

# Cloud Computing Applications and Services

(Aplicações e Serviços de Computação em Nuvem)

Google Cloud Platform

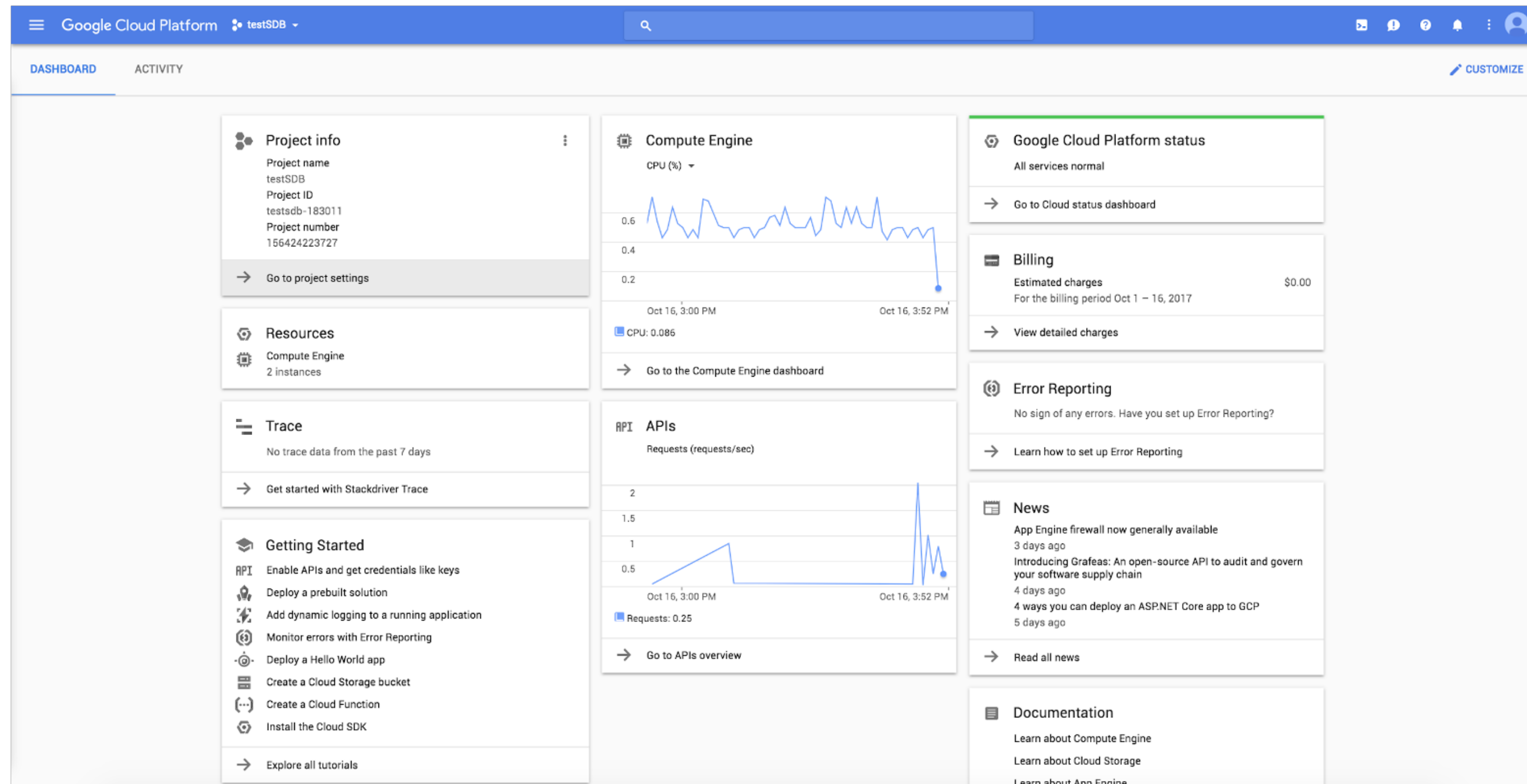
University of Minho

2024-2025



# Google Cloud Platform

<https://cloud.google.com>



# Create a Project

- Create a project
  - Associate billing account (check e-mail for coupon)
  - Each account has 50\$

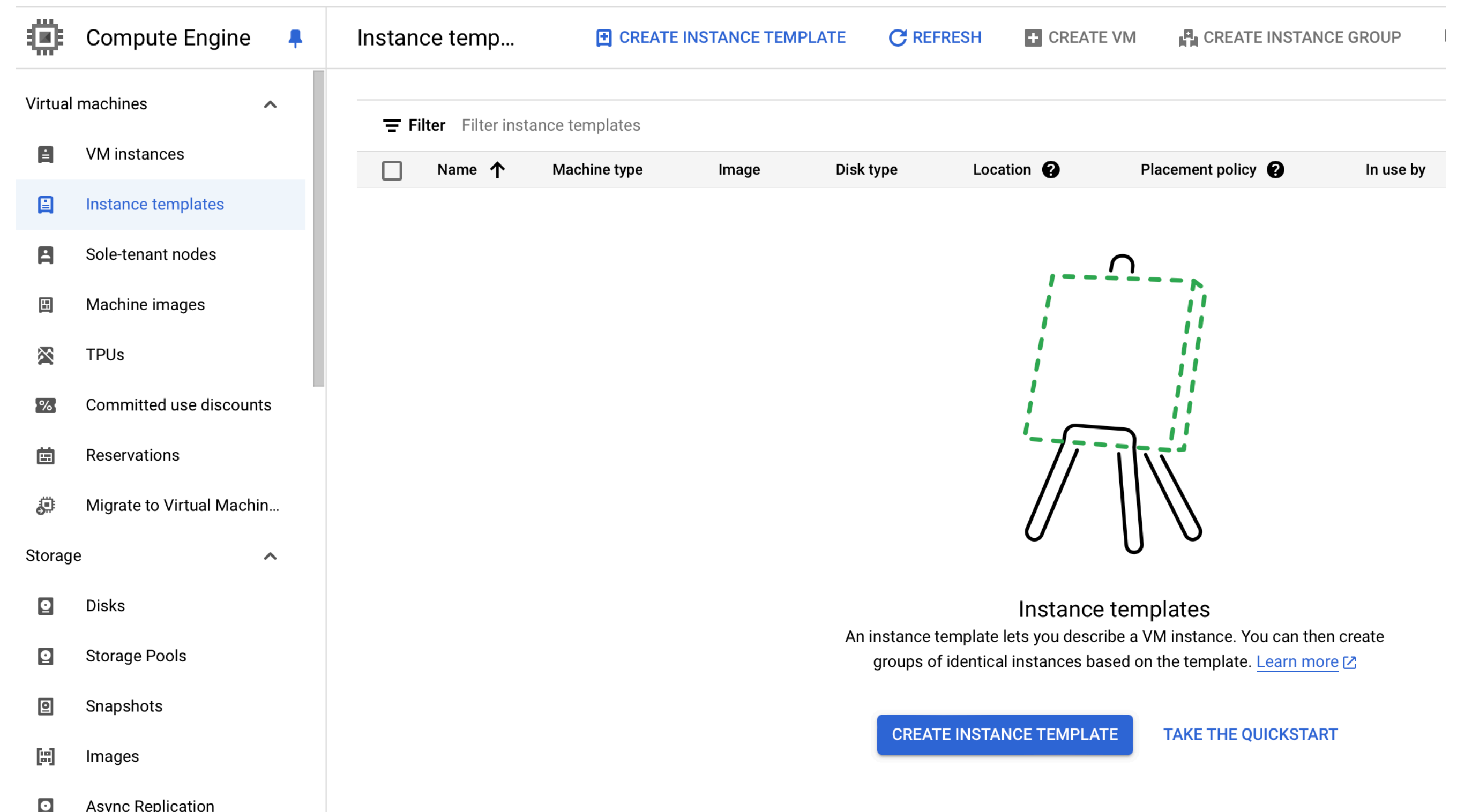
# Configure SSH Keys

- Go to Side Bar → Compute Engine → Settings → Metadata
  - Click on “SSH KEYS”
  - Click on “EDIT”
  - Click on “ADD ITEM”
    - Add the content of your SSH Public key

# Create a Template

● To create a template:

1. Go to Side Bar → Compute Engine → Instance Templates
2. Click on “CREATE INSTANCE TEMPLATE”

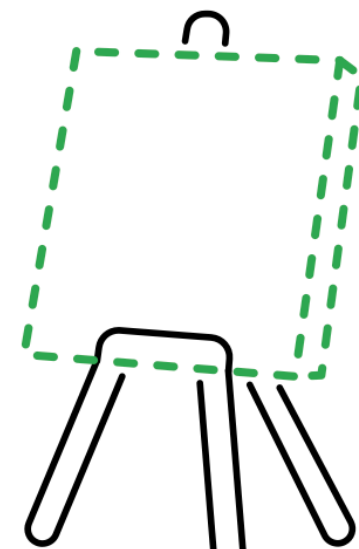


Compute Engine

Instance temp... [CREATE INSTANCE TEMPLATE](#) [REFRESH](#) [CREATE VM](#) [CREATE INSTANCE GROUP](#)

Filter Filter instance templates

<input type="checkbox"/>	Name <a href="#">↑</a>	Machine type	Image	Disk type	Location <a href="#">?</a>	Placement policy <a href="#">?</a>	In use by
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**Instance templates**

An instance template lets you describe a VM instance. You can then create groups of identical instances based on the template. [Learn more](#)

[CREATE INSTANCE TEMPLATE](#) [TAKE THE QUICKSTART](#)

# Create a Template

- Choose a name for the template
- Select the region and the machine configuration
  - **Note:** Different regions and different machine configurations will have different costs. Choose it wisely!

← Create an instance template

Name \*

nodes-template

?

MANAGE TAGS AND LABELS

Location  
Global instance templates can be used in any region. To lower the impact of outages outside your region and gain data residency within your region, use a regional instance template. [Learn more](#)

- ☒ Regional (recommended)
- ☐ Global

Region \*

us-central1 (Iowa)

▼

?

Machine configuration

☒ General purpose

☐ Compute optimized

☐ Memory optimized

☐ Storage optimized

☐ GPUs

Machine types for common workloads, optimized for cost and flexibility

	Series ?	Description	vCPUs ?	Memory ?	Platform
<input type="radio"/>	C4	Consistently high performance	2 - 192	4 - 1,488 GB	Intel Emerald Rapids
<input type="radio"/>	N4	Flexible & cost-optimized	2 - 80	4 - 640 GB	Intel Emerald Rapids
<input type="radio"/>	C3	Consistently high performance	4 - 192	8 - 1,536 GB	Intel Sapphire Rapids
<input type="radio"/>	C3D	Consistently high performance	4 - 360	8 - 2,880 GB	AMD Genoa
<input checked="" type="radio"/>	E2	Low cost, day-to-day computing	0.25 - 32	1 - 128 GB	Based on availability
<input type="radio"/>	N2	Balanced price & performance	2 - 128	2 - 864 GB	Intel Cascade and Ice Lake
<input type="radio"/>	N2D	Balanced price & performance	2 - 224	2 - 896 GB	AMD EPYC



# Create a Template

- Choose the Machine type
  - **Note:** The machine type also has an impact on the budget. Choose it wisely!

Machine type

Choose a machine type with preset amounts of vCPUs and memory that suit most workloads. Or, you can create a custom machine for your workload's particular needs. [Learn more](#)

PRESET

CUSTOM

e2-small (2 vCPU, 1 core, 2 GB memory)



vCPU

0.5-2 vCPU (1 shared core)

Memory

2 GB

▼ ADVANCED CONFIGURATIONS

Availability policies

VM provisioning model

Standard

Choose "Spot" to get a discounted, preemptible VM. Otherwise, stick to "Standard". [Learn more](#)

You can always create an instance template free of charge. These are estimated costs for a VM instance created using this template:

Monthly estimate

\$13.23

That's about \$0.02 hourly

Pay for what you use: no upfront costs and per second billing

Item	Monthly estimate
2 vCPU + 2 GB memory	\$12.23
10 GB balanced persistent disk	\$1.00
Total	\$13.23


[Compute Engine pricing](#)

^ LESS

# Create a Template

- Under the “Boot disk” section, click on “CHANGE” and choose “Ubuntu” as the OS, and “Ubuntu 24.04 LTS” as the Version.

## Boot disk ?

Name	node
Type	New balanced persistent disk
Size	10 GB
License type ?	Free
Image	 Ubuntu 24.04 LTS

CHANGE

## Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

PUBLIC IMAGES

CUSTOM IMAGES

Operating system

Ubuntu

Version \*

Ubuntu 24.04 LTS

x86/64, amd64 noble image built on 2024-09-27

Boot disk type \*

Balanced persistent disk

COMPARE DISK TYPES

Size (GB) \*

10

Provision between 10 and 3072 GB

SHOW ADVANCED CONFIGURATION

SELECT

CANCEL



# Create a Template

- Under the “Firewall” section, select the options “Allow HTTP traffic” and “Allow HTTPS traffic”.

## Firewall ?

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

- ☒ Allow HTTP traffic
- ☒ Allow HTTPS traffic
- ☐ Allow Load Balancer Health Checks

# Create a Template

● Click on “CREATE” to create the template.

Compute Engine

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Committed use discounts

Instance temp...

CREATE INSTANCE TEMPLATE

REFRESH

CREATE VM

CREATE INSTANCE GROUP

Instance templates are saved VM configurations used to create identical VMs, either individually or as part of managed instance groups. [Learn more](#)

Filter

Filter instance templates

	Name	Machine type	Image	Disk type	Location	Placement policy
<input type="checkbox"/>	<a href="#">nodes-template</a>	e2-small	debian-12-bookworm-v20240910	Balanced persistent disk	us-central1	No policy

# Create a VM from a Template

- To create a VM instance:
1. Go to Side Bar → Compute Engine → VM Instance
  2. Click on “CREATE INSTANCE”
  3. Click on “CREATE VM FROM...”

The screenshot shows the Google Cloud Platform interface for creating a VM instance. A dropdown menu titled "CREATE VM FROM..." is open, showing options: "Instance templates", "Machine images", and "Marketplace". Below these are "Presets" with four options: "Low cost" (2 vCPUs + 1 GB memory Intel or AMD), "Web server" (2 vCPUs + 4 GB memory Intel or AMD), "Application server" (2 vCPUs + 8 GB memory Intel), and "In-memory database" (4 vCPUs + 8 GB memory Intel). A "See all presets..." link is at the bottom of the menu. The background shows the VM creation configuration page with fields for "Zone" (set to "Any") and "Machine type". A "Monthly estimate" section on the right shows a total of \$25.46 per month, broken down into \$24.46 for the VM and \$1.00 for the disk. A "Compute Engine pricing" link and a "LESS" link are also visible.

**CREATE VM FROM...**

- Instance templates
- Machine images
- Marketplace

**Presets**

- Low cost**  
2 vCPUs + 1 GB memory Intel or AMD
- Web server**  
2 vCPUs + 4 GB memory Intel or AMD
- Application server**  
2 vCPUs + 8 GB memory Intel
- In-memory database**  
4 vCPUs + 8 GB memory Intel

[See all presets...](#)

**Zone \***  
Any

Google will choose a zone on your behalf, maximizing VM obtainability. Zone is permanent.

**Monthly estimate**  
**\$25.46**  
That's about \$0.03 hourly  
Pay for what you use: no upfront costs and per second billing

Item	Monthly estimate
2 vCPU + 4 GB memory	\$24.46
10 GB balanced persistent disk	\$1.00
<b>Total</b>	<b>\$25.46</b>

[Compute Engine pricing](#)

[LESS](#)

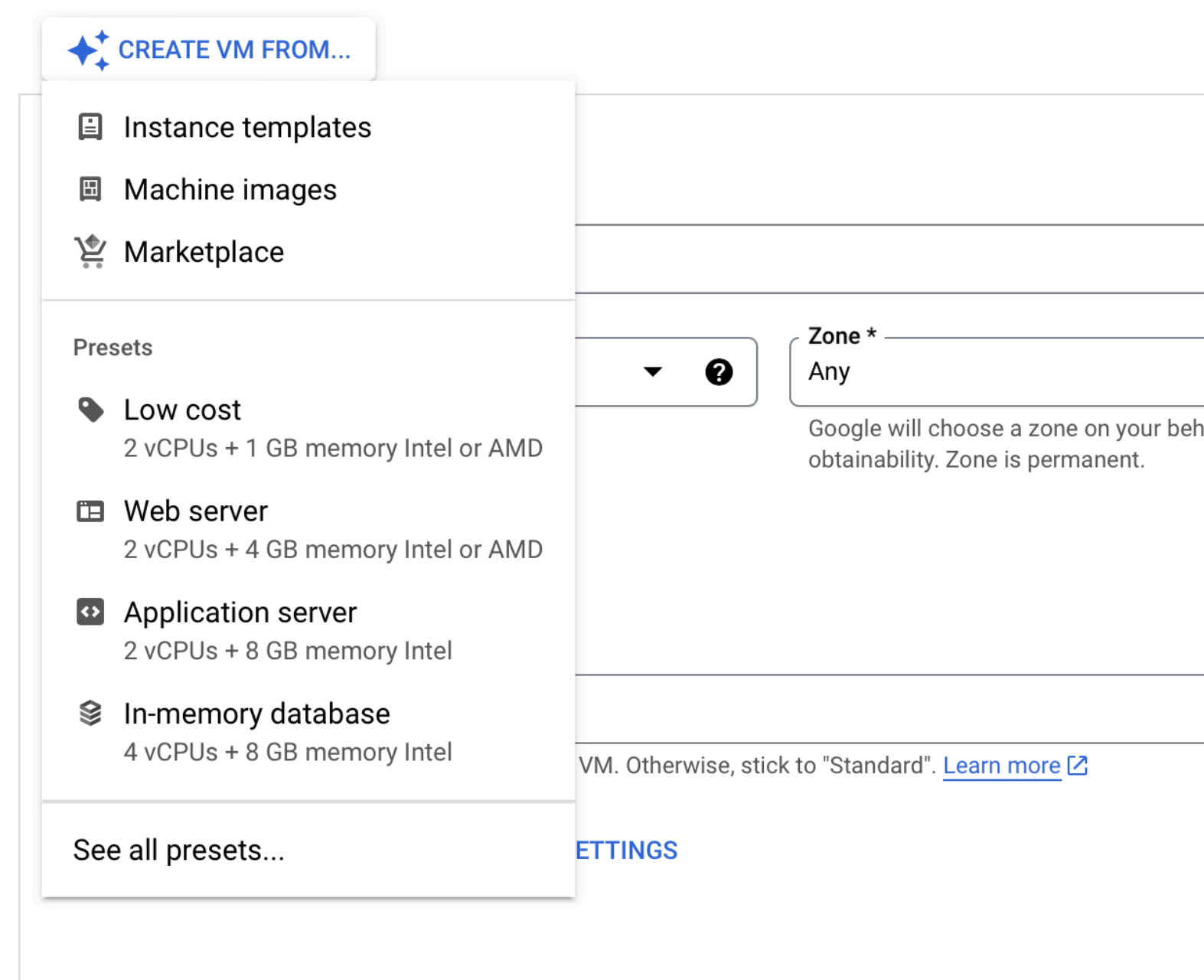
# Create a VM from a Template

● Go to Side Bar → Compute Engine → VM Instance

1. Click on “CREATE INSTANCE”

2. Click on “CREATE VM FROM...”

3. Click on “Instance templates”, select your template and click on “CREATE”



Create VM from template					
Filter instance templates					
Name ↑	Machine type	Disk type	Location	Creation time	
nodes-template	e2-small	Balanced persistent disk	us-central1	Sep 29, 2024, 6:59:01 PM UTC+01:00	

# Create a VM from a Template

- To change the VM's name:
  1. Stop the VM
  2. Click on the VM's name and then on "Edit"
  3. Rename the VM under the "VM instance name" option
  4. Click on "Save"

# Using the VM

- Use the SSH command to access the VM:

```
ssh <username>@<vm_ip>
```

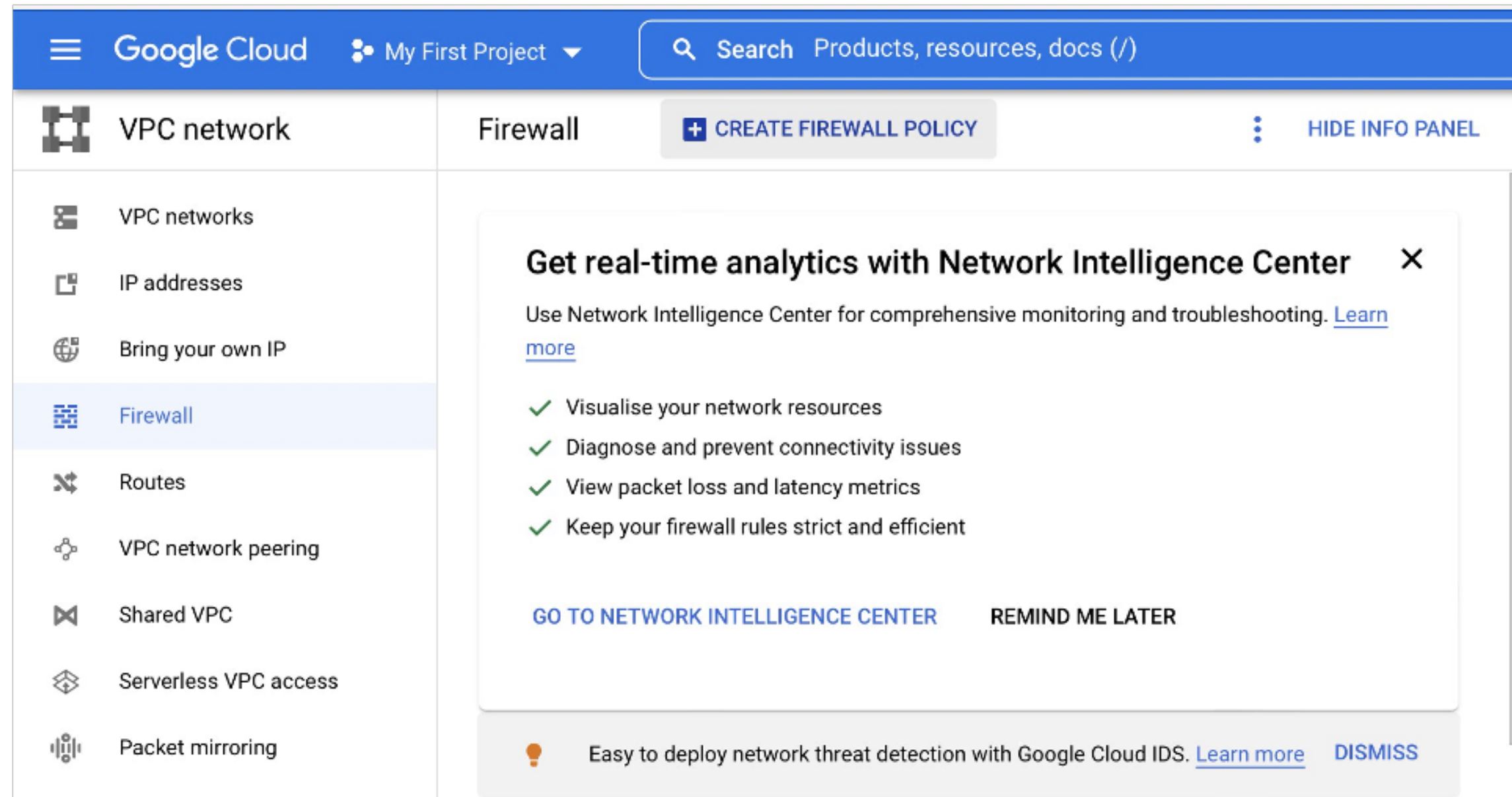
- If you manage your SSH keys in metadata, the username is what you specified when you created the SSH key.
- As the IP, you should use the VM's external IP.

- Once you are done working with the VM, **make sure you stop it!** Otherwise, it will keep consuming resources and wasting the budget.



# Open Firewall Ports

1. Go to VPC network → Firewall



2. Create a new firewall policy

1

Configure policy

Policy name \*

swap-port

Lowercase letters, numbers, hyphens allowed

Description

Deployment scope

☒ Global

☐ Regional

CONTINUE

# Open Firewall Ports

## 3. Add a rule with the following configurations:

- **Priority:** 0
- **Direction of traffic:** Ingress
- **Action on match:** allow
- **Target Type:** All instances in the network
- **Source IPv4 ranges:** 0.0.0.0/0
- **Protocols and ports:** Specified protocols and ports
  - Select **TCP**
  - **Ports:** <port>

The screenshot shows the Google Cloud Firewall configuration interface. It has a vertical progress bar on the left with three steps: 1. Configure policy (checked), 2. Add rules (optional) (active), and 3. Associate policy with VPC networks (optional). The main content area for step 2 is titled 'Firewall rules' and includes a description: 'Firewall rules control incoming or outgoing traffic to an instance. By default, all traffic is delegated to next level. [Learn more](#)'. Below this are two buttons: 'ADD RULE' and 'DELETE'. A note states 'You can also add rules after the policy is created.' followed by a 'CONTINUE' button. At the bottom of the interface, there are 'CREATE' and 'CANCEL' buttons.

# Open Firewall Ports

### Create a firewall rule

Priority \*

0

Priority can be 0 – 2147483643.

Description

Logs

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

On

Off

Direction of traffic ?

Ingress

Egress

Action on match ?

Allow

Deny

Go to next

Target type

All instances in the network

Source filter

IPv4 ranges

Source IPv4 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

Ports

30007

E.g. 20, 50–60

UDP

Ports

E.g. all

Other

Protocols

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

CREATE

CANCEL

2024-2025

CLOUD COMPUTING APPLICATIONS AND SERVICES

GOOGLE CLOUD PLATFORM

17

# Open Firewall Ports

✓

Configure policy

|

2

Add rules (optional)

Firewall rules

Firewall rules control incoming or outgoing traffic to an instance. By default, all traffic is delegated to next level. [Learn more](#)

ADD RULE

DELETE

You can also add rules after the policy is created.

<input type="checkbox"/>	Priority <span>↑</span>	Direction of traffic	Targets	Source	Destination	Protocols and ports	Action
<input type="checkbox"/>	0	Ingress	Apply to all	IPv4 ranges: 0.0.0.0/0		tcp:30007	Allow

CONTINUE

3

Associate policy with VPC networks (optional)

CREATE

CANCEL





# Open Firewall Ports

## 4. Associate policy with VPC networks

- Select default network

Associate policy with VPC networks

Select the VPC networks to associate this policy with

 **Filter** Enter property name or value 

<input checked="" type="checkbox"/>	Network name ↑	Subnets	Regions
<input checked="" type="checkbox"/>	<a href="#">default</a>	36	36

**ASSOCIATE** CANCEL

## 5. Create the policy

☒ Configure policy

☒ Add rules (optional)

**3** Associate policy with VPC networks (optional)

You can associate network firewall policy with a network. Associating a policy with a network applies the policy rules to targets in the network.

**ASSOCIATE** DELETE

You can associate the policy with VPC networks after it is created.

<input type="checkbox"/>	Network name ↑	Subnets	Regions
<input type="checkbox"/>	<a href="#">default</a>	36	36

**CONTINUE**

**CREATE** CANCEL