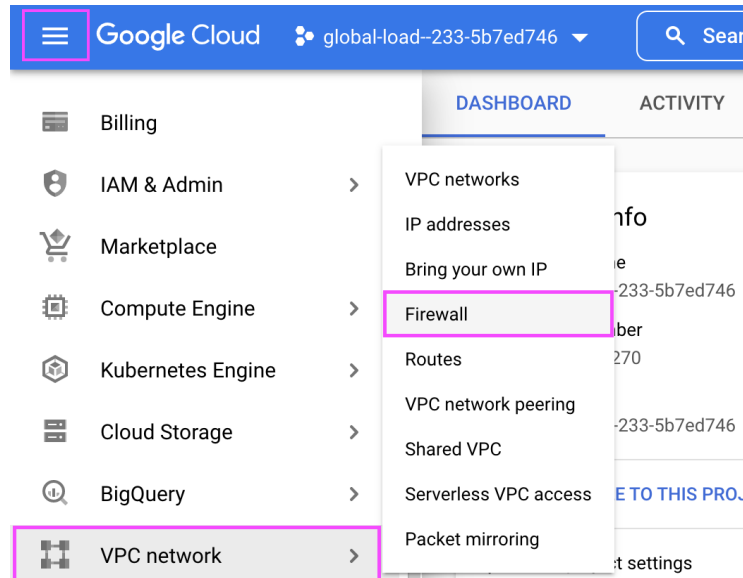
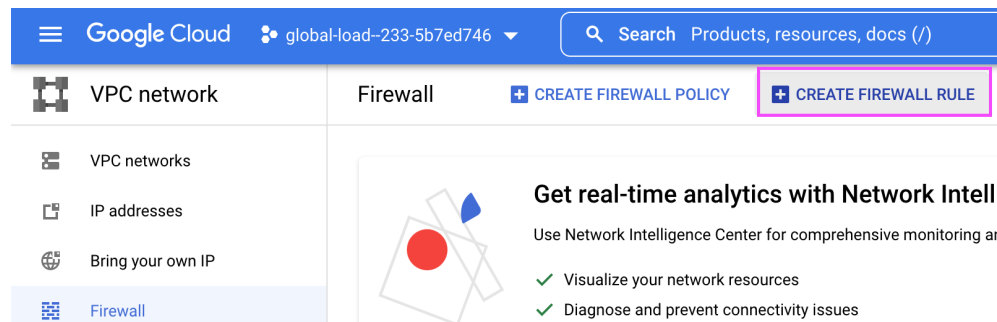


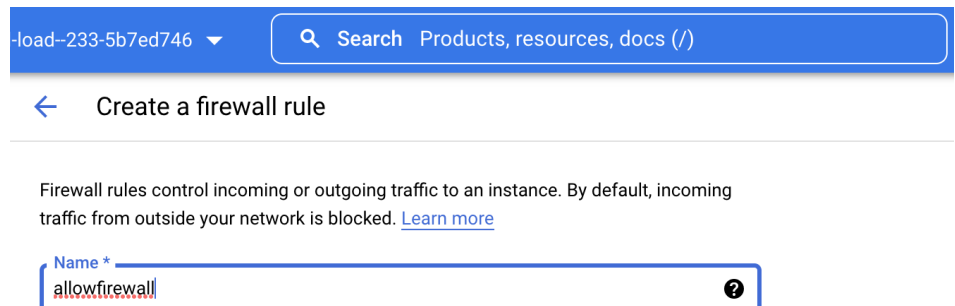
1. Set up the firewall rule
 - a. Select “VPC Network” from the GC menu
 - b. “Firewall”



c. “Create Firewall Rule”



- i. Assign firewall rule a name for incoming and outgoing traffic to an instance



- ii. Scroll down, and give “target tag” a name tag, meaning that the firewall rule will apply to any VM that has this tag. I use the tag: http-server

- iii. For “source IP ranges” enter 0.0.0.0/0, which means the entire internet

Targets
Specified target tags

Target tags *
http-server

Source filter
IPv4 ranges

Source IPv4 ranges *
0.0.0.0/0 for example, 0.0.0.0/0, 192.168.2.0/24

- iv. Under “Protocols and ports” select “Specified protocols and ports”; checkmark box next to “TCP”, and in the “ports” section besides it enter “80”
- v. Click “Create”

Protocols and ports

☐ Allow all

☒ Specified protocols and ports

☒ TCP

Ports
80
E.g. 20, 50-60

☐ UDP

Ports
E.g. all

☐ Other

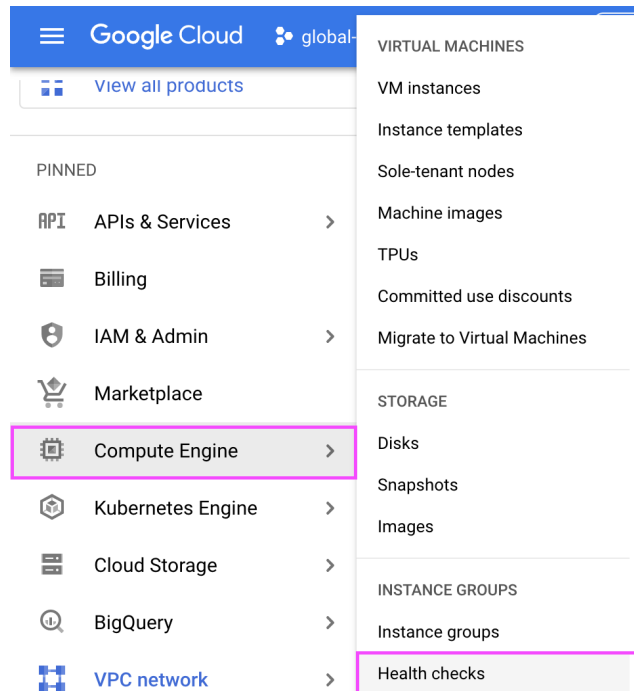
Protocols
Separate multiple protocols by commas, e.g. ah, sctp

DISABLE RULE

CREATE CANCEL

2. Set up the http health check

- Select “Compute Engine” from the top left menu corner
- Click “Health Checks”



c. “Create Health Check”

Compute Engine

Health checks

A health check determines whether a VM instance is healthy by sending requests to the instance. An instance is considered healthy if it returns consecutive responses within a specified time. Health checks are used for load balancing and autoscaling managed instance groups. [Learn more](#)

[CREATE A HEALTH CHECK](#)

i. Name the health check; ex: http-port-80

← Create a health check

Health checking mechanisms determine whether VM instances respond properly to traffic. You cannot create a legacy health check using this page. For more information, refer to the [Health Checks Concepts](#) documentation.

Name *

http-port-80

?

Lowercase, no spaces.

Description

- ### Health criteria

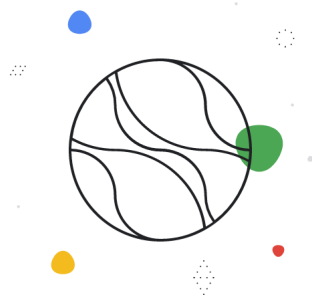
Check interval *	seconds	?	Timeout *	seconds	?
10			5		
Healthy threshold *					
3	consecutive successes				
Unhealthy threshold *					
3	consecutive failures				

CREATE **CANCEL** EQUIVALENT COMMAND LINE

- The screenshot shows the Google Cloud Platform console interface. On the left sidebar, under the 'Compute Engine' section, the 'Instance groups' option is highlighted with a red rectangle. The main panel displays the 'Health checks' page. At the top right of this panel are three buttons: '+ CREATE HEALTH CHECK' (blue), 'REFRESH' (blue circular arrow), and 'DELETE' (grey trash can). Below these buttons is a paragraph explaining that health checks determine if applications on VMs respond to requests and are used for load balancing and autohealing. A 'Learn more' link is provided. Underneath is a search bar labeled 'Filter' with the placeholder text 'Enter property name or value'. Below the search bar is a table listing health checks. The table has columns: Name, Scope, Region, Host, Path, Protocol, Port, and In use by. One health check is listed with the name 'http-port-80' (a blue hyperlink), a scope of 'Global', and a port of '80'. The 'In use by' column is currently empty.

Name	Scope	Region	Host	Path	Protocol	Port	In use by
http-port-80	Global				TCP	80	

- c. 
- d. “Create Instance Group”



Instance Groups

Instance groups let you organize VM instances or use them in a load-balancing backend service. You can group existing instances or create a group based on an instance template. [Learn more](#)

CREATE INSTANCE GROUP

e. Give instance group a “name”; ex: apache

Set up automatic management for a group of stateless VMs, including updates, regional deployments, load balancing, autoscaling, and autohealing. [Learn more](#)

Name *
apache

Name is permanent

Description

Instance template *

Number of instances
Based on autoscaling configuration

f. Under “Location” give instance group high availability by selecting “Multiple zones”

Location

For higher availability, select multiple zones in a region instead of a single zone. [Learn more](#)

☐ Single zone

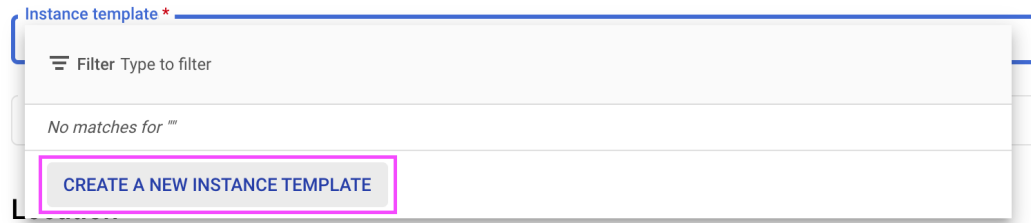
☒ Multiple zones

Region *
us-central1 (Iowa)

Zones
us-central1-c, us-central1-f, and us-central1-b

Target distribution shape
Even

g. Scroll down and under the “instance template” dropdown select “Create new instance template”



- i. “Name” the template
- ii. Change “machine type” to “e2-small”

Create an instance template

Name *
apache-template

Labels ?

+ ADD LABELS

Machine configuration

Machine family

GENERAL-PURPOSE

COMPUTE-OPTIMIZED

MEMORY-OPTIMIZED

GPU

Machine types for common workloads, optimized for cost and flexibility

Series

E2

CPU platform selection based on availability

Machine type

e2-small (2 vCPU, 2 GB memory)



vCPU

0.5-2 vCPU (1 shared core)

Memory

2 GB

✓ CPU PLATFORM AND GPU

- iii. Under “Firewall” select “allow HTTP traffic”, which will assign the HTTP server network tag to instances created from this template

Identity and API access ?

Service accounts ?

Access scopes ?

- ☒ Allow default access
- ☐ Allow full access to all Cloud APIs
- ☐ Set access for each API

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- ☒ Allow HTTP traffic
- ☐ Allow HTTPS traffic

Advanced options

Networking, disks, security, management, sole-tenancy



You can create this instance template free of charge

- iv. Expand the “Advanced options” menu to open the “Management” section
 1. Under “Automation”, enter in a startup script, which updates the system packages, installs the apache web server, queries the metadata server to get the zone the VM is currently running in, assigns it to the environment variable zone, and creates a basic webpage using the variable to tell us where the server is serving from
- v. Click “Save and Continue” to create the instance template

Management

Description, deletion protection, reservations, automation, and availability policies

Description

Reservations

Automatically use created reservation

Use an existing reservation when creating an instance from this template

Automation

Startup script

```
#!/bin/bash
sudo apt update
sudo apt -y install apache2
ZONE=`curl -fs http://metadata/computeMetadata/v1/instance/zone -H
"Metadata-Flavor: Google" | cut -d'/' -f4`
cat <<EOF > /var/www/html/index.html
<html><body><h1>Hello Cloud Gurus</h1>
<p>This server is serving from ${ZONE}</p>
</body></html>
EOF
```

You can choose to specify a startup script that will run when your instance boots up or restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. [Learn more](#)

SAVE AND CONTINUE

CANCEL

- h. Under “Autoscaling” set the “Minimum number of instances” to “3”, and “Maximum number of instances” to “5”

Autoscaling

Use autoscaling to automatically add and remove instances to the group for periods of high and low load. [Learn more](#)

Autoscaling mode

On: add and remove instances to the group

Minimum number of instances *

3

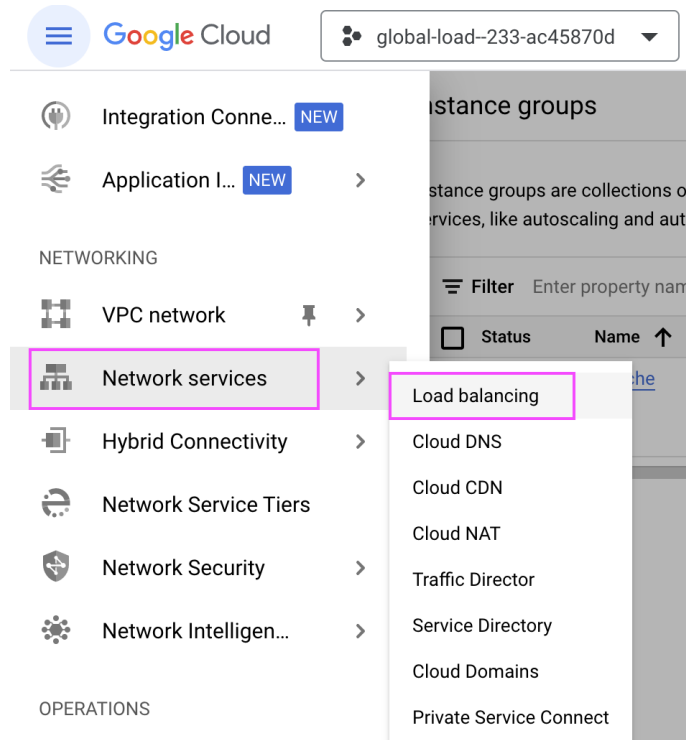


Maximum number of instances *

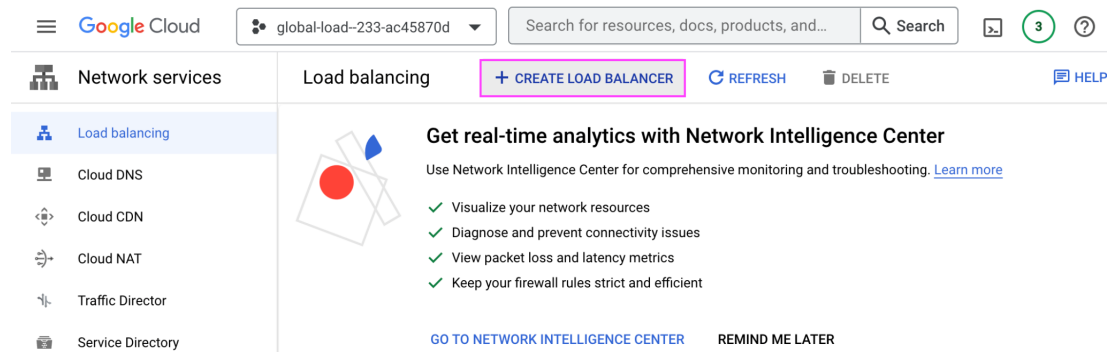
5



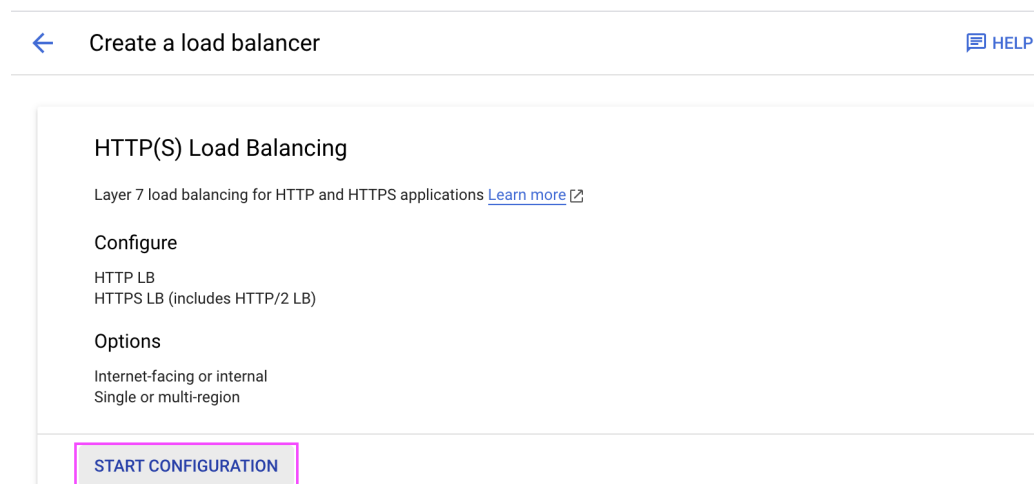
- i. Under “Autohealing” select the “http-port-80”
- j. Click “Create” to create the managed instance group



c. “Create load balancer”



d. In “HTTP(S) Load Balancing” box click “Start Configuration”



- e. “Name” the load balancer; ex: apache-lb
- f. Create a “Backend configuration”
 - i. From “Backend services & backend buckets” dropdown menu, select “Create a backend service”; “ok”

← New HTTP(S) load balancer HELP ASSISTANT

Name *
apache-lb
Lowercase, no spaces.

☒ Frontend configuration

☒ Backend configuration

- Routing rules
- Review and finalize (optional)

Backend configuration

Create or select a backend service for incoming traffic. You can add multiple backend services and backend buckets to serve different types of content.

Backend services & backend buckets

Filter Type to filter

No matches for ""

CREATE A BACKEND SERVICE **CREATE A BACKEND BUCKET**

CANCEL **OK**

- ii. Assign backend service a “name”; ex: apache-backend

Create backend service

Name *
apache-backend
Lowercase, no spaces.

Description

Backend type
Instance group

Protocol
HTTP

Named port *
http

Timeout *
30 seconds

- iii. Under “new backend” section select the “apache” instance group

Backends

New backend

Instance group *

Filter Type to filter

apache (us-central1, multi-zone)

Balancing mode ?

☒ Utilization

☐ Rate

Maximum backend utilization * 80 % ?

Maximum RPS RPS ? Scope per instance

Capacity * 100 % ?

- iv. Under “port numbers” select “80”

Backends

Regions

us-central1

New backend

Instance group *

apache

Port numbers * 80

Balancing mode ?

☒ Utilization

☐ Rate

Maximum backend utilization * 80 % ?

Maximum RPS RPS ? Scope per instance

Capacity * 100 % ?

CREATE CANCEL

- v. “Done”
- vi. For “Health check” section, select the health check that was created earlier

vii. “Create”

Create backend service

1 hour 1 hour

Maximum time to live
1 day

Cache key
Default (include all components of a request URL)

Health check *

Filter | Type to filter

http-port-80
port: 80, timeout: 5s, check interval: 10s, unhealthy threshold: 3 attempts

CREATE A HEALTH CHECK

Cloud Armor backend security policy

Cloud Armor edge security policy

ADVANCED CONFIGURATIONS

CREATE CANCEL

g. Create a “Frontend Configuration”

i. Assign frontend service a “name”; ex: apache-frontend

New HTTP(S) load balancer

NAME *
apache-lb
Lowercase, no spaces.

Frontend configuration

Backend configuration

Routing rules

Review and finalize (optional)

Frontend configuration

Configure the load balancer's frontend IP address, port, and protocol.
Configure an SSL certificate if using HTTPS.

New Frontend IP and port

Name
apache-frontend
Lowercase, no spaces.

ii. “Done”

h. “Create”

5. Test the load balancer

- a. Once load balancer is finished creating, click on it's name, copy the IP address on the frontend, and load it in your browser

LOAD BALANCERS

BACKENDS

FRONTENDS

Filter

Enter property name or value

?

⋮

<input type="checkbox"/>	Name	Load balancer type ↑	Protocols	Region	Backends
<input type="checkbox"/>	<div>apache-lb</div>	HTTP(S)	HTTP		<div><div>✓</div>1 backend service (1 instance group, 0 network endpoint groups)</div> <div>⋮</div>

←

Load balancer details

EDIT

DELETE

apache-lb

Faster web performance and improved web protection with Cloud CDN and Cloud Armor. [Learn more](#)

DISMISS

DETAILS	MONITORING	CACHING
---------	------------	---------

Frontend

Protocol ↑	IP:Port	Certificate	SSL Policy	Network Tier ?
HTTP	34.117.226.141:80	-		Premium