

## Lab 2: Cloud Project

### Step 1: Create the VPC network

We create a VPC network with two subnets, one for the US region and one for the EU region.

[←](#) Create a VPC network

Name \*

bvh-vpc-os3

Lowercase letters, numbers, hyphens allowed

Description

Virtual Private Network for OS3 lab 2 assignment

### Subnets

Subnets let you create your own private cloud topology within Google Cloud. Click Automatic to create a subnet in each region, or click Custom to manually define the subnets. [Learn more](#)

**Subnet creation mode**

☒ Custom

☐ Automatic

Edit subnet

Name \*

bvh-subnet1

Lowercase letters, numbers, hyphens allowed

Description

Region \*



europa-west1

IP address range \*

192.168.0.0/24

CREATE SECONDARY IP RANGE

### Edit subnet



Name \*

bvh-subnet2

Lowercase letters, numbers, hyphens allowed

?

Description

//

Region \*

us-east1

▼

?

IP address range \*

192.168.1.0/24

?

CREATE SECONDARY IP RANGE

Private Google access

?

☐ On

☒ Off

Flow logs

Turning on VPC flow logs doesn't affect performance, but some systems generate a large number of logs, which can increase costs in Stackdriver. [Learn more](#)

☐ On

☒ Off

DONE

## Step 2: Create the Firewall rules

We will need two firewall rules: one that allows HTTP traffic from port 80 and one that allows SSH from port 22 so we can connect to our VMs.

←

Create a firewall rule

Firewall rules control incoming or outgoing traffic to an instance. By default, incoming traffic from outside your network is blocked. [Learn more](#)

Name \*

bvh-allow-http

?

Lowercase letters, numbers, hyphens allowed

Description

Logs

Turning on firewall logs can generate a large number of logs which can increase costs in Stackdriver. [Learn more](#)

☐ On

☒ Off

Network \*

bvh-vpc-os3

▼

?

Priority \*

1000

CHECK PRIORITY OF OTHER FIREWALL RULES

?

Priority can be 0 - 65535

Direction of traffic

?

☒ Ingress

☐ Egress

Action on match

?

☒ Allow

☐ Deny

Targets

Specified target tags

▼

?

Target tags \*

front-web

×

Source filter

IP ranges

▼

?

Source IP ranges \* ?

0.0.0.0/0 ✕ for example, 0.0.0.0/0, 192.168.2.0/24

Second source filter

None ▼ ?

Protocols and ports ?

- ☐ Allow all
- ☒ Specified protocols and ports

☒ tcp : 80

☐ udp : all


☐ Other protocols

protocols, comma separated, e.g. ah, sctp


▼ DISABLE RULE


CREATE

CANCEL



 Create a firewall rule


Firewall rules control incoming or outgoing traffic to an instance. By default, incoming traffic from outside your network is blocked. [Learn more](#)


**Name \***  
bvh-allow-ssh   
Lowercase letters, numbers, hyphens allowed


Description 



**Logs**  
Turning on firewall logs can generate a large number of logs which can increase costs in Stackdriver. [Learn more](#)  
☐ On  
☒ Off



**Network \***  
bvh-vpc-os3  



**Priority \***  
1000 [CHECK PRIORITY OF OTHER FIREWALL RULES](#)   
Priority can be 0 - 65535

**Direction of traffic**   
☒ Ingress  
☐ Egress

**Action on match**   
☒ Allow  
☐ Deny

**Targets**  
All instances in the network  

**Source filter**  
IP ranges  

**Source IP ranges \***  
0.0.0.0/0  for example, 0.0.0.0/0, 192.168.2.0/24 

Second source filter

None

Protocols and ports

☐ Allow all

☒ Specified protocols and ports

☒ tcp :

22

☐ udp :

all

☐ Other protocols

protocols, comma separated, e.g. ah, sctp

▼ DISABLE RULE

CREATE

CANCEL

### Step 3: Provision VMs

We will need one VM for the admin service and one VM for the video service to ensure that updates can be rolled out without affecting one another.

Name ?  
Name is permanent

bvh-admin-vm

Labels ? (Optional)

+ Add label

Region ?  
Region is permanent

Zone ?  
Zone is permanent

europa-west1 (Belgium)

europa-west1-b

Machine configuration

Machine family

General-purpose | Compute-optimized | Memory-optimized

Machine types for common workloads, optimized for cost and flexibility


Series

N1

Powered by Intel Skylake CPU platform or one of its predecessors

Machine type

f1-micro (1 vCPU, 614 MB memory)



vCPU	Memory	GPUs
1 shared core	614 MB	-

⌵ CPU platform and GPU


Confidential VM service ?

☐ Enable the Confidential Computing service on this VM instance.

Container ?


☐ Deploy a container image to this VM instance. [Learn more](#)

Boot disk ?



New 10 GB balanced persistent disk

Image

 Ubuntu 20.04 LTS

Change

Management

Security

Disks

Networking

Sole Tenancy

Network tags ? (Optional)

front-web x

Hostname ?  
Set a custom hostname for this instance or leave it default. Choice is permanent

bvh-admin-vm.europe-west1-b.c.micro-answer-307313.internal

Network interfaces ?  
Network interface is permanent

Network interface

Network ?  
bvh-vpc-os3

Subnetwork ?  
bvh-subnet1 (192.168.0.0/24)

Primary internal IP ?  
Ephemeral (Automatic)

⌵ Show alias IP ranges

External IP ?  
Ephemeral

Network Service Tier ?  
☒ Premium (Current project-level tier, change) ?  
☐ Standard (europe-west1) ?

IP forwarding ?  
Off

Public DNS PTR Record ?  
☐ Enable

PTR domain name

Done Cancel

This VM will be deployed in the Europe-west1 region using the “front-web” network-tag and a custom VPC “bvh-vpc-os3”.



**Name** ⓘ  
Name is permanent

**Labels** ⓘ (Optional)  

+ Add label

**Region** ⓘ  
Region is permanent

**Zone** ⓘ  
Zone is permanent

**Machine configuration**

**Machine family**  


General-purpose Compute-optimized Memory-optimized

Machine types for common workloads, optimized for cost and flexibility

**Series**  

Powered by Intel Skylake CPU platform or one of its predecessors

**Machine type**




vCPU	Memory	GPUs
1 shared core	614 MB	-

⌵ CPU platform and GPU

**Confidential VM service** ⓘ  
☐ Enable the Confidential Computing service on this VM instance.

**Container** ⓘ  
☐ Deploy a container image to this VM instance. [Learn more](#)

**Boot disk** ⓘ



New 10 GB balanced persistent disk

Image

🛡️ Ubuntu 20.04 LTS

Change

9

Management

Security

Disks

Networking

Sole Tenancy

Network tags

(Optional)

front-web

Hostname

Set a custom hostname for this instance or leave it default. Choice is permanent

bvh-video-vm.europe-west1-b.c.micro-answer-307313.internal

Network interfaces

Network interface is permanent

Network interface

Network

bvh-vpc-os3

Subnetwork

bvh-subnet1 (192.168.0.0/24)

Primary internal IP

Ephemeral (Automatic)

Show alias IP ranges

External IP

Ephemeral

Network Service Tier

☒ Premium (Current project-level tier, [change](#))

☐ Standard (europe-west1)

IP forwarding

Off

Public DNS PTR Record

☐ Enable

PTR domain name

Done

Cancel

This VM will be deployed in the Europe-west1 region using the “front-web” network-tag and a custom VPC “bvh-vpc-os3”.

This results in the following:

Filter VM instances							Columns
<input type="checkbox"/> Name ^	Zone	Recommendation	In use by	Internal IP	External IP	Connect	
<input type="checkbox"/> <input checked="" type="checkbox"/> bvh-admin-vm	europe-west1-b			192.168.0.2 (nic0)	34.78.227.201	SSH	⋮
<input type="checkbox"/> <input checked="" type="checkbox"/> bvh-video-vm	europe-west1-b			192.168.0.3 (nic0)	34.76.171.174	SSH	⋮

We will now connect to our VMs using SSH and execute the following script on both VMs:

```
#!/bin/bash
apt-get update
apt-get install apache2 -y
a2ensite default-ssl
a2enmod ssl
vm_hostname="$(curl -H "Metadata-Flavor:Google" \
  http://169.254.169.254/computeMetadata/v1/instance/name)"
echo "Page served from: $vm_hostname" | \
tee /var/www/html/index.html
```

```
root@bvh-admin-vm:~# systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2021-03-16 12:46:53 UTC; 17s ago
     Docs: https://httpd.apache.org/docs/2.4/
  Main PID: 2286 (apache2)
    Tasks: 55 (limit: 682)
   Memory: 5.4M
   CGroup: /system.slice/apache2.service
           └─2286 /usr/sbin/apache2 -k start
             └─2288 /usr/sbin/apache2 -k start
               └─2289 /usr/sbin/apache2 -k start


Mar 16 12:46:53 bvh-admin-vm systemd[1]: Starting The Apache HTTP Server...
Mar 16 12:46:53 bvh-admin-vm systemd[1]: Started The Apache HTTP Server.
```

```
root@bvh-video-vm:~# systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2021-03-16 12:50:15 UTC; 28s ago
     Docs: https://httpd.apache.org/docs/2.4/
  Main PID: 2247 (apache2)
    Tasks: 55 (limit: 682)
   Memory: 5.4M
   CGroup: /system.slice/apache2.service
           └─2247 /usr/sbin/apache2 -k start
             └─2249 /usr/sbin/apache2 -k start
               └─2250 /usr/sbin/apache2 -k start

Mar 16 12:50:15 bvh-video-vm systemd[1]: Starting The Apache HTTP Server...
Mar 16 12:50:15 bvh-video-vm systemd[1]: Started The Apache HTTP Server.
```

## Step 4: Create disk image

We create the disk images for video and admin from the VMs created in the previous step. This image will be available in multiple regions because of growing demand in the US and Europe.

 **Compute Engine**

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

**Images**

Instance groups


Instance groups

Health checks

VM Manager

OS patch management

Marketplace

 **Create an image**

**Name** ?  
Name is permanent

**Source** ?  

Disk

**Source disk** ?  

bvh-admin-vm

**Location** ?  

☒ Multi-regional  
☐ Regional

eu (European Union) (default)

**Family** (Optional) ?

**Description** (Optional)

**Labels** ? (Optional)  

+ Add label

**Encryption**  
Data is encrypted automatically. Select an encryption key management solution.  

☒ Google-managed key  
No configuration required  
☐ Customer-managed key  
Manage via Google Cloud Key Management Service  
☐ Customer-supplied key  
Manage outside of Google Cloud

You will be billed for this image. [Compute Engine pricing](#)

Create

Cancel

**Compute Engine**

**Create an image**

**Virtual machines**

- VM instances
- Instance templates
- Sole-tenant nodes
- Machine images
- TPUs
- Migrate for Compute Engi...
- Committed use discounts

**Storage**

- Disks
- Snapshots
- Images**

**Instance groups**

- Instance groups
- Health checks

**VM Manager**

- OS patch management

**Marketplace**

**Name** ⓘ  
Name is permanent  
bvh-video-image

**Source** ⓘ  
Disk

**Source disk** ⓘ  
bvh-video-vm

**Location** ⓘ  
☒ Multi-regional  
☐ Regional  
eu (European Union) (default)

**Family (Optional)** ⓘ

**Description (Optional)**

**Labels** ⓘ (Optional)  
[+ Add label](#)

**Encryption**  
Data is encrypted automatically. Select an encryption key management solution.

- ☒ **Google-managed key**  
No configuration required
- ☐ **Customer-managed key**  
Manage via Google Cloud Key Management Service
- ☐ **Customer-supplied key**  
Manage outside of Google Cloud

You will be billed for this image. [Compute Engine pricing](#)

**Create** **Cancel**

We can now delete both VM instances that were created in step 3.

## Step 5: Create the instance template

We will now create two instance templates (one for each region) for both our video and admin services using the disk images created in the previous step.

Admin, EU:

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

Images

Instance groups

Instance groups

Health checks

VM Manager

OS patch management

Create an instance template

Describe a VM instance once and then use that template to create groups of identical instances [Learn more](#)

Name <sup>?</sup>  
Name is permanent  
bvh-admin-instance-eu

Machine configuration

Machine family  
General-purpose Compute-optimized Memory-optimized GPU  
Machine types for common workloads, optimized for cost and flexibility

Series  
N1  
Powered by Intel Skylake CPU platform or one of its predecessors

Machine type  
f1-micro (1 vCPU, 614 MB memory)

vCPU  
1 shared core

Memory  
614 MB

GPUs  
-

CPU platform and GPU

Confidential VM service <sup>?</sup>  
☐ Enable the Confidential Computing service on this VM instance.

Container <sup>?</sup>  
☐ Deploy a container image to this VM instance. [Learn more](#)

Boot disk <sup>?</sup>  

New 10 GB balanced persistent disk  
Image  
bvh-admin-image

Change

Management Security Disks **Networking** Sole Tenancy

Network <sup>?</sup>  
bvh-vpc-os3

Subnet <sup>?</sup>  
bvh-subnet1 (europe-west1, 192.168.0.0/24)

Show alias IP ranges

Network tags <sup>?</sup> (Optional)  
front-web

External IP <sup>?</sup>  
Ephemeral

Network Service Tier <sup>?</sup>  
☒ Premium (Current project-level tier, [change](#)) <sup>?</sup>  
☐ Standard <sup>?</sup>

IP forwarding <sup>?</sup>  
Off

Less

You can create this instance template free of charge

Create Cancel

## Admin, US:

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

Images

Instance groups

Instance groups

Health checks

VM Manager

OS patch management

Create an instance template

Describe a VM instance once and then use that template to create groups of identical instances [Learn more](#)

**Name** ⓘ  
Name is permanent  
bvh-admin-instance-us

**Machine configuration**

**Machine family**

General-purpose

Compute-optimizedMemory-optimizedGPU

Machine types for common workloads, optimized for cost and flexibility

**Series**

N1

Powered by Intel Skylake CPU platform or one of its predecessors

**Machine type**

f1-micro (1 vCPU, 614 MB memory)

vCPU

1 shared core

Memory

614 MB

GPUs

-

⌵ CPU platform and GPU

**Confidential VM service** ⓘ  
☐ Enable the Confidential Computing service on this VM instance.

**Container** ⓘ  
☐ Deploy a container image to this VM instance. [Learn more](#)

**Boot disk** ⓘ

New 10 GB balanced persistent disk

Image

bvh-admin-image

Change

Management

Security

Disks

Networking

Sole Tenancy

**Network** ⓘ

bvh-vpc-os3

**Subnet** ⓘ

bvh-subnet2 (us-east1, 192.168.1.0/24)

⌵ Show alias IP ranges

**Network tags** ⓘ (Optional)

front-web

**External IP** ⓘ

Ephemeral

**Network Service Tier** ⓘ

☒ Premium (Current project-level tier, [change](#)) ⓘ

☐ Standard ⓘ

**IP forwarding** ⓘ

Off

⌵ Less

You can create this instance template free of charge

Create

Cancel

15

## Video, EU:

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

Images

Instance groups

Instance groups

Health checks

VM Manager

OS patch management

Create an instance template

Describe a VM instance once and then use that template to create groups of identical instances [Learn more](#)

**Name** [?](#)  
Name is permanent  
bvh-video-instance-eu

**Machine configuration**

**Machine family**

General-purpose

Compute-optimizedMemory-optimizedGPU

Machine types for common workloads, optimized for cost and flexibility


**Series**


N1


Powered by Intel Skylake CPU platform or one of its predecessors

**Machine type**

f1-micro (1 vCPU, 614 MB memory)

vCPU  
1 shared core

Memory  
614 MB


GPUs  
-

[CPU platform and GPU](#)

**Confidential VM service** [?](#)  
☐ Enable the Confidential Computing service on this VM instance.

**Container** [?](#)  
☐ Deploy a container image to this VM instance. [Learn more](#)

**Boot disk** [?](#)

New 10 GB balanced persistent disk  
Image  
bvh-video-image

Change

ManagementSecurityDisksNetworkingSole Tenancy

**Network** [?](#)

bvh-vpc-os3

**Subnet** [?](#)

bvh-subnet1 (europe-west1, 192.168.0.0/24)

[Show alias IP ranges](#)

**Network tags** [?](#) (Optional)

front-web

**External IP** [?](#)

Ephemeral

**Network Service Tier** [?](#)

☒ Premium (Current project-level tier, [change](#)) [?](#)

☐ Standard [?](#)

**IP forwarding** [?](#)

Off

16



## Video, US:

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

Images

Instance groups

Instance groups

Health checks

VM Manager

OS patch management

Create an instance template

Describe a VM instance once and then use that template to create groups of identical instances [Learn more](#)

**Name** ⓘ  
Name is permanent

bvh-video-instance-us

**Machine configuration**

**Machine family**

General-purpose Compute-optimized Memory-optimized GPU

Machine types for common workloads, optimized for cost and flexibility

**Series**

N1

Powered by Intel Skylake CPU platform or one of its predecessors

**Machine type**

f1-micro (1 vCPU, 614 MB memory)

vCPU	Memory	GPUs
1 shared core	614 MB	-

⌵ CPU platform and GPU

**Confidential VM service** ⓘ

☐ Enable the Confidential Computing service on this VM instance.

**Container** ⓘ

☐ Deploy a container image to this VM instance. [Learn more](#)

**Boot disk** ⓘ

New 10 GB balanced persistent disk

Image

bvh-video-image

Change

Management Security Disks **Networking** Sole Tenancy

**Network** ⓘ

bvh-vpc-os3

**Subnet** ⓘ

bvh-subnet2 (us-east1, 192.168.1.0/24)

⌵ Show alias IP ranges

**Network tags** ⓘ (Optional)

front-web

**External IP** ⓘ

Ephemeral

**Network Service Tier** ⓘ

☒ Premium (Current project-level tier, [change](#)) ⓘ

☐ Standard ⓘ

**IP forwarding** ⓘ

Off

⌵ Less

This results in the following:

Instance templates							<a href="#">CREATE INSTANCE TEMPLATE</a> <a href="#">REFRESH</a> <a href="#">COPY</a> <a href="#">CREATE INSTANCE GROUP</a> <a href="#">DELETE</a>	
<input type="text"/> Filter instance templates							Columns ▾	
<input type="checkbox"/> Name ^	Machine type	Image	Disk type	Placement policy	In use by	Creation time		
<input type="checkbox"/> bvh-admin-instance-eu	1 vCPU, 0.6 GB	bvh-admin-image	Balanced persistent disk	No policy		Mar 16, 2021, 2:03:54 PM	⋮	
<input type="checkbox"/> bvh-admin-instance-us	1 vCPU, 0.6 GB	bvh-admin-image	Balanced persistent disk	No policy		Mar 16, 2021, 2:06:29 PM	⋮	
<input type="checkbox"/> bvh-video-instance-eu	1 vCPU, 0.6 GB	bvh-video-image	Balanced persistent disk	No policy		Mar 16, 2021, 2:09:09 PM	⋮	
<input type="checkbox"/> bvh-video-instance-us	1 vCPU, 0.6 GB	bvh-video-image	Balanced persistent disk	No policy		Mar 16, 2021, 2:10:59 PM	⋮	

## Step 6: Create the instance groups

First, we create a TCP health check to see if port 80 is available.

**Name** <sup>?</sup>  
Name is permanent

health-check

**Description** (Optional)

**Protocol** **Port** <sup>?</sup>

TCP 80

**Proxy protocol** <sup>?</sup>

NONE

**Request** (Optional) <sup>?</sup> **Response** (Optional) <sup>?</sup>

**Health criteria**

Define how health is determined: how often to check, how long to wait for a response, and how many successful or failed attempts are decisive

**Check interval** <sup>?</sup> **Timeout** <sup>?</sup>

10 seconds 5 seconds

**Healthy threshold** <sup>?</sup> **Unhealthy threshold** <sup>?</sup>

2 consecutive successes 3 consecutive failures

This is the instance group for admin in EU. It will have at minimum 3 instances spread over multiple zones (3) as suggested by GCP. It uses auto scaling to scale up or down. GCP suggests having the minimum number of instances be equal to the number of zones, in our case 3, to ensure high availability, as per the requirement of the assignment. Scaling occurs when the CPU load is over 80%. We use TCP health checks, created in the image above, to see if port 80 is available.

Create an instance group

To create an instance group, select one of the options:

New managed instance group (stateless)

For stateless serving and batch workloads.

Supports:

- autoscaling, autohealing, auto-updating
- multi-zone deployment
- load balancing

>

New managed instance group (stateful)

For stateful workloads such as databases.

Supports:

- disk and metadata preservation
- autohealing and updating
- multi-zone-deployment
- load balancing

New unmanaged instance group

A group of VMs that you manage yourself.

Supports:

- load balancing

Organize VM instances in a group to manage them together. [Instance groups](#)

Name ?  
Name is permanent  

bvh-instance-group-admin-eu

Description (Optional)

Location

To ensure higher availability, select a multiple zone location for an instance group.  
[Learn more](#)

☐ Single zone

☒ Multiple zones  
Only managed instance groups can exist in multiple zones.

Region ?  
Region is permanent  

europe-west1

Zones  

☒ europe-west1-b

☒ europe-west1-c

☒ europe-west1-d

< Less

Specify port name mapping (Optional)

Instance template ?  

bvh-admin-instance-eu

Number of instances

Based on autoscaling configuration

Autoscaling

Use autoscaling to allow automatic resizing of this instance group for periods of high and low load. [Autoscaling groups of instances](#)

Autoscaling mode  

Autoscale

Autoscaling mode

Autoscale

Autoscaling policy

Use metrics and schedules to determine when to autoscale the group.  
[Autoscaling policy and target utilization](#)

CPU utilization: 80%

+ Add new metric

+ Add new scaling schedule

Predictive autoscaling

Use predictive autoscaling to predict future capacity needs based on historical CPU load.  
[Learn more](#)

Off

No predictive method is used. The autoscaler scales the group to meet current demand based on real-time metrics.

Optimize for availability

Predictive autoscaling improves availability by monitoring daily and weekly CPU load patterns and scaling out ahead of anticipated demand.

To enable predictive autoscaler, your group needs to have had an autoscaling configuration for at least 3 days.

Cool down period

Specify how long it takes for your app to initialize from boot time until it is ready to serve.  
[Cool down period](#)

60seconds

Minimum number of instances

3

Maximum number of instances

10

Scale In Controls

Prevent a sudden drop in the number of running VM instances in the group by controlling the process of scaling in. [Learn more](#)

☐ Enable Scale In Controls

Delete autoscaling configuration

Autohealing

Health check

health-check (TCP)

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

Initial delay

300seconds

To use autohealing, configure firewall rules. This will allow the health check to connect to VM instances in the group.  
[How to configure firewall rules to allow health checking](#)

We have now created the instance group for admin in the EU.

We create 3 more of these instance groups: one instance group for admin in the US, one instance group for video in the EU and one instance group for admin the US. The creation of these groups is similar to the previous and is therefore not shown.

## Step 7: Create the load balancer

We create the load balancer for the instance groups for admin and video, adding these as backends.

### Create backend service

#### Name ?

Name is permanent

bvh-web-server-admin

#### Description

#### Backend type

Instance group

#### Protocol, named port & timeout

##### Protocol ?

HTTP

##### Named port ?

http

##### Timeout ?

30

seconds

#### Backends

Regions: europe-west1, us-east1

bvh-instance-group-admin-eu (Zone: europe-west1, Port:...



bvh-instance-group-admin-us (Zone: us-east1, Port: 80)



+ Add backend

#### Cloud CDN ?

☐ Enable Cloud CDN

#### Cache mode

By default, Cloud CDN will cache static content - including web assets and video files - that are not explicitly marked as private for the configured default time to live (TTL), without requiring any changes at your origin.

☐ Cache static content (recommended) ?

☐ Use origin settings based on Cache-Control headers ?

Origin must set headers.

☐ Force cache all content

Cache all content served by the origin, ignoring any "private", "no-store" or "no-cache" directives.

#### Cache key ?

#### Health check ?

health-check (TCP)

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

#### Logging ?

☒ Enable logging

This results in the following, where we have specified the host and path rules such that all default traffic is routed to our admin service, and traffic starting with video is routed to our video service. Notice both backends, one for each service, with each backend containing 2 instance groups, one for the EU and one for the US.

← Edit HTTP(S) load balancer

bvh-load-balancer

✓ Backend configuration

You have configured 2 backend(s)

✓ Host and path rules

You have created host and path rules

✓ Frontend configuration

Your frontend is configured

ⓘ Review and finalize

Optional

→

Update

Cancel

Review and finalize

Backend services

✓ 1. bvh-web-server-admin

Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Health check: health-check

Advanced configurations

Instance group	Zone	Healthy	Autoscaling	Balancing mode	Capacity	Selected ports
bvh-instance-group-admin-eu	europe-west1	2 / 2	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80
bvh-instance-group-admin-us	us-east1	3 / 3	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80

✓ 2. bvh-web-server-video

Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Health check: health-check

Advanced configurations

Instance group	Zone	Healthy	Autoscaling	Balancing mode	Capacity	Selected ports
bvh-instance-group-video-eu	europe-west1	2 / 2	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80
bvh-instance-group-video-us	us-east1	3 / 3	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80

Host and path rules

Hosts	Paths	Backend
All unmatched (default)	All unmatched (default)	bvh-web-server-admin
*	/*	bvh-web-server-admin
*	/video, /video/*	bvh-web-server-video

Frontend

Protocol	IP:Port	Network Tier
HTTP	34.120.129.212:80	Premium


The final overview of the load balancer can be seen in the image below. It has appropriate host and path rules to deal with /video requests. The backend services are configured correctly, linking to our instance groups for admin and video for both the US and EU.

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[←](#) Load balancer details [EDIT](#) [DELETE](#)

**bvh-load-balancer**

Details Monitoring Caching

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

**Frontend**

Protocol ^	IP:Port	Network Tier ?
HTTP	34.120.129.212:80	Premium

**Host and path rules**

Hosts ^	Paths	Backend
All unmatched (default)	All unmatched (default)	bvh-web-server-admin
*	/*	bvh-web-server-admin
*	/video, /video/*	bvh-web-server-video

**Backend**

**Backend services**

**1. bvh-web-server-admin**

Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Traffic policy: disabled Health check: [health-check](#)

Advanced configurations

Name ^	Type	Zone	Healthy	Autoscaling	Balancing mode	Capacity	Selected ports ?
bvh-instance-group-admin-eu	Instance group	europe-west1	2 / 2	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80
bvh-instance-group-admin-us	Instance group	us-east1	3 / 3	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80

**2. bvh-web-server-video**

Endpoint protocol: HTTP Named port: http Timeout: 30 seconds Cloud CDN: disabled Traffic policy: disabled Health check: [health-check](#)

Advanced configurations

Name ^	Type	Zone	Healthy	Autoscaling	Balancing mode	Capacity	Selected ports ?
bvh-instance-group-video-eu	Instance group	europe-west1	2 / 2	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80
bvh-instance-group-video-us	Instance group	us-east1	3 / 3	On: Target CPU utilization 80%	Max backend utilization: 80%	100%	80