Creating a Virtual Machine

Overview

Google Compute Engine lets you create virtual machines running 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 has been designed to be fast and to offer strong consistency of performance.

In this hands-on lab you'll learn how to create virtual machine instances of various machine types using the Google Cloud Platform (GCP) Console and using the `gcloud` command line. You'll also learn how to connect an NGINX web server to your virtual machine.

Although you can easily copy and paste commands from the lab to the appropriate place, students should type the commands themselves to reinforce their understanding of the core concepts

What you'll do

- Create a virtual machine with the GCP Console
- Create a virtual machine with `gcloud` command line
- Deploy a web server and connect it to a virtual machine

Prerequisites

- Familiarity with standard Linux text editors such as `vim`, `emacs`, or `nano` will be helpful

### What you need

To complete this lab, you need:

- Access to a standard internet browser (Chrome browser recommended).
- Time to complete the lab.

How to start your lab and sign in to the Console

- Open https://console.cloud.google.com/
- Enter login credentials

After a few moments, the GCP console opens in this tab.

Note: You can view the menu with a list of GCP Products and Services by clicking the **Navigation menu** at the top-left, next to "Google Cloud Platform".
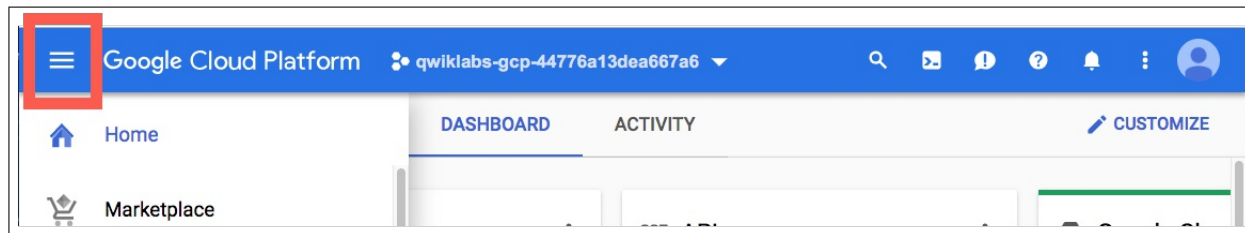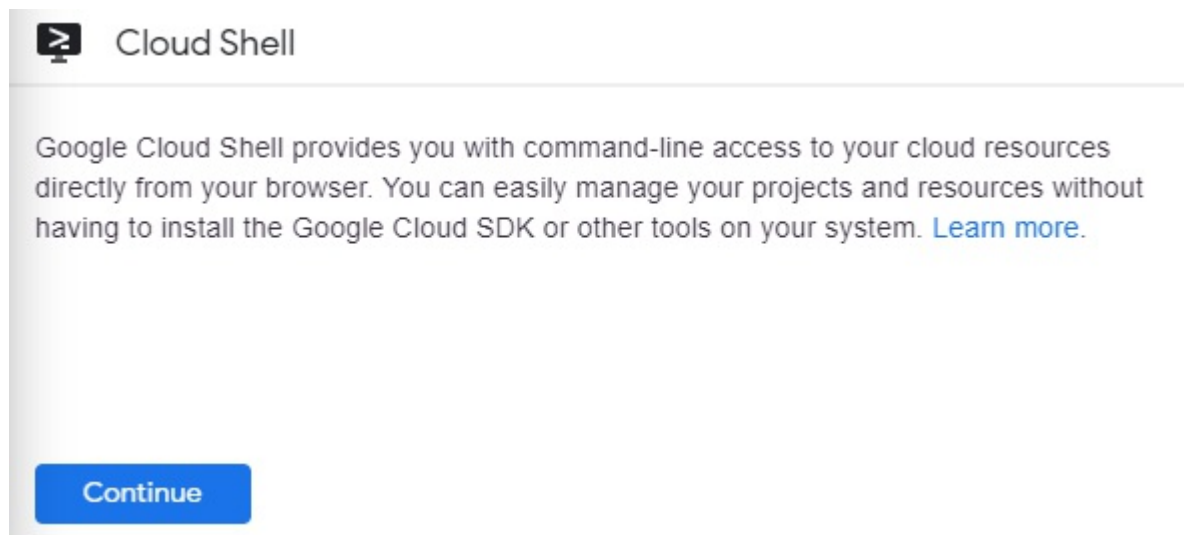
Activate Google Cloud Shell

Google Cloud Shell is a virtual machine that is loaded with development tools. It offers a persistent 5GB home directory and runs on the Google Cloud. Google Cloud Shell provides command-line access to your GCP resources.
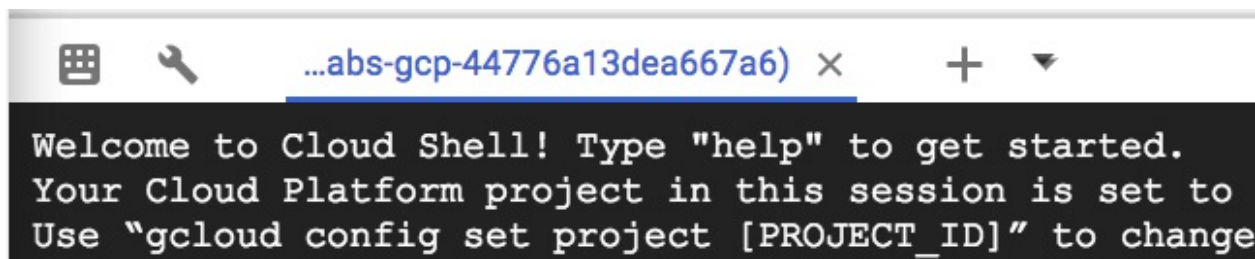
1. In GCP console, on the top right toolbar, click the Open Cloud Shell button.
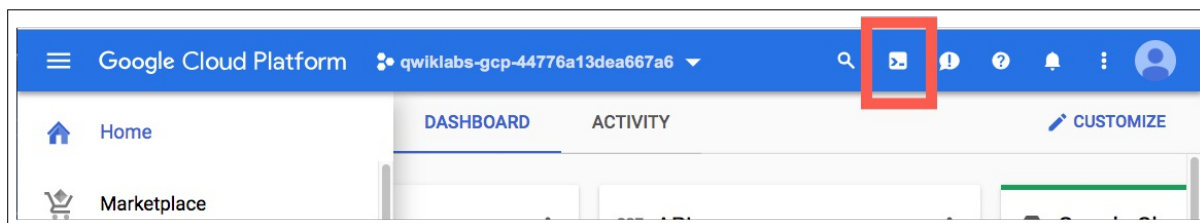
2. Click **Continue**.

It takes a few moments to provision and connect to the environment. When you are connected, you are already authenticated, and the project is set to your *PROJECT_ID*. For example:

gcloud is the command-line tool for Google Cloud Platform. It comes pre-installed on Cloud Shell and supports tab-completion.

You can list the active account name with this command:

```
gcloud auth list
```

Output:

```
Credentialed accounts:
 - <myaccount>@<mydomain>.com (active)
```

Example output:

```
Credentialed accounts:
 - google1623327_student@testlabs.net
```

You can list the project ID with this command:

```
gcloud config list project
```

Output:

```
[core]
project = <project_ID>
```

Example output:

```
[core]
project = testlabs-gcp-44776a13dea667a6
```

Full documentation of **gcloud** is available on Google Cloud gcloud Overview .

Understanding Regions and Zones

Certain Compute Engine resources live in regions or zones. A region is a specific geographical location where you can run your resources. Each region has one or more zones. For example, the us-central1 region denotes a region in the Central United States that has zones

`us-central1-a` , `us-central1-b` , `us-central1-c` , and `us-central1-f` .

Resources that live in a zone are referred to as zonal resources.
Virtual machine Instances and persistent disks live in a zone. To attach
a persistent disk to a virtual machine instance, both resources must be
in the same zone. Similarly, if you want to assign a static IP address
to an instance, the instance must be in the same region as the static
IP.

Learn more about regions and zones and see a complete list in Regions & Zones documentation.

Create a new instance from the Cloud Console

In this section, you'll learn how to create new pre-defined machine
types with Google Compute Engine from the Cloud Console.

In the GCP Console, on the top left of the screen, select **Navigation menu** > **Compute Engine** > **VM Instances**:
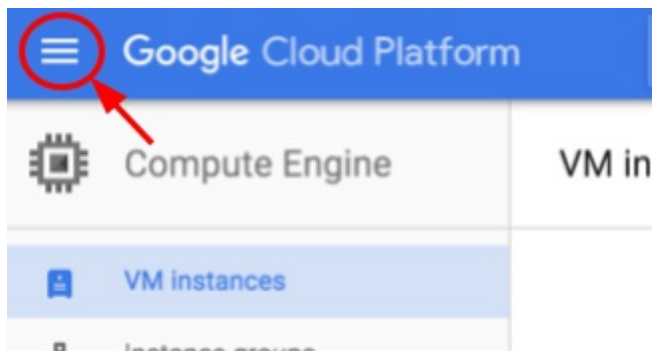
This may take a minute to initialize for the first time.

To create a new instance, click **Create**.

Compute Engine
VM instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. You can choose from micro-VMs to large instances running Debian, Windows, or other standard images. Create your first VM instance, import it by CloudEndure migration service or try the quickstart to build a sample app.

Create or **Import** or **Take the quickstart**

There are many parameters you can configure w hen creating a new instance. Use the follow ing for this lab:

Field

Value

Additional Information

Name

`gcelab`

Name for the VM instance

Region

`us-central1 (Iowa)`

or

`asia-south1 (Mumbai)`

Learn more about regions in Regions & Zones documentation.

Zone

`us-central1-c`

or

`asia-south1-c`

Note: remember the zone that you selected, you'll need it later.

Learn more about zones in Regions & Zones documentation.

Machine Type

`2 vCPUs`

This is a (n1-standard-2),

2-CPU, 7.5GB RAM instance.

There are a number of machine types, ranging from micro instance types to 32-core/208GB RAM instance types. Learn more in the Machine Types documentation.

Note: A new project has a default resource quota, which may limit the number of CPU cores. You can request more when you work on projects outside of this lab.

Boot Disk

`New 10 GB standard persistent disk`

`OS Image: Debian GNU/Linux 9 (stretch)`

There are a number of images to choose from, including: Debian, Ubuntu, CoreOS as well as premium images such as Red Hat Enterprise Linux and Windows Server. See Operating System documentation for more detail.

Firewall

Check `Allow HTTP traffic`

Check this option so to access a webserver that you'll install later.

Note: This will automatically create firewall rule to allow HTTP traffic on port 80.

Click **Create**.

Wait for it to finish - it shouldn't take more than a minute.

Once finished, you should see the new virtual machine in the **VM Instances** page.

To SSH into the virtual machine, click on **SSH** on the right hand side. This launches a SSH client directly from your browser.

	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
☐ ✅	gcelab	us-central1-c		10.128.0.2 (nic0)	35.194.40.76 ⬀	SSH ▾ ⋮

Note: For more information, see the Connect to an instance using ssh documentation.

Install a NGINX web server

Now you'll install NGINX web server, one of the most popular web servers in the world, to connect your virtual machine to something.

Once SSH'ed, get `root` access using `sudo` :

```
sudo su -
```

As the `root` user, update your OS:

```
apt-get update
```

(Output)

```
Get:1 http://security.debian.org stretch/updates InRelease [94.3 kB]
Ign http://deb.debian.org strech InRelease
Get:2 http://deb.debian.org strech-updates InRelease [91.0 kB]
...
```

Install NGINX:

```
apt-get install nginx -y
```

(Output)

```
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
...
```

Check that NGINX is running:

```
ps auwx | grep nginx
```

(Output)

```
root       2330  0.0  0.0 159532  1628 ?       Ss   14:06   0:00 nginx: master process /usr/sbin/nginx -g daemon on; maste
www-data   2331  0.0  0.0 159864  3204 ?       S    14:06   0:00 nginx: worker process
www-data   2332  0.0  0.0 159864  3204 ?       S    14:06   0:00 nginx: worker process
root       2342  0.0  0.0  12780   988 pts/0   S+   14:07   0:00 grep nginx
```

Awesome! To see the web page, go to the Cloud Console and click the
`External IP` link of the virtual machine instance. You can also see the
web page by adding the `External IP` to `http://EXTERNAL_IP/` in a new
browser window or tab.

VM instances

CREATE INSTANCE   **IMPORT VM**   **REFRESH**   ▶ START

	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
☑ ✅	gcelab	us-central1-c		10.128.0.2	104.154.165.45 ⬈	SSH ▼ ⋮

You should see this default w eb page:

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.

To check your progress in this lab, click **Check my progress** below. A checkmark means you're on track.

Create a Compute Engine instance and add Nginx Server to your instance w ith necessary firew all rules.

Create a new instance with gcloud

Rather than using the GCP Console to create a virtual machine instance, you can use the command line tool `gcloud` , w hich is pre-installed in Google Cloud Shell.
Cloud Shell is a Debian-based virtual machine loaded w ith all the development tools you'll need (`gcloud` , `git,` and others) and offers a persistent 5GB home directory.

If you w ant to try this on your ow n machine in the future, read the gcloud command line tool guide.

In the Cloud Shell, create a new virtual machine instance from the command line using `gcloud` , replacing [YOUR_ZONE] w ith one of the zone choices given earlier:

```
gcloud compute instances create gcelab2 --machine-type n1-standard-2 --zone [your_zone]
```

(Output)

```
Created [...gcelab2].
NAME     ZONE          MACHINE_TYPE  ...    STATUS
gcelab2  us-central1-c n1-standard-2 ...    RUNNING
```

Click **Check my progress** below to verify you're on track in this lab.

Create a new instance with gcloud.

The instance created has these default values:

- The latest Debian 9 (stretch)
  image.
- The `n1-standard-2` machine type. In this
  lab you can select one of these other machine types if you'd like:
  `n1-highmem-4` or `n1-highcpu-4` . You can also specify a custom machine type.
- A root persistent disk with the same name as the instance; the disk
  is automatically attached to the instance.

Run `gcloud compute instances create --help` to see all the defaults.

Note: You can set the default region and zones that `gcloud` uses if
you are always working within one region/zone and you don't want to
append the `--zone` flag every time. Do this by running these commands :

```
gcloud config set compute/zone ...
```

```
gcloud config set compute/region ...
```

To exit `help` , press **Ctrl+c**.

Check out your instances. Select **Navigation menu** > **Compute Engine** > **VM instances**. You should see the 2 instances you created
in this lab.

VM instances						SHOW INFO PANEL

Name ^	Zone	Recommendation	Internal IP	External IP	Connect	
✓ gcelab	us-central1-c		10.128.0.2 (nic0)	104.155.128.223 ⤴	SSH ▾	⋮
✓ gcelab2	us-central1-c		10.128.0.3 (nic0)	104.154.152.174	SSH ▾	⋮

Finally, you can SSH into your instance using `gcloud` as well. Make
sure you add your zone, or omit the `--zone` flag if you've set the
option globally:

```
gcloud compute ssh gcelab2 --zone [YOUR_ZONE]
```

(Output)

```
WARNING: The public SSH key file for gcloud does not exist.
WARNING: The private SSH key file for gcloud does not exist.
WARNING: You do not have an SSH key for gcloud.
WARNING: [/usr/bin/ssh-keygen] will be executed to generate a key.
This tool needs to create the directory
[/home/gcpstaging306_student/.ssh] before being able to generate SSH
Keys.
```

Now you'll type **Y** to continue.

```
Do you want to continue? (Y/n)
```

Enter through the passphrase section to leave the passphrase empty.

```
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase)
```

After connecting, you disconnect from SSH by exiting from the remote shell:

```
exit
```

Test your knowledge

Test your knowledge about GCP by taking our quiz. (Please select multiple correct options if necessary.)

Congratulations!

Google Compute Engine is the foundation to GCP's Infrastructure-as-a-Service. You created a virtual machine with Compute Engine and can now map your existing server infrastructure, load balancers, and network topology to GCP.

Next Steps / Learn More

- For an overview of VMs, see Virtual Machine Instances.
- Check out how to migrate VMs to the GCP.
- Learn more about subnetworks and network topology.
- And then be sure to choose the right VM type by reviewing Choosing a VM Machine.