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/

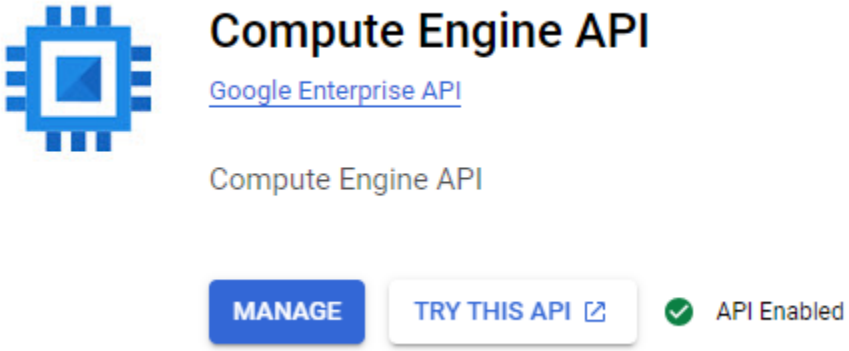
**Helping Material:**

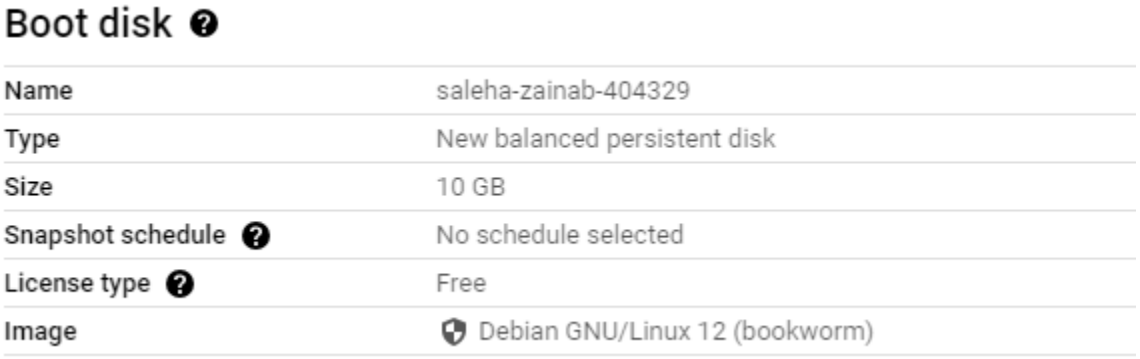
1. Creating a VM: https://www.cloudskillsboost.google/focuses/3563?parent=catalog
2. Compute Engine – Windows: https://www.cloudskillsboost.google/focuses/560?parent=catalog

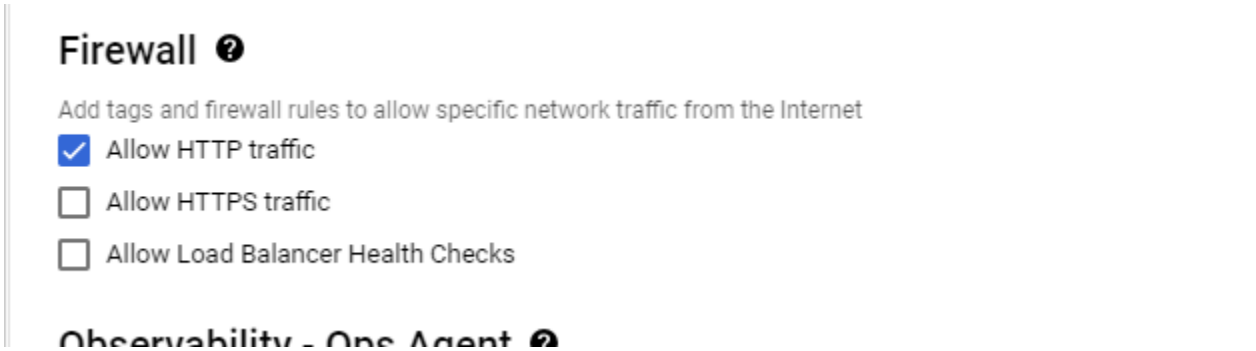
## Lab Task

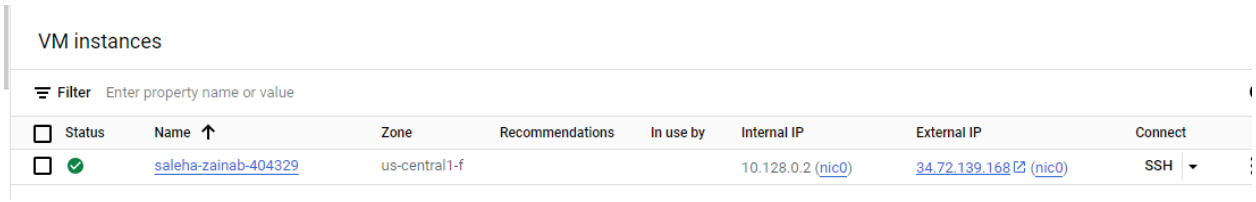
1. Go through the link 1 given above (under helping material: https://www.cloudskillsboost.google/focuses/3563?parent=catalog) which will take you to the 'Creating a VM' page. You have to start the lab and perform the tasks given below. Make sure to take screenshots of each task as you will need to add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

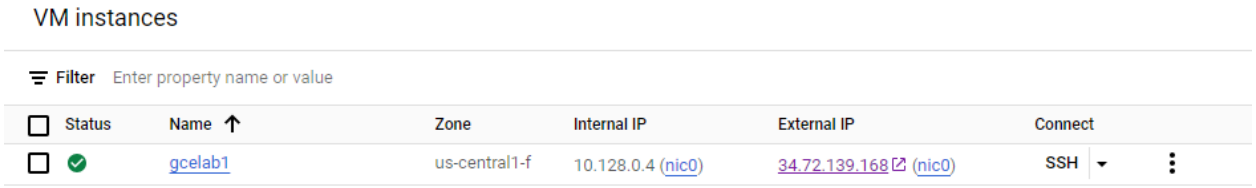
    a. Create a new instance from the Cloud console



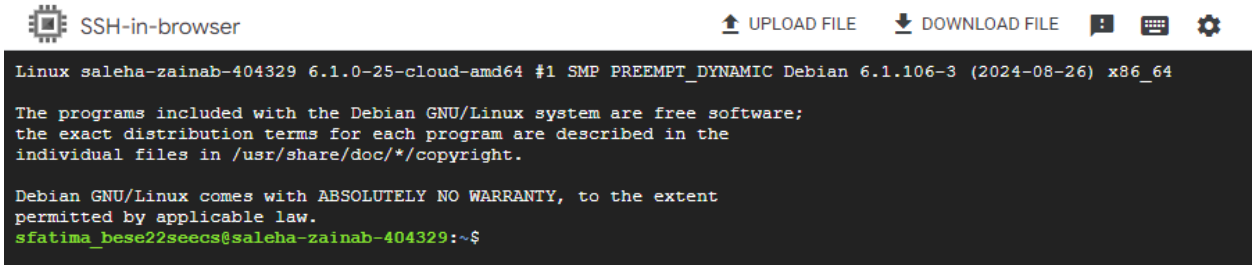





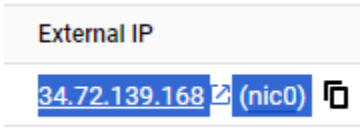

s launches an SSH client directly from your browser.

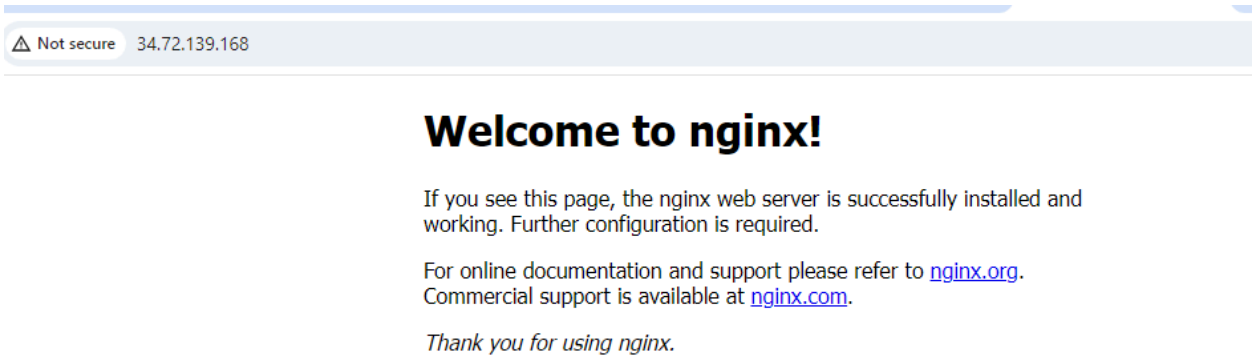



b. Install an NGINX web server

```
sfatima_bese22seecs@gcelab1:~$ ps auwx | 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]
```




c. Create a new instance with gcloud

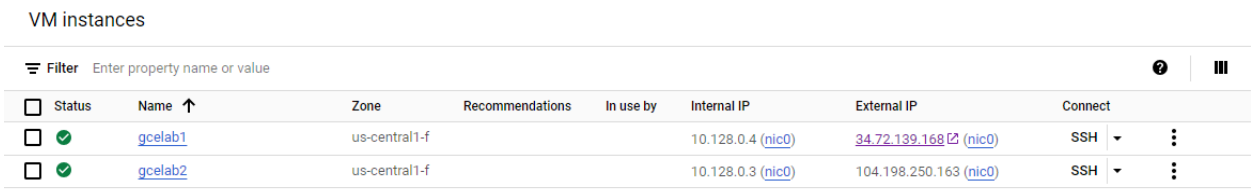
```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to massive-tea-433020-b2.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2)$ gcloud compute instances create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

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

```
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

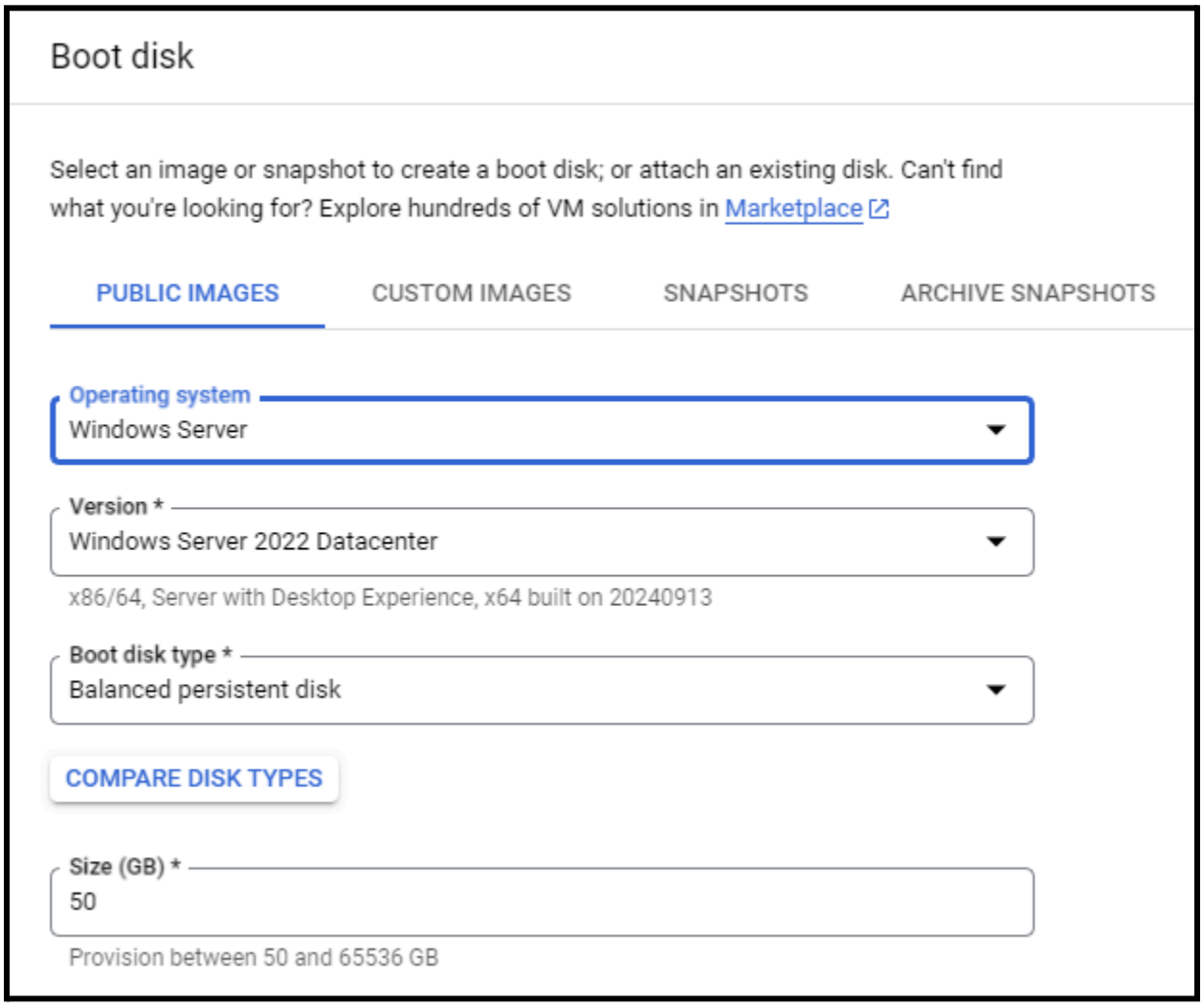


2. Go through the link 2 given above (under helping material: https://www.cloudskillsboost.google/focuses/560?parent=catalog) which will take you to the 'Compute Engine - Qwik Start - Windows' page. You have to start the lab and perform the tasks given below. Make sure to take screenshots of each task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

```
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

| | |
|---|---|
| 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

| Status | Name | Zone | Internal IP | External IP | Connect |
|---|---|---|---|---|---|
| ✓ | 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
```

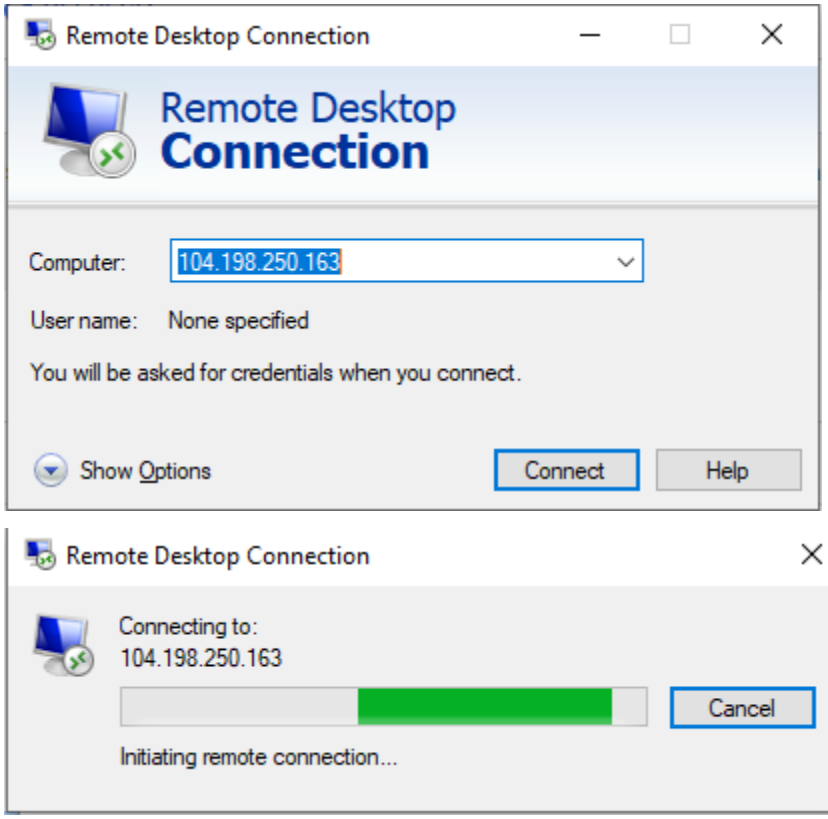
```
Resetting and retrieving password for [admin] on [gce-lab2]
Updated [https://www.googleapis.com/compute/v1/projects/massive-tea-433020-b2/zones/us-central1-f/instances/gce-lab2]
ip_address: 34.72.139.168
password:   8<dT)&9U&/Byan6
username:   admin
```

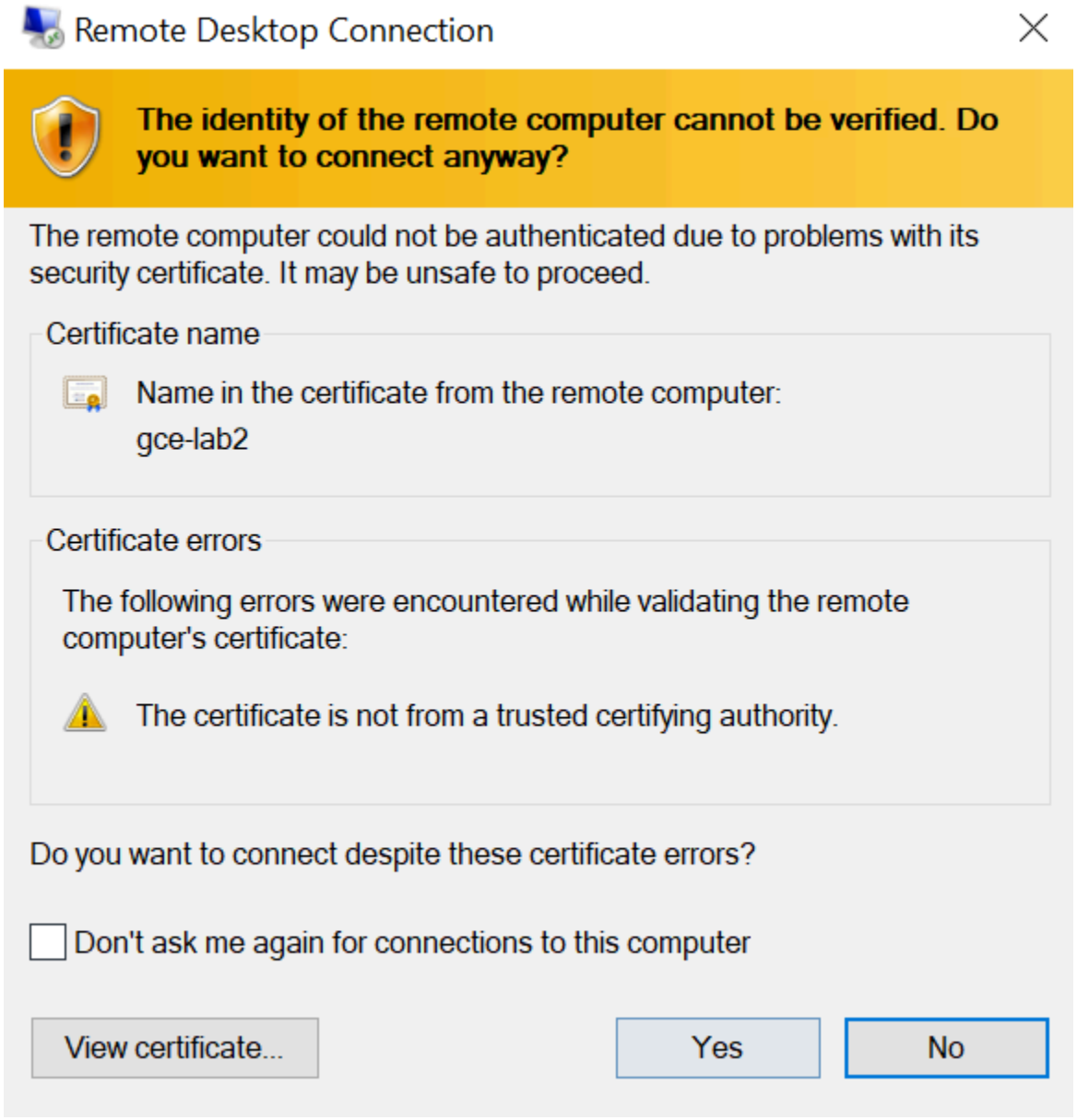
# Remote Desktop

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.

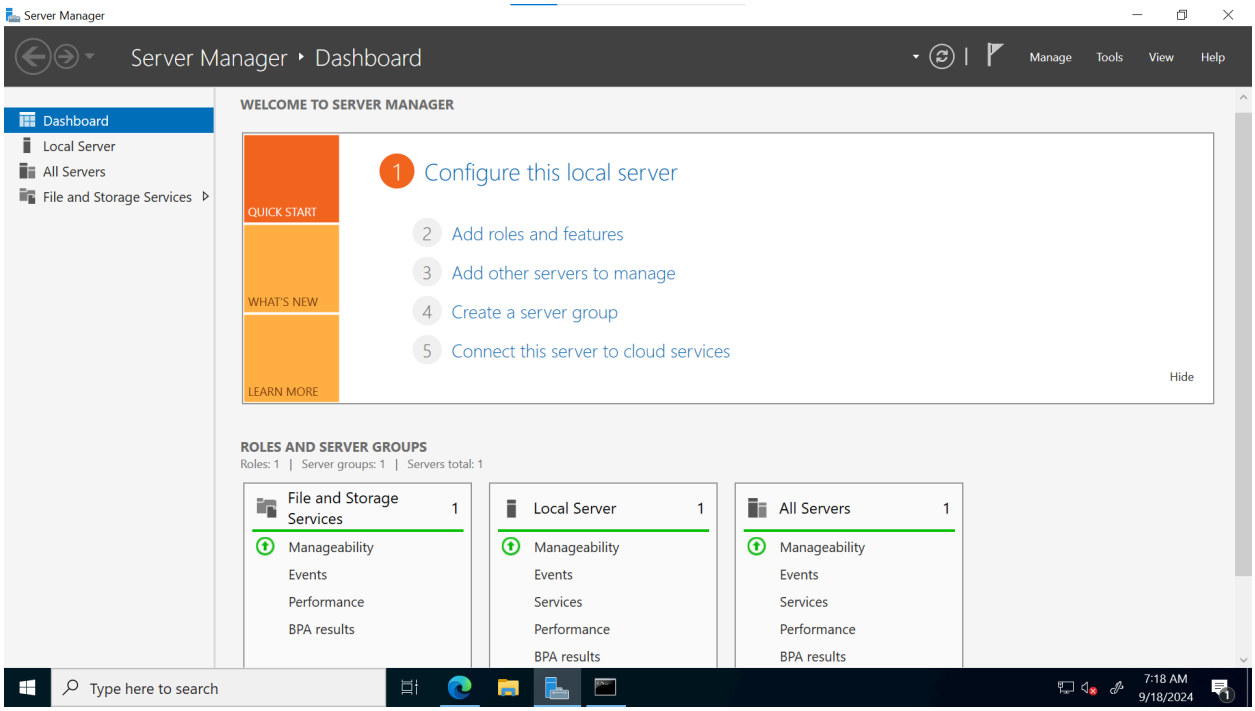
Enable Remote Desktop

On






b. Install an NGINX web server



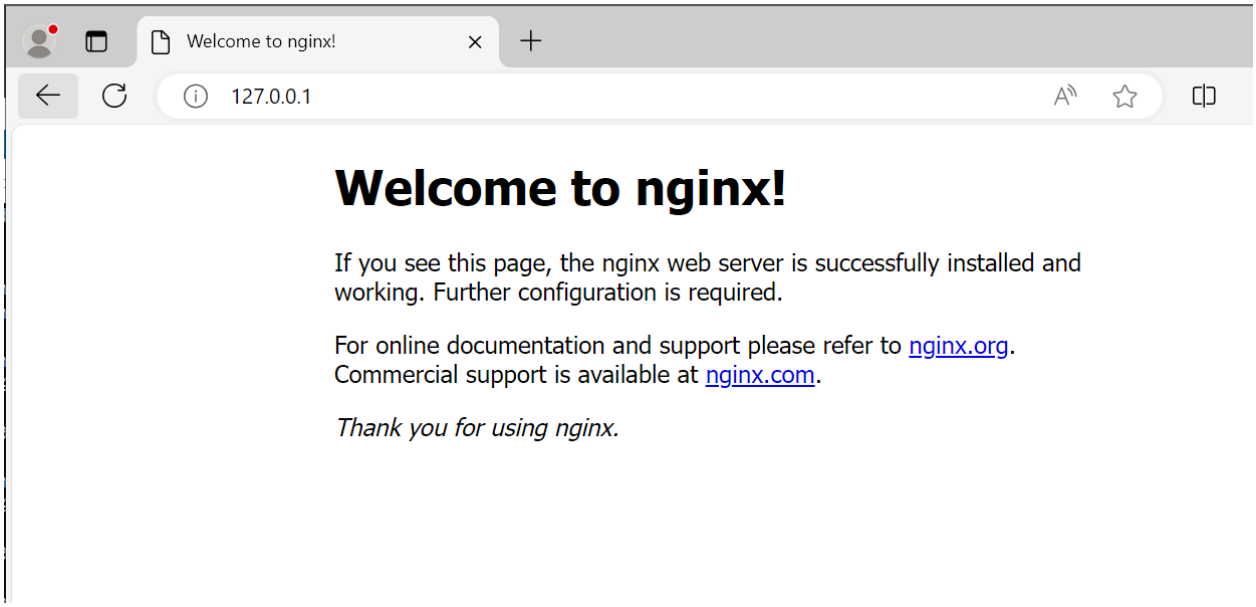

```
C:\Users\admin>curl -O https://nginx.org/download/nginx-1.26.0.zip
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 2030k  100 2030k    0     0  1048k      0  0:00:01  0:00:01 --:--:--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

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

C:\Users\admin>
C:\Users\admin>cd C:\nginx\nginx-1.26.0

C:\nginx\nginx-1.26.0>start nginx

C:\nginx\nginx-1.26.0>_
```




```
sfatima_bese22seecs@cloudshell:~ (massive-tea-433020-b2)$ gcloud compute instances create gcelab2-pa
rt3 --machine-type e2-medium --zone us-central1-f
Created [https://www.googleapis.com/compute/v1/projects/massive-tea-433020-b2/zones/us-central1-f/in
stances/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
```