Quiz

1. Which of the following does not allow you to interact with Google Cloud?
   - ☐ Cloud Shell
   - ☐ Google Cloud Console
   - ☐ Cloud Explorer
   - ☐ REST-based API

2. What is the difference between the Google Cloud Console and Cloud Shell?
   - ☐ Cloud Shell is a command-line tool, while the Cloud Console is a graphical user interface
   - ☐ The Cloud Console is a command-line tool, while Cloud Shell is a graphical user interface
   - ☐ There is no difference as these tools are 100% identical.
   - ☐ Cloud Shell is a locally installed tool, while the Cloud Console is a temporary virtual machine.

3. What are the three types of networks offered in Google Cloud?
   - ☐ Default network, auto network, and custom network.
   - ☐ IPv4 unicast network, IPv4 multicast network, IPv6 network
   - ☐ Gigabit network, 10 gigabit network, and 100 gigabit network
   - ☐ Zonal, regional, and global

4. What is one benefit of applying firewall rules by tag rather than by address?
   - ☐ Tags on firewall rules control which ephemeral IP addresses VMs will receive.
   - ☐ When a VM is created with a matching tag, the firewall rules apply irrespective of the IP address it is assigned.
   - ☐ Tags in network traffic help with network sniffing.
   - ☐ Tags help organizations track firewall billing.

5. In Google Cloud, what is the minimum number of IP addresses that a VM instance needs?
   - ☐ Three: One internal, one external and one alias IP address
   - ☐ Two: One internal and one external IP address
   - ☐ One: Only an internal IP address

6. Which statement is true of persistent disks?
   - ☐ Persistent disks are encrypted by default.
   - ☐ Persistent disks are physical hardware devices connected directly to VMs.
   - ☐ Persistent disks are always HDDs (magnetic spinning disks).

☐ Once created, a persistent disk cannot be resized.

7. Which statement is true of Virtual Machine Instances in Compute Engine?
   ☐ A VM in Compute Engine always maps to a single hardware computer in a rack.
   ☐ Compute Engine uses VMware to create Virtual Machine Instances.
   ☐ In Compute Engine, a VM is a networked service that simulates the features of a computer.
   ☐ All Compute Engine VMs are single tenancy and do not share CPU hardware.

8. What are sustained use discounts?
   ☐ Automatic discounts that you get for running specific Compute Engine resources for a significant portion of the billing month
   ☐ Purchase commitments for specific resources you know you will use
   ☐ Discounts you receive by using preemptible VM instances
   ☐ Per-second billing that starts after a 1 minute minimum

9. Which of the following is not a type of IAM role?
   ☐ Predefined
   ☐ Advanced
   ☐ Custom
   ☐ Basic

10. What abstraction is primarily used to administer user access in IAM ?
   ☐ Roles, an abstraction of job roles.
   ☐ Privileges, an abstraction of access rights.
   ☐ Credentials, an abstraction of an authorization token.
   ☐ Leases, an abstraction of periodic entitlements.

11. Which Google Cloud data storage service offers ACID transactions and can scale globally?
   ☐ Cloud CDN
   ☐ Cloud Spanner
   ☐ Cloud SQL
   ☐ Cloud Storage

Challenge 1

Objectives

In this lab, you will learn how to perform the following tasks:
- Create a Compute Engine virtual machine using the Google Cloud console.
- Create a Compute Engine virtual machine using the gcloud command-line interface.
- Connect between the two instances.

Task 1. Create a virtual machine using the Cloud console

1. In the Navigation menu (≡), click Compute Engine > VM instances.
2. Click CREATE INSTANCE.
3. On the Create an Instance page, for Name, type my-vm-1.
4. For Region and Zone, select the region and zone assigned by Google Cloud Skills Boost.
5. For Machine type, accept the default.
6. For Boot disk, if the Image shown is not Debian GNU/Linux 10 (Buster), click Change and select Debian GNU/Linux 10 (Buster).
7. Leave the defaults for Identity and API access unmodified.
8. For Firewall, click Allow HTTP traffic.
9. Leave all other defaults unmodified.
10. To create and launch the VM, click Create.

Task 2. Create a virtual machine using the gcloud command line

1. In the Cloud console, on the top right toolbar, click the Activate Cloud Shell button ( ).
2. Click Continue.
3. To display a list of all the zones in the region to which Google Cloud Skills Boost assigned you, enter this partial command gcloud compute zones list | grep followed by the region that Google Cloud Skills Boost or your instructor assigned you to.
   Your completed command will look like this: gcloud compute zones list | grep us-central1
4. Choose a zone from that list other than the zone to which Google Cloud Skills Boost assigned you. For example, if Google Cloud Skills Boost assigned you to region us-central1 and zone us-central1-a you might choose zone us-central1-b.
5. To set your default zone to the one you just chose, enter this partial command gcloud config set compute/zone followed by the zone you chose.
   Your completed command will look like this: gcloud config set compute/zone us-central1-b
6. To create a VM instance called my-vm-2 in that zone, execute this command:

Command : gcloud compute instances create "my-vm-2" --machine-type "n1-standard-1" --image-project "debian-cloud" --image-family "debian-10" --subnet "default"

7. To close the Cloud Shell, execute the following command:
   Command : exit

Task 3. Connect between VM instances

1. In the Navigation menu, click Compute Engine > VM instances.
   You will see the two VM instances you created, each in a different zone.
   Notice that the Internal IP addresses of these two instances share the first three bytes in common. They reside on the same subnet in their Google Cloud VPC even though they are in different zones.
2. To open a command prompt on the my-vm-2 instance, click SSH in its row in the VM instances list.
3. Use the ping command to confirm that my-vm-2 can reach my-vm-1 over the network:
   Command : ping my-vm-1.us-central1-a
   Notice that the output of the ping command reveals that the complete hostname of my-vm-1 is my-vm-1.us-central1-a.c.PROJECT_ID.internal, where PROJECT_ID is the name of your Google Cloud Platform project. The Cloud console automatically supplies Domain Name Service (DNS) resolution for the internal IP addresses of VM instances.
4. Press Ctrl+C to abort the ping command.
5. Return to the Cloud Console tab.
6. Click SSH in the my-vm-1 row in the VM instances list
7. At the command prompt on my-vm-1, install the Nginx web server:
   Command : sudo apt-get install nginx-light -y
8. Use the nano text editor to add a custom message to the homepage of the web server:
   sudo nano /var/www/html/index.nginx-debian.html
9. Use the arrow keys to move the cursor to the line just below the h1 header. Add text like this, and replace YOUR_NAME with your name: Hi from YOUR_NAME
10. Press Ctrl+O and then press Enter to save your edited file, and then press Ctrl+X to exit the nano text editor.
11. Confirm that the web server is serving your new page. At the command prompt on my-vm-1, execute this command: curl http://localhost/
    The response will be the HTML source of the web server's home page, including your line of custom text.
12. Return to the command prompt on my-vm-2
13. To confirm that my-vm-2 can reach the web server on my-vm-1, at the command prompt on my-vm-2, execute this command: curl http://my-vm-1.us-central1-a/
    The response will again be the HTML source of the web server's home page, including your line of custom text.
14. In the Navigation menu, click Compute Engine > VM instances.
15. Copy the External IP address for my-vm-1 and paste it into the address bar of a new browser tab.

You will see your web server's home page, including your custom text.

Congratulations!

In this lab, you created virtual machine (VM) instances in two different zones and connected to them using ping, ssh, and HTTP.

Quiz

1. Choose an application that would be suitable for running in a Preemptible VM.
   - ☐ An interactive website
   - ☐ A batch job that cannot be checkpointed and restarted
   - ☐ A batch job that can be checkpointed and restarted
   - ☐ An online relational database

2. How do VPC routers and firewalls work?
   - ☐ They are managed by Google in virtual machines, which customers may tune or turn off.
   - ☐ Customers provision virtual machines and run their routers and firewalls in them.
   - ☐ They are managed by Google as a built-in feature.
   - ☐ They are managed by Google in virtual machines, which customers may never modify.

3. Which statement is true about Google VPC networks and subnets?
   - ☐ Networks are regional; subnets are zonal
   - ☐ Networks and subnets are global
   - ☐ Networks are global; subnets are regional
   - ☐ Networks are global; subnets are zonal

4. How do Compute Engine customers choose between big VMs and many VMs?
   - ☐ Use big VMs for fault tolerance and elasticity; use many VMs for in-memory databases and CPU-intensive analytics
   - ☐ Use big VMs for in-memory databases and CPU-intensive analytics; use many VMs for fault tolerance and elasticity

5. Which of these problems are containers intended to solve? Mark all that are correct (3 correct answers).
   - ☐ Packaging applications in virtual machines can be wasteful.
   - ☐ Applications need a way to isolate their dependencies from one another.
   - ☐ It's difficult to troubleshoot applications when they work on a developer's laptop but fail in production.
   - ☐ Large monolithic applications that need to be run in the cloud.

6. When you use Kubernetes, you describe the desired state you want, and Kubernetes's job is to make the deployed system conform to your desired state

and to keep it there in spite of failures. What is the name for this management approach?

- [ ] Declarative configuration
- [ ] Virtualization
- [ ] Imperative configuration
- [ ] Containerization

7. What is the difference between a pod and a container?
    - [ ] A pod contains one or more containers.
    - [ ] Pods and containers are two names for the same thing.
    - [ ] A container contains one or more pods.

8. A fully-managed petabyte-scale data warehouse that runs on the Google Cloud.
    - [ ] BigQuery
    - [ ] Cloud SQL
    - [ ] Google Cloud
    - [ ] Cloud Storage bucket

9. With BigQuery, you can access datasets shared publicly from other Google Cloud projects.
    - [ ] False
    - [ ] True

10. A publisher application creates and sends messages to a ____. Subscriber applications create a ____ to a topic to receive messages from it.
    - [ ] topic, subscription
    - [ ] topic, topic
    - [ ] subscription, topic
    - [ ] subscription, subscription

11. Cloud Pub/Sub is an asynchronous messaging service designed to be highly reliable and scalable.
    - [ ] True
    - [ ] False

Challenge 2

Objectives

In this lab, you learn how to perform the following tasks:
- Create a Cloud Storage bucket and place an image into it.
- Use the image in the Cloud Storage bucket on a web page.

Task 1. Deploy a web server VM instance

1. In the GCP Console, on the Navigation menu (≡), click Compute Engine > VM instances.
2. Click Create Instance.
3. On the Create an Instance page, for Name, type bloghost
4. For Region and Zone, select the region and zone assigned by Qwiklabs.
5. For Machine type, accept the default.
6. For Boot disk, if the Image shown is not Debian GNU/Linux 11 (bullseye), click Change and select Debian GNU/Linux 11 (bullseye).
7. Leave the defaults for Identity and API access unmodified.
8. For Firewall, click Allow HTTP traffic.
9. Click Networking, disks, security, management, sole tenancy to open that section of the dialog.
10. Click Management to open that section of the dialog.
11. Scroll down to the Automation section, and enter the following script as the value for Startup script: apt-get update
    apt-get install apache2 php php-mysql -y
    service apache2 restart
12. Leave the remaining settings as their defaults, and click Create.
13. On the VM instances page, copy the bloghost VM instance's internal and external IP addresses to a text editor for use later in this lab.

Task 2. Create a Cloud Storage bucket using the gsutil command line

All Cloud Storage bucket names must be globally unique. To ensure that your bucket name is unique, these instructions will guide you to give your bucket the same name as your Cloud Platform project ID, which is also globally unique.

Cloud Storage buckets can be associated with either a region or a multi-region location: US, EU, or ASIA. In this activity, you associate your bucket with the multi-region closest to the region and zone that Qwiklabs or your instructor assigned you to.

1. On the Google Cloud Platform menu, click Activate Cloud Shell ⏩. If a dialog box appears, click Continue.
2. For convenience, enter your chosen location into an environment variable called LOCATION. Enter one of these commands: export LOCATION=US or export LOCATION=EU or export LOCATION=ASIA
3. In Cloud Shell, the DEVSHELL_PROJECT_ID environment variable contains your project ID. Enter this command to make a bucket named after your project ID: gsutil mb -l $LOCATION gs://PROJECT_ID
4. Retrieve a banner image from a publicly accessible Cloud Storage location: gsutil cp gs://cloud-training/gcpfci/my-excellent-blog.png my-excellent-blog.png
5. Copy the banner image to your newly created Cloud Storage bucket: gsutil cp my-excellent-blog.png gs://PROJECT_ID/my-excellent-blog.png
6. Modify the Access Control List of the object you just created so that it is readable by everyone: gsutil acl ch -u allUsers:R gs://PROJECT_ID/my-excellent-blog.png

Task 3. Configure an application in a Compute Engine instance to use a Cloud Storage object

1. In the GCP Console, click Cloud Storage > Browser.
2. Click on the bucket that is named after your GCP project.
3. In this bucket, there is an object called my-excellent-blog.png. Copy the URL behind the link icon that appears in that object's Public access column, or behind the words "Public link" if shown.
4. Return to your ssh session on your bloghost VM instance.
5. Enter this command to set your working directory to the document root of the web server: cd /var/www/html
6. Use the nano text editor to edit index.php: sudo nano index.php
7. Use the arrow keys to move the cursor to the line that contains the h1 element. Press Enter to open up a new, blank screen line, and then paste the URL you copied earlier into the line.
8. Paste this HTML markup immediately before the URL: <img src='
9. Place a closing single quotation mark and a closing angle bracket at the end of the URL: '> The resulting line will look like this:
   <img
   src='https://storage.googleapis.com/qwiklabs-gcp-0005e186fa559a09/my-excellent-blog.png'>
   The effect of these steps is to place the line containing <img src='...'> immediately before the line containing <h1>...</h1>
10. Press Ctrl+O, and then press Enter to save your edited file.
11. Press Ctrl+X to exit the nano text editor.
12. Restart the web server: sudo service apache2 restart
13. Return to the web browser tab in which you opened your bloghost VM instance's external IP address. When you load the page, its content now includes a banner image.

Congratulations!

You have successfully created a Cloud Storage bucket and placed an image into it. Furthermore you have used that image on a webpage through the Google Cloud Storage bucket

Challenge 3

Overview

Google Cloud Pub/Sub is a messaging service for exchanging event data among applications and services. A producer of data publishes messages to a Cloud Pub/Sub topic. A consumer creates a subscription to that topic. Subscribers either pull messages from a subscription or are configured as webhooks for push subscriptions. Every subscriber must acknowledge each message within a configurable window of time.

Objective

- Set up a topic to hold data.
- Subscribe to a topic to access the data.
- Publish and then consume messages with a pull subscriber.

Task 1. Setting up Pub/Sub

You can use the Google Cloud Shell console to perform operations in Google Cloud Pub/Sub.
To use a Pub/Sub, you create a topic to hold data and a subscription to access data published to the topic.

1. Click Navigation menu (☰) > Pub/Sub > Topics.
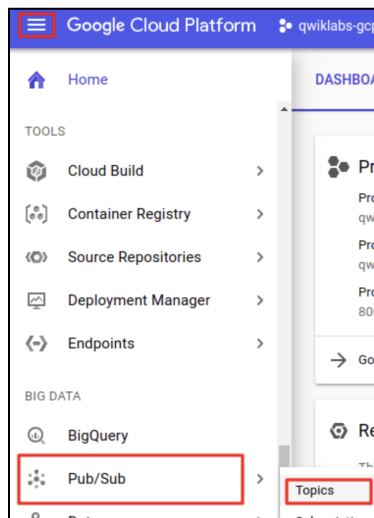
2. Click Create topic.
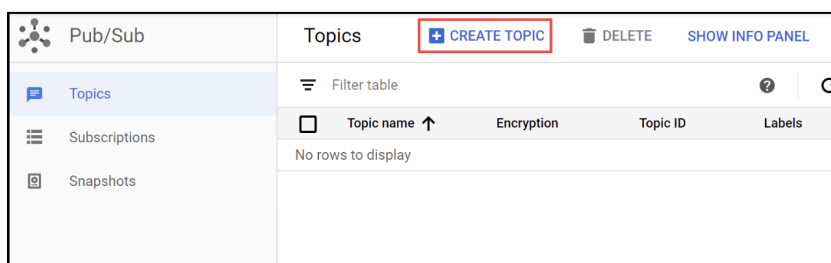
3. The topic must have a unique name. For this lab, name your topic MyTopic. In the Create a topic dialog:
   a. For Topic ID, type MyTopic.
   b. Leave other fields at their default value.
   c. Click CREATE TOPIC.

Create a topic

A topic forwards messages from publishers to subscribers.

Topic ID *
MyTopic

Topic name: projects/qwiklabs-gcp-04-92740db4c614/topics/MyTopic

☑ Add a default subscription ❓
☐ Use a schema ❓
☐ Set message retention duration (not free) ❓

Encryption

◉ Google-managed encryption key
No configuration required

○ Customer-managed encryption key (CMEK)
Manage via Google Cloud Key Management Service

CANCEL   CREATE TOPIC

Task 2. Add a subscription

Now you'll make a subscription to access the topic.

1. Click Topics in the left panel to return to the Topics page. For the topic you just made click the three dot icon > Create subscription.

Topics   ➕ CREATE TOPIC   🗑 DELETE   SHOW INFO PANEL

☰ Filter table   ❓ C ▥

☐	Topic name ↑	Encryption	Topic ID	
☐	MyTopic	Google-managed	projects/qwiklabs-gcp-5d37823...	⋮

≡ Create subscription
🏷 Update labels
+👤 View permissions
▤ View storage policies
🗑 Delete

2. In the Add subscription to topic dialog:
● Type a name for the subscription, such as MySub
● Set the Delivery Type to Pull.
● Leave all other options at the default values.

- Click Create.

Task 3. Publish a message to the topic

1. At the bottom of the Topics details page, click Messages tab and then click Publish Message.
2. Enter Hello World in the Message field and click Publish.

Task 4. View the message

To view the message you'll use the subscription (MySub) to pull the message (Hello World) from the topic (MyTopic).
- Enter the following command in the command line: gcloud pubsub subscriptions pull --auto-ack MySub
  The message appears in the DATA field of the command output.

```
student_01_572e84584510@cloudshell:~ (qwiklabs-gcp-01-3cd9c976899d)$ gcloud pubsub subscriptions pull --auto-ack MySub
DATA: Hello World
MESSAGE_ID: 3155001243661683
ORDERING_KEY:
ATTRIBUTES:
DELIVERY_ATTEMPT:
```

Congratulations

You have successfully met the objectives of this challenge. You were able to add a subscription, publish a message and view the message using Google Pub/Sub service.