codelabs: custom_network](#)

The image shows two terminal windows side-by-side. The left window is connected to a private VM (private-vm) and shows a successful ping to 192.168.0.2. The right window is connected to a public VM (public-vm) and shows a failed ping to 192.168.1.2 with 100% packet loss. Both windows show the output of the 'ping' command and the 'ping statistics' command.

```

ssh.cloud.google.com/projects/smooth-era-287810/zones/us-central1-b/instances/private-vm
Connected, host fingerprint: ssh-rsa 0 7F:9C:A0:A8:78:7E:EE:E2:14:E9:03:2E:7E:85:85:17:0F:E5:E5:2A:98:0B:67:30:6C:A3:18:DA:73:8A:23
Linux private-vm 4.9.0-13-amd64 #1 SMP Debian 4.9.228-1 (2020-07-05) 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: Wed Sep  2 11:00:08 2020 from 35.235.240.1
xafonya_gmail_com@private-vm:~$ ping 192.168.0.2
PING 192.168.0.2 (192.168.0.2) 56(84) bytes of data.
4 bytes from 192.168.0.2: icmp_seq=1 ttl=64 time=1.42 ms
4 bytes from 192.168.0.2: icmp_seq=2 ttl=64 time=0.292 ms
4 bytes from 192.168.0.2: icmp_seq=3 ttl=64 time=0.278 ms
C
--- 192.168.0.2 ping statistics ---
11 packets transmitted, 3 received, 0% packet loss, time 2021ms
rtt min/avg/max/mdev = 0.278/0.664/1.424/0.537 ms
xafonya_gmail_com@private-vm:~$ ping 35.184.83.171
PING 35.184.83.171 (35.184.83.171) 56(84) bytes of data.
4 bytes from 35.184.83.171: icmp_seq=1 ttl=67 time=1.91 ms
4 bytes from 35.184.83.171: icmp_seq=2 ttl=67 time=1.99 ms
4 bytes from 35.184.83.171: icmp_seq=3 ttl=67 time=1.66 ms
C
--- 35.184.83.171 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 1.667/1.860/1.999/0.140 ms
xafonya_gmail_com@private-vm:~$

ssh.cloud.google.com/projects/smooth-era-287810/zones/us-central1-a/instances/public-vm?u
Connected, host fingerprint: ssh-rsa 0 F0:28:1D:8B:10:21:45:DF:E5:31:66:DC:E7:21:C2:4C:1C1:EE:24:42:42:76:4C:10:F:29:8D:E4:FE:39:DB:2A:87:02
Linux public-vm 4.9.0-13-amd64 #1 SMP Debian 4.9.228-1 (2020-07-05) 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.
Creating directory '/home/xafonya_gmail_com'.
xafonya_gmail_com@public-vm:~$ ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2) 56(84) bytes of data.
^C
--- 192.168.1.2 ping statistics ---
11 packets transmitted, 0 received, 100% packet loss, time 10221ms
xafonya_gmail_com@public-vm:~$ ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2) 56(84) bytes of data.
64 bytes from 192.168.1.2: icmp_seq=1 ttl=64 time=1.42 ms
64 bytes from 192.168.1.2: icmp_seq=2 ttl=64 time=0.257 ms
64 bytes from 192.168.1.2: icmp_seq=3 ttl=64 time=0.275 ms
^C
--- 192.168.1.2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2024ms
rtt min/avg/max/mdev = 0.257/0.651/1.422/0.545 ms
xafonya_gmail_com@public-vm:~$ ping 104.154.226.252
PING 104.154.226.252 (104.154.226.252) 56(84) bytes of data.
^C
--- 104.154.226.252 ping statistics ---
6 packets transmitted, 0 received, 100% packet loss, time 5115ms
xafonya_gmail_com@public-vm:~$
  
```

TASK 5

Create network configuration via terraform.

Resources should be used:

- 1) **google_compute_network** (to create network)

https://www.terraform.io/docs/providers/google/r/compute_network.html

Network name: \${student_name}-vpc

VPC networks								
		CREATE VPC NETWORK		REFRESH				
Name ↑	Region	Subnets	Mode	IP address ranges	Gateways	Firewall Rules	Global dynamic routing	Flow logs
▼ alexey-vpc		2	Custom			2	Off	
	us-central1	private-subnet		10.1.2.0/24	10.1.2.1			Off
	us-central1	public-subnet		10.1.1.0/24	10.1.1.1			Off

- 2) **google_compute_firewall**

(to create rules for external (allow 80,22) /internal access (allow 0-65535))

https://www.terraform.io/docs/providers/google/r/compute_firewall.html

← VPC network details [EDIT](#) [DELETE VPC NETWORK](#)

alexey-vpc

Description

Custom virtual private network for task 3

Subnet creation mode

Custom subnets

Dynamic routing mode

Regional

DNS server policy

None

Subnets Static internal IP addresses **Firewall rules** Routes VPC Network Peering Private service connection

[Add firewall rule](#) [Delete](#)

Filter resources

Columns

<input type="checkbox"/>	Name	Type	Targets	Filters	Protocols / ports	Action	Priority	Logs	Hit count	?	Last hit	?
<input type="checkbox"/>	external-fwr	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:80,22	Allow	1000	Off	—		—	
<input type="checkbox"/>	internal-fwr	Ingress	Apply to all	IP ranges: 10.1.0.0/16	tcp:0-65535 udp:0-65535	Allow	1000	Off	—		—	

3) google_compute_subnetwork

https://www.terraform.io/docs/providers/google/r/compute_subnetwork.html

ranges:

- Public range: 10."\${student_IDnum}".1.0/24
- Private range: 10."\${student_IDnum}".2.0/24

← VPC network details [EDIT](#) [DELETE VPC NETWORK](#)

alexey-vpc

Description

Custom virtual private network for task 3

Subnet creation mode

Custom subnets

Dynamic routing mode

Regional

DNS server policy

None

Subnets Static internal IP addresses Firewall rules Routes VPC Network Peering Private service connection

[Add subnet](#) [Flow logs](#)

<input type="checkbox"/>	Name ^	Region	IP address ranges	Gateway	Private Google access	Flow logs	?
<input type="checkbox"/>	private-subnet	us-central1	10.1.2.0/24	10.1.2.1	Off	Off	
<input type="checkbox"/>	public-subnet	us-central1	10.1.1.0/24	10.1.1.1	Off	Off	

Reserved subnets for internal HTTP(S) load balancers ?

<input type="checkbox"/>	Name	Region ^	IP address ranges	Gateway	Role
--------------------------	------	----------	-------------------	---------	------

No matching results

4) google_compute_instance

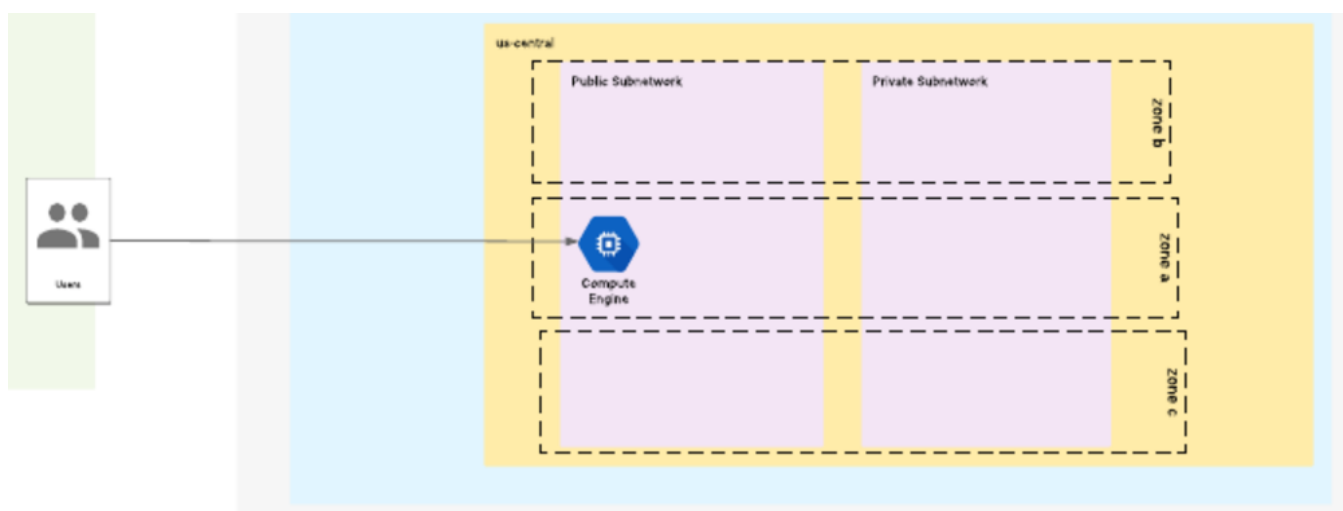
https://www.terraform.io/docs/providers/google/r/compute_instance.html

1. nginx with default page “Hello from \${student_name}”

All resources should contain description (where it's possible)

The screenshot shows the Google Cloud Platform console for project 'smooth-era-287810'. The 'VM instances' page lists one instance, 'task3-instance', in the 'us-central1-a' zone with an internal IP of '10.1.1.2 (nic0)' and an external IP of '34.121.45.5'. A separate box shows the default nginx page 'Hello from alexey'.

Network topology.



All reports/code please place into repository:

<https://github.com/MNT-Lab/google-cloud-module> into appropriate branches: *first char of name + surname*.

For example:

Student: Siarhei Ivanou

Branch Name: **sivanou**

Format depends on case: README.md/scripts/terraform files

Email pattern: [MNT-CD-10.3]-FirstName-LastName

Email should contain the link to personalized branch.