

**Title: Assignment 2, Cloud Computing**

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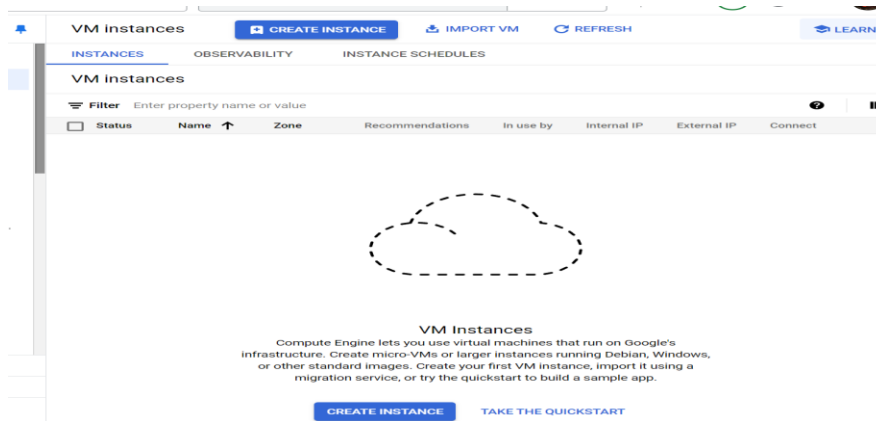
**DATE: 17.10.2024**

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## 1. Virtual Machines in Google Cloud

- Use the Google Cloud Console to create a VM instance.
- Select an appropriate machine type, operating system, and region.
- Configure the firewall to allow SSH traffic.



[CREATE VM FROM...](#) [EQUIVALENT CODE](#)

☒ 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 R
<input type="radio"/> N4	Flexible & cost-optimized	2 - 80	4 - 640 GB	Intel Emerald R
<input type="radio"/> C3D	Consistently high performance	4 - 192	8 - 1,536 GB	Intel Sapphire F
<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 avail
<input type="radio"/> N2	Balanced price & performance	2 - 128	2 - 864 GB	Intel Cascade x
<input type="radio"/> N2D	Balanced price & performance	2 - 224	2 - 896 GB	AMD EPYC
<input type="radio"/> T2A	Scale-out workloads	1 - 48	4 - 192 GB	Ampere Altra A
<input type="radio"/> T2D	Scale-out workloads	1 - 60	4 - 240 GB	AMD EPYC Mil
<input type="radio"/> N1	Balanced price & performance	0.25 - 96	0.6 - 624 GB	Intel Skylake

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](#)

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

Requires the Service Account User role (roles/iam.serviceAccountUser) to be set for users who want to access VMs with this service account. [Learn more](#)

### 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
- ☐ Allow Load Balancer Health Checks

That's about

Pay for what you  
billing


Item
2 vCPU + 2 GB memory
10 GB balanced persistent disk
Total

[Compute Engine pricing](#)

[LESS](#)

- Write a brief explanation of the choices made during setup.

Have chosen basic configurations to keep low cost. For region chose asia-east2(Hong Kong) and zone asia-east2-a, probably as closest to my current location.

	E2	Low cost, day-to-day computing	0.25 - 32	1 - 128 GB	Based on availa
---	----	--------------------------------	-----------	------------	-----------------

With configurations for basic purpose.

VM instances						
Filter Enter property name or value						
<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	Internal IP	Connect
<input type="checkbox"/>	assingment-2					

- Use the SSH option from the Cloud Console to connect to your VM.

```

ssh.cloud.google.com/v2/ssh/projects/silver-pen-436109-a0/zones/asia-east2-a/instances/assingment-2?authuser=0&hl=en_US&projectN...
ssh.cloud.google.com/v2/ssh/projects/silver-pen-436109-a0/zones/asia-east2-a/instances/assingment-2?authuser=0&hl=en_US&...
SSH-in-browser
Linux assingment-2 6.1.0-26-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.112-1 (2024-09-30) 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.
kassym914@assingment-2:~$

```

- Install a web server (e.g., Apache or Nginx) on the VM.

```

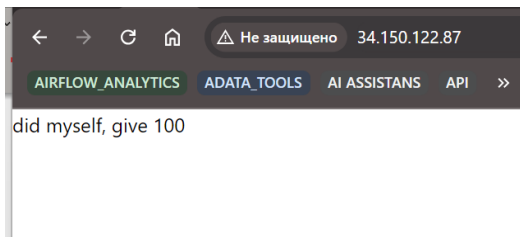
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
kassym914@assingment-2:~$ sudo apt update && sudo apt -y install apache2
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
Get:3 file:/etc/apt/mirrors/debian-security.list Mirrorlist [39 B]
Hit:7 https://packages.cloud.google.com/apt google-compute-engine-bookworm-stable InRelease
Get:2 https://deb.debian.org/debian bookworm InRelease [151 kB]
Get:8 https://packages.cloud.google.com/apt cloud-sdk-bookworm InRelease [1654 B]
Get:4 https://deb.debian.org/debian bookworm-updates InRelease [55.4 kB]
Get:5 https://deb.debian.org/debian bookworm-backports InRelease [59.0 kB]
Get:6 https://deb.debian.org/debian-security bookworm-security InRelease [48.0 kB]
Get:9 https://packages.cloud.google.com/apt cloud-sdk-bookworm/main amd64 Packages [3391 kB]

```

```
kassym914@assingment-2:~$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
   Loaded: loaded (/lib/systemd/system/apache2.service; enabled; preset: enabled)
   Active: active (running) since Thu 2024-10-17 09:19:02 UTC; 1min 35s ago
     Docs: https://httpd.apache.org/docs/2.4/
    Main PID: 1877 (apache2)
      Tasks: 55 (limit: 2344)
```

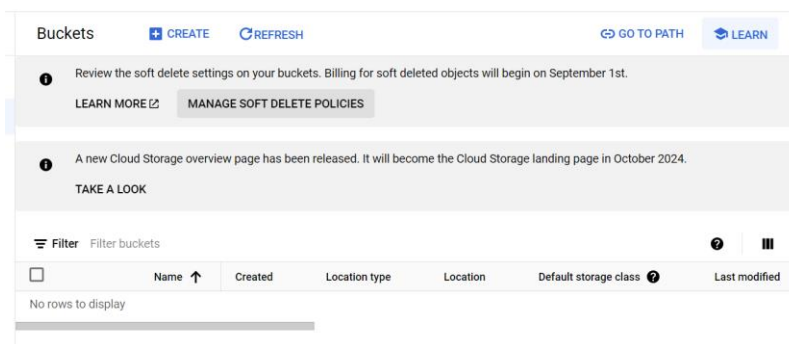
- Create a simple HTML page to serve as a test.


```
kassym914@assingment-2:/$ sudo su
root@assingment-2:/# cd /var/www/html
root@assingment-2:/var/www/html# ls
index.html
root@assingment-2:/var/www/html# echo "did myself, give 100" > index.html
root@assingment-2:/var/www/html# echo "did myself, give 100" > index.html
root@assingment-2:/var/www/html#
```




## 2. Storage Solutions in Google Cloud

- **Create a Cloud Storage Bucket**
  - Use the Google Cloud Console to create a Cloud Storage bucket.



 A new Cloud Storage overview page has been released. It will become the Cloud Storage landing page in October 2024.


 Filter Filter buckets

<input type="checkbox"/>	Name 	Created	Location type	Location	Default storage class
<input type="checkbox"/>	<a href="#">orakbaykassymassignment2</a>	Oct 17, 2024, 2:48:39 PM	Multi-region	us	Standard

- Set the bucket's access controls (public/private).
- Upload a sample file (e.g., image or document) to the bucket.

- Choose how to control access to objects

#### Prevent public access

Restrict data from being publicly accessible via the internet. Will prevent this bucket from being used for web hosting. [Learn more](#) 


☐ Enforce public access prevention on this bucket

us (multiple regions in United States) Standard Not public

< OBJECTS CONFIGURATION **PERMISSIONS** PR

#### Public access

##### Not public

This bucket is not publicly accessible. If you know objects should never be exposed on the public internet, you should also prevent public access to this bucket. [Learn more](#) 

**PREVENT PUBLIC ACCESS**

OBJECTS

CONFIGURATION

PERMISSIONS

PROTECTION

LIFECYCLE

OBSERVABILITY

Folder browser

orakbaykassymassignment2

assign2/

Buckets > orakbaykassymassignment2 > assign2

CREATE FOLDER

UPLOAD

TRANSFER DATA

Filter by name prefix only

Filter

Filter objects and folders

<input type="checkbox"/>	Name	Size	Type	
<input type="checkbox"/>	1638090901_3-koshka-top-p-kota...	116.7 KB	image/	⬇️ ⋮

## Implement Object Lifecycle Management

- Set up a lifecycle rule for your bucket to automatically delete objects after a certain period (e.g., 30 days).

orakbaykassymassignment2

Location	Storage class	Public access	Protection
us (multiple regions in United States)	Standard	Not public	None

OBJECTS

CONFIGURATION

PERMISSIONS

PROTECTION

LIFECYCLE

OBSERVABILITY

After you add or edit a rule, it may take up to 24 hours to take effect.

Lifecycle rules let you apply actions to a bucket's objects when certain conditions are met – for example, switching objects to colder storage classes when they reach or pass a certain age. [Learn more](#)

If an object meets the conditions for multiple rules:

- Deletion takes precedence over a change in storage class.
- Changing objects to colder storage classes takes precedence over changing to warmer ones (ex. objects will switch to the Archive storage class instead of Coldline if there are rules for both).

Rules

ADD A RULE

DELETE ALL

Action	Object condition	Works with
You haven't added any lifecycle rules to this bucket.		

After you add or edit a rule, it may take up to 24 hours to take effect.

Select an action

☐ Set storage class to Nearline  
Best for backups and data accessed less than once a month

☐ Set storage class to Coldline  
Best for disaster recovery and data accessed less than once a quarter

☐ Set storage class to Archive  
Best for long-term digital preservation of data accessed less than once a year



☒ Delete object

☒ Days since becoming noncurrent ?

days

☐ Became noncurrent before ?  
 if there are rules for doing it.

**Rules**   [ADD A RULE](#)   [DELETE ALL](#)

Action	Object condition	Works with
Delete object	1+ days since object became noncurrent	Object versioning  

Explain the use cases for Cloud Storage and the benefits of lifecycle management.

There are a lot of use cases for cloud storage, it makes possible to access data from different devices and applications and it is applicable for backups. Lifecycle management allows to set rules that can minimize memory usage.

### 3. Networking in Google Cloud

- **Set Up a Virtual Private Cloud (VPC)**
  - Create a new VPC network with subnets.
  - Configure firewall rules to allow traffic between your VM and the internet.

My First Project

Search (/) for resources, docs, products, and more

←

Create a VPC network

Name \*

assignment2kassym

Lowercase letters, numbers, hyphens allowed

Description

Region \*

asia-east1

IP stack type

☒ IPv4 (single-stack)
 ☐ IPv4 and IPv6 (dual-stack) ?

IPv4 range \*

123.123.123.0/25

E.g. 10.0.0.0/24

☒ I confirm that my subnet configuration includes a range outside of the RFC 1918 address space.

[CREATE SECONDARY IPV4 RANGE](#)

Private Google Access ?

☐ On
 ☒ Off

Flow logs

☐ On
 ☒ Off

Hybrid Subnets ?

☒ On
 ☐ Off



page

IPv4 FIREWALL RULES

<input checked="" type="checkbox"/>	Name	Type	Targets	Filters	Protocols / ports	Action	Priority	↑
<input checked="" type="checkbox"/>	assignment2kassymvpc-allow-custom ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	all	Allow	65,534	EDIT
<input checked="" type="checkbox"/>	assignment2kassymvpc-allow-icmp ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	icmp	Allow	65,534	
<input checked="" type="checkbox"/>	assignment2kassymvpc-allow-rdp ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:3389	Allow	65,534	
<input checked="" type="checkbox"/>	assignment2kassymvpc-allow-ssh ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	tcp:22	Allow	65,534	
	assignment2kassymvpc-deny-all-ingress ?	Ingress	Apply to all	IP ranges: 0.0.0.0/0	all	Deny	65,535	

SMTP port 25 disallowed in this project. [Learn more](#)

#### VPC networks

Filter Enter property name or value

Name ↑	Subnets	MTU ?	Mode	IPv6 ULA range	Gateways	Firewall rules
<a href="#">assignment2kassymvpc</a>	1	1460	Custom			4

Recreated VM, because deleted first one

INSTANCES

OBSERVABILITY

INSTANCE SCHEDULES

VM instances

Filter

Enter property name or value

<input type="checkbox"/> Status	Name	Zone	Recommendations	In use by	Internal IP
<input checked="" type="checkbox"/>	<a href="#">testforlastexercise</a>	us-central1-c			10.128.0.2 <a href="#">(nic0)</a>

VPC Network

VPC networks

IP addresses

Internal ranges

Bring your own IP

Firewall

Routes

VPC network peering

Shared VPC

IP addresses

RESERVE EXTERNAL STATIC IP ADDRESS

RESERVE INTERNAL STATIC IP ADDRESS

REFRESH

RELEASE STATIC ADDRESS

ALL

INTERNAL IP ADDRESSES

EXTERNAL IP ADDRESSES

IPv4 ADDRESSES

IPv6 ADDRESSES

Filter

Enter property name or value

IP address	Access type	Region	Type ↓	Version	In use by	Subnetwork	VPC Network	Network
10.128.0.2	Internal	us-central1	Ephemeral	IPv4	VM instance testforlastexercise (Zone us-central1-c)	default	default	
34.134.149.134	External	us-central1	Ephemeral	IPv4	VM instance testforlastexercise (Zone us-central1-c)	default	default	Pre...

- Use the VM to ping an external server to verify connectivity.

```
kassym914@testforlastexercise:~$ ping google.com
PING google.com (142.251.184.100) 56(84) bytes of data.
64 bytes from yucbfad-in-f100.1e100.net (142.251.184.100): icmp_seq=1 ttl=111 time=5.66 ms
64 bytes from yucbfad-in-f100.1e100.net (142.251.184.100): icmp_seq=2 ttl=111 time=1.48 ms
64 bytes from yucbfad-in-f100.1e100.net (142.251.184.100): icmp_seq=3 ttl=111 time=1.57 ms
64 bytes from yucbfad-in-f100.1e100.net (142.251.184.100): icmp_seq=4 ttl=111 time=1.63 ms
64 bytes from yucbfad-in-f100.1e100.net (142.251.184.100): icmp_seq=5 ttl=111 time=1.49 ms
^C
--- google.com ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4005ms
rtt min/avg/max/mdev = 1.483/2.365/5.656/1.646 ms
kassym914@testforlastexercise:~$ s
```

- Discuss the importance of VPCs and firewall rules in cloud networking.

VPC provides networking functionality to VM instances, k8s clusters and serverless workloads and makes globally accessible and firewall rules guarantees the security.

## References

- [https://cloud.google.com/compute/docs/instances?\\_gl=1\\*1a0z2dc\\*\\_ga\\*MTcxMzI2MzQxMS4xNzI2NzM3NTI1\\*\\_ga\\_WH2QY8WWF5\\*MTcyOTE1NTU4Mi40LjEuMTcyOTE2MTk1Mi4zOC4wLjA](https://cloud.google.com/compute/docs/instances?_gl=1*1a0z2dc*_ga*MTcxMzI2MzQxMS4xNzI2NzM3NTI1*_ga_WH2QY8WWF5*MTcyOTE1NTU4Mi40LjEuMTcyOTE2MTk1Mi4zOC4wLjA).
- <https://cloud.google.com/vpc/docs/overview>
- <https://cloud.google.com/storage/docs>