



National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

Faculty of Computing

SE-315: Cloud Computing

Lab 02: Compute Engine – Working with VMs

CLO1: Explain the core concepts of the cloud computing paradigm

Date: 18.09.24



Lab 02: Compute Engine – Working with VMs

Introduction:

Compute Engine allows you to create virtual machines (VMs) that run different operating systems, including multiple flavors of Linux (Debian, Ubuntu, Suse, Red Hat, CoreOS) and Windows Server, on Google infrastructure. You can run thousands of virtual CPUs on a system that is designed to be fast and to offer strong consistency of performance.

In this hands-on lab, you create VM instances of various machine types using the Google Cloud console and the gcloud command line in Cloud Shell. You also learn how to connect an NGINX web server to your VM. Google Cloud is a suite of cloud services hosted on Google's infrastructure. From computing and storage, to data analytics, machine learning, and networking, Google Cloud offers a wide variety of services and APIs that can be integrated with any cloud-computing application or project, from personal to enterprise-grade. Students will familiarize themselves with the Google Cloud Platform (GCP) environment. They will explore different features available in GCP.

Lab Objectives:

In this lab, students will learn how to...:

- Create a VM with the Cloud console.
- Create a VM with the gcloud command line.
- Deploy a web server and connect it to a VM.
- Launch a Windows Server instance in Compute Engine and use Remote Desktop Protocol (RDP) to connect to it

Reading:

<https://cloud.google.com/compute/docs/instances/>

Helping Material:

1. Creating a VM: <https://www.cloudskillsboost.google/focuses/3563?parent=catalog>
2. Compute Engine – Windows: <https://www.cloudskillsboost.google/focuses/560?parent=catalog>



Lab Task

1. Go through the link 1 given above (under helping material: <https://www.cloudskillsboost.google/focuses/3563?parent=catalog>) which will take you to the 'Creating a VM' page. You have to start the lab and perform the tasks given below. Make sure to take screenshots of each task as you will need to add them in the solution section given below.
 - a. Create a new instance from the Cloud console



Compute Engine API

[Google Enterprise API](#)

Compute Engine API

MANAGE

TRY THIS API [↗](#)

✓ API Enabled

Boot disk ?

Name	saleha-zainab-404329
Type	New balanced persistent disk
Size	10 GB
Snapshot schedule ?	No schedule selected
License type ?	Free
Image	Debian GNU/Linux 12 (bookworm)



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

Observability - One Agent ?

VM instances

Filter Enter property name or value

<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect
<input type="checkbox"/>	saleha-zainab-404329	us-central1-f			10.128.0.2 (nic0)	34.72.139.168 (nic0)	SSH ▾

VM instances

Filter Enter property name or value

<input type="checkbox"/> Status	Name ↑	Zone	Internal IP	External IP	Connect
<input type="checkbox"/>	gcelab1	us-central1-f	10.128.0.4 (nic0)	34.72.139.168 (nic0)	SSH ▾

s launches an SSH client directly from your browser.

SSH-in-browser

UPLOAD FILE

DOWNLOAD FILE

SSH

⌵

⌵

⌵

```
Linux saleha-zainab-404329 6.1.0-25-cloud-amd64 #1 SMP PREEMPT_DYNAMIC Debian 6.1.106-3 (2024-08-26) 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.
sfatima_bese22seecs@saleha-zainab-404329:~$
```

b. Install an NGINX web server



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```
sfatima_bese22seecs@gcelab1:~$ ps aux | grep nginx
root      1050  0.0  0.1 10360  6724 ?        S    06:07   0:00 nginx: master process /usr/sbin/nginx -g daem
on on; master process on;
www-data  1052  0.0  0.0 10704  2496 ?        S    06:07   0:00 nginx: worker process
www-data  1053  0.0  0.0 10704  2496 ?        S    06:07   0:00 nginx: worker process
sfatima+  1065  0.0  0.0  3744  1924 pts/0    S+   06:08   0:00 grep nginx
sfatima_bese22seecs@gcelab1:~$
```

```
sfatima_bese22seecs@gcelab1:~$ sudo apt-get install -y nginx
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  nginx-common
Suggested packages:
  fcgiwrap nginx-doc ssl-cert
The following NEW packages will be installed:
  nginx nginx-common
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 640 kB of archives.
After this operation, 1696 kB of additional disk space will be
Get:1 file:/etc/apt/mirrors/debian.list Mirrorlist [30 B]
```

External IP

34.72.139.168 (nic0)

Not secure 34.72.139.168

Welcome to nginx!

If you see this page, the nginx 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 nginx.

c. Create a new instance with gcloud

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to massive-tea-433020-b2.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2) $ gcloud compute instances create gcelab2 --machine-type e2-medium --zone=$ZONE
```

gcloud compute instances create gcelab2 --machine-type e2-medium --zone=us-central1-f



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```
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2)$ gcloud compute instances create gcelab2 --machine-type e2-medium --zone=us-central1-f
Created [https://www.googleapis.com/compute/v1/projects/massive-tea-433020-b2/zones/us-central1-f/instances/gcelab2].
NAME: gcelab2
ZONE: us-central1-f
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.3
EXTERNAL_IP: 104.198.250.163
STATUS: RUNNING
```

```
NAME: gcelab2
ZONE: us-central1-f
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.3
EXTERNAL_IP: 104.198.250.163
STATUS: RUNNING
```

`gcloud compute instances delete saleha-zainab-404329 --zone=us-central1-f`

VM instances

Filter Enter property name or value								?	
<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Connect		
<input type="checkbox"/> ✓	gcelab1	us-central1-f			10.128.0.4 (nic0)	34.72.139.168 (nic0)	SSH ▾	⋮	
<input type="checkbox"/> ✓	gcelab2	us-central1-f			10.128.0.3 (nic0)	104.198.250.163 (nic0)	SSH ▾	⋮	



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2. Go through the link 2 given above (under helping material: <https://www.cloudskillsboost.google/focuses/560?parent=catalog>) which will take you to the 'Compute Engine - Qwik Start - Windows' page. You have to start the lab and perform the tasks given below. Make sure to take screenshots of each task as you will need to add them in the solution section given below.
 - a. Create a new instance from the Cloud console



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```
Your Cloud Platform project in this session is set to massive-tea-433020-b2.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2)$ gcloud auth list  
Credentialed Accounts
```

```
ACTIVE: *  
ACCOUNT: sfatima.bese22seecs@seecs.edu.pk
```

```
To set the active account, run:  
$ gcloud config set account 'ACCOUNT'
```

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

SNAPSHOTS

ARCHIVE SNAPSHOTS

Operating system

Windows Server

Version *

Windows Server 2022 Datacenter

x86/64, Server with Desktop Experience, x64 built on 20240913

Boot disk type *

Balanced persistent disk

COMPARE DISK TYPES

Size (GB) *


50

Provision between 50 and 65536 GB



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Boot disk ?

Name	gce-lab2
Type	New balanced persistent disk
Size	50 GB
Snapshot schedule ?	No schedule selected
License type ?	PAYG (Pay-as-you-go)
Image	 Windows Server 2022 Datacenter

If you are using Windows and intend to run additional Microsoft software, please fill out the [License Verification Form](#)

VM instances

 Filter Enter property name or value

<input type="checkbox"/> Status	Name ↑	Zone	Internal IP	External IP	Connect
<input checked="" type="checkbox"/>	gce-lab2	us-central1-f	10.128.0.5 (nic0)	104.198.250.163 (nic0)	RDP ▾ ⋮

```
Starting instance(s) gce-lab2...done.
```

```
shieldedInstanceConfig:
  enableIntegrityMonitoring: true
  enableSecureBoot: false
  enableVtpm: true
shieldedInstanceIntegrityPolicy:
  updateAutoLearnPolicy: true
startRestricted: false
status: RUNNING
```

```
Resetting and retrieving password for [admin] on [gce-lab2]
Updated [https://www.googleapis.com/compute/v1/projects/massive-tea-433020-b2/zones/us-central1-f/instances/gce-lab2]
ip_address: 34.72.139.168
password: 8<dT) &9U&/Byan6
username: admin
```



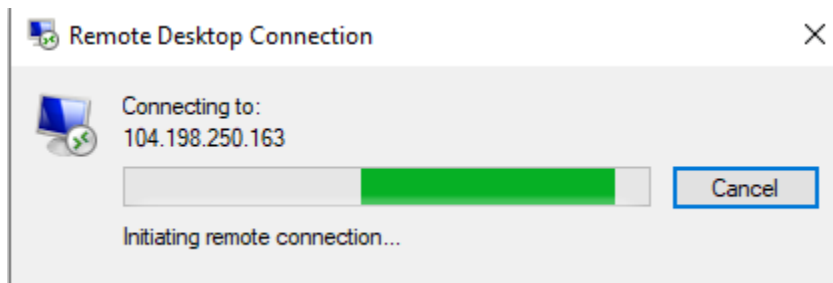
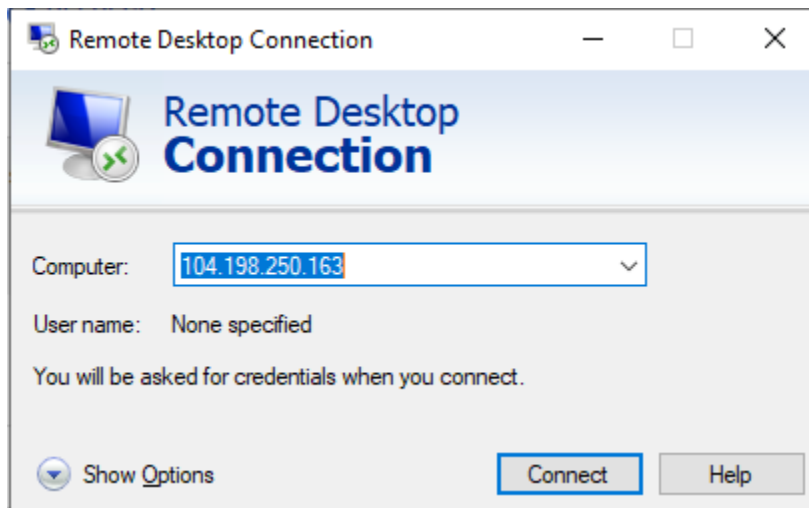
Remote Desktop

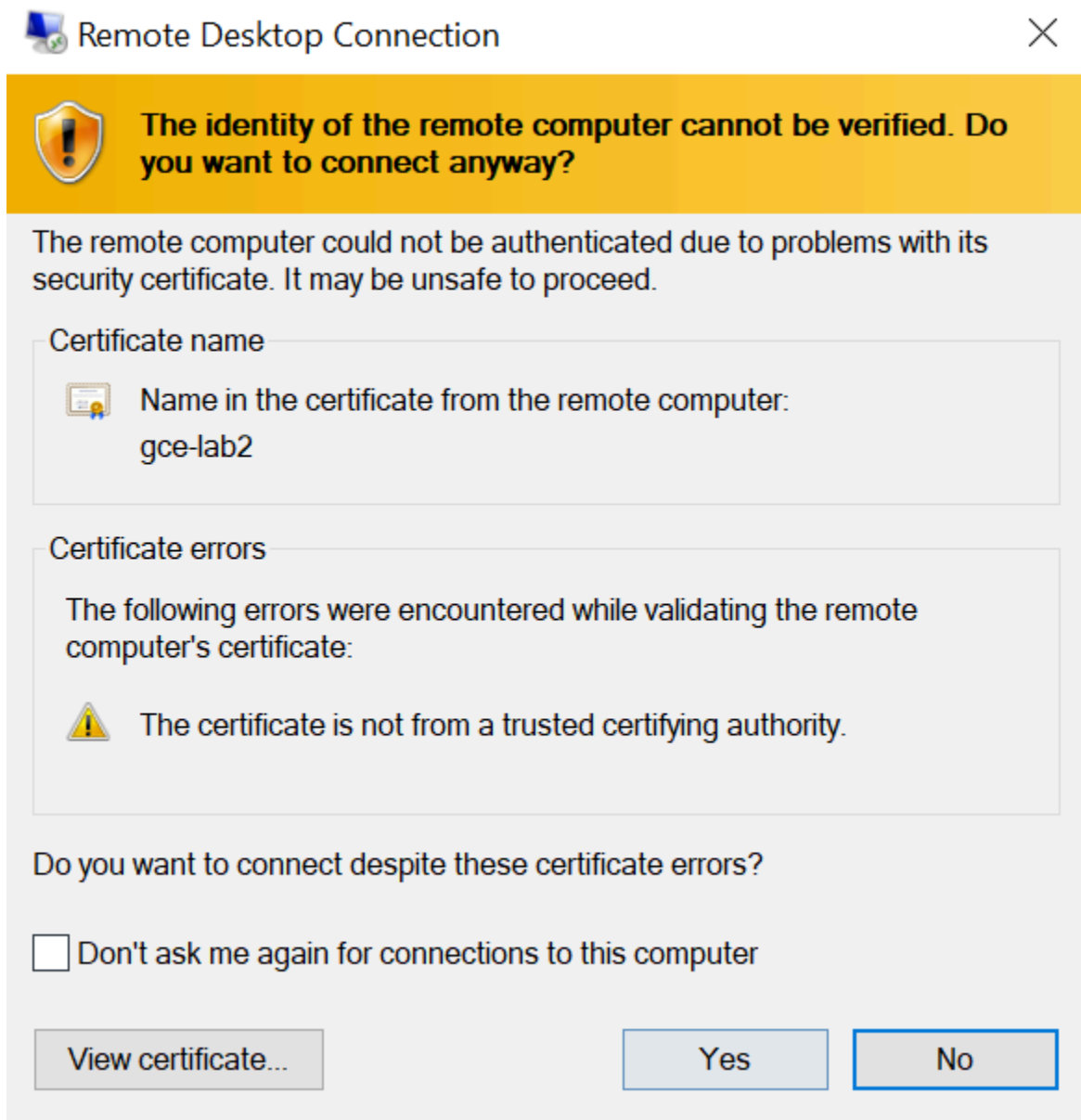
Remote Desktop lets you connect to and control this PC from a remote device by using a Remote Desktop client (available for Windows, Android, iOS and macOS). You'll be able to work from another device as if you were working directly on this PC.

Enable Remote Desktop



On





b. Install an NGINX web server



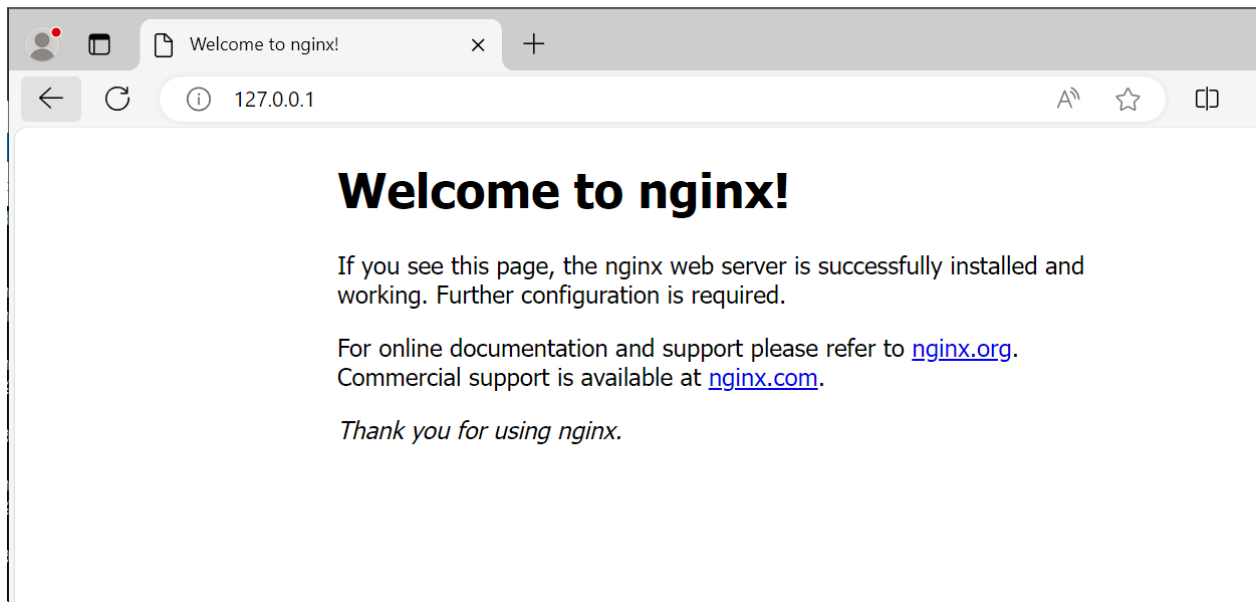
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The screenshot shows the Windows Server Manager Dashboard. The left sidebar contains a navigation menu with 'Dashboard', 'Local Server', 'All Servers', and 'File and Storage Services'. The main area is titled 'WELCOME TO SERVER MANAGER' and features a 'QUICK START' section with a numbered list of steps: 1. Configure this local server, 2. Add roles and features, 3. Add other servers to manage, 4. Create a server group, and 5. Connect this server to cloud services. Below this, the 'ROLES AND SERVER GROUPS' section displays three columns: 'File and Storage Services', 'Local Server', and 'All Servers', each with a list of features like Manageability, Events, Services, Performance, and BPA results.

```
C:\Users\admin>curl -O https://nginx.org/download/nginx-1.26.0.zip
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload  Total    Spent    Left   Speed
100 2030k  100 2030k    0     0  1048k      0  0:00:01  0:00:01 --:--:-- 1051k

C:\Users\admin>powershell -command "Expand-Archive -Path C:\Users\admin\nnginx-1.26.0.zip -DestinationPath C:\nginx"
C:\Users\admin>
C:\Users\admin>cd C:\nginx\nnginx-1.26.0
C:\nginx\nnginx-1.26.0>start nginx
C:\nginx\nnginx-1.26.0>
```



```
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2)$ gcloud compute instances create gcelab2-part3 --machine-type e2-medium --zone us-central1-f
Created [https://www.googleapis.com/compute/v1/projects/massive-tea-433020-b2/zones/us-central1-f/instances/gcelab2-part3].
NAME: gcelab2-part3
ZONE: us-central1-f
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.7
EXTERNAL_IP: 34.45.163.154
STATUS: RUNNING
```

```
NAME: gcelab2-part3
ZONE: us-central1-f
MACHINE_TYPE: e2-medium
PREEMPTIBLE:
INTERNAL_IP: 10.128.0.7
EXTERNAL_IP: 34.45.163.154
STATUS: RUNNING
```