

IT718 - Google Cloud Platform Lab

Objectives

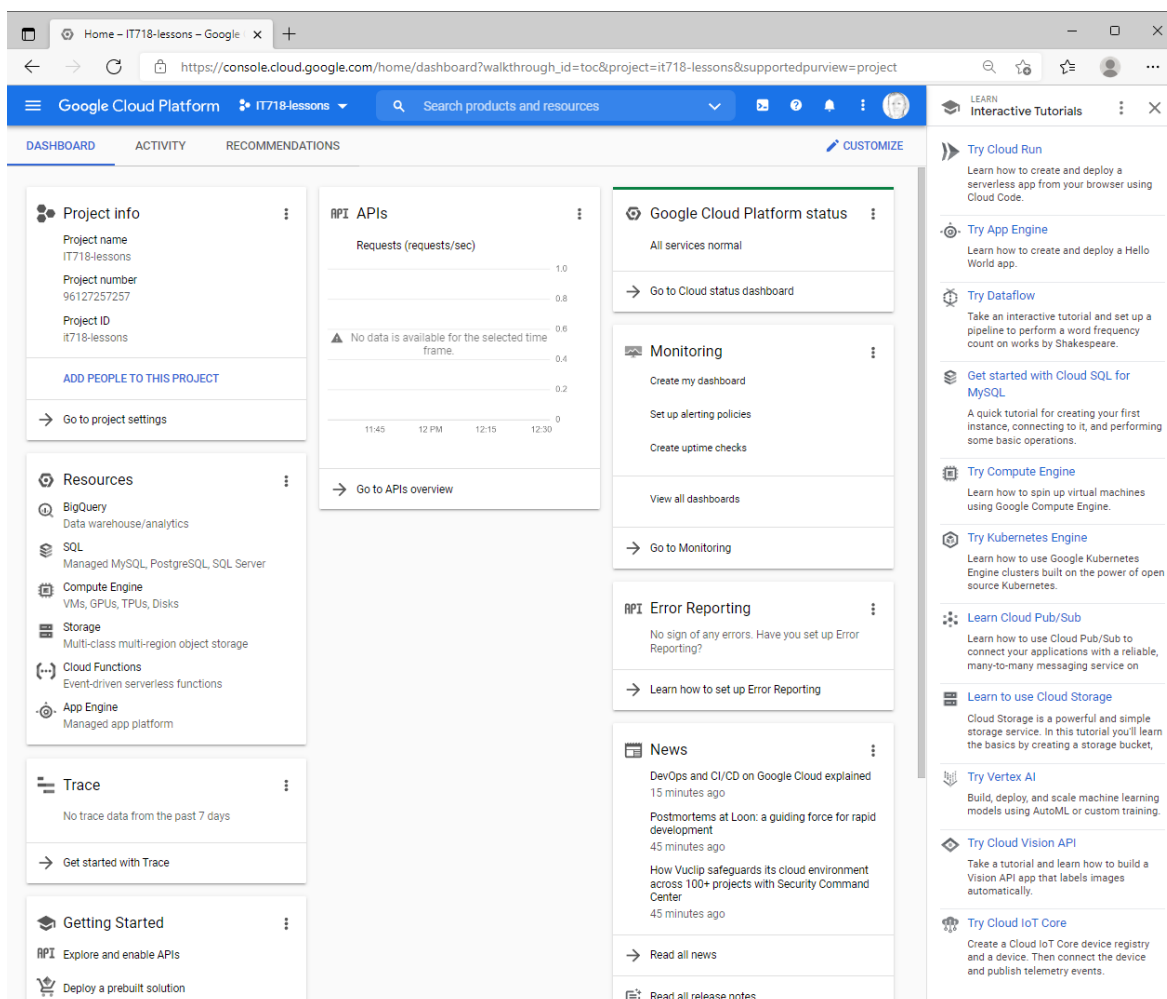
The purpose of this lab is to introduce you to basic services on the Google Cloud Platform.

Here is the URL you will need to access in order to request a Google Cloud coupon. You will be asked to provide your school email address and name. An email will be sent to you to confirm these details before a coupon is sent to you.

[Student Coupon Retrieval Link](#)

- You will be asked for a name and email address, which needs to match your school domain. A confirmation email will be sent to you with a coupon code.
- You can request a coupon from the URL and redeem it until: **5/23/2023**
- Coupon valid through: **1/23/2024**
- You can only request ONE code per unique email address.

The labs should not incur any expense. I have in past years experimented with Kubernetes and auto-scaling that have incurred a few dollars in expense. The coupon will allow to you to experiment beyond the lab.



Task: Complete the "Help" -> "Start a Tutorial"

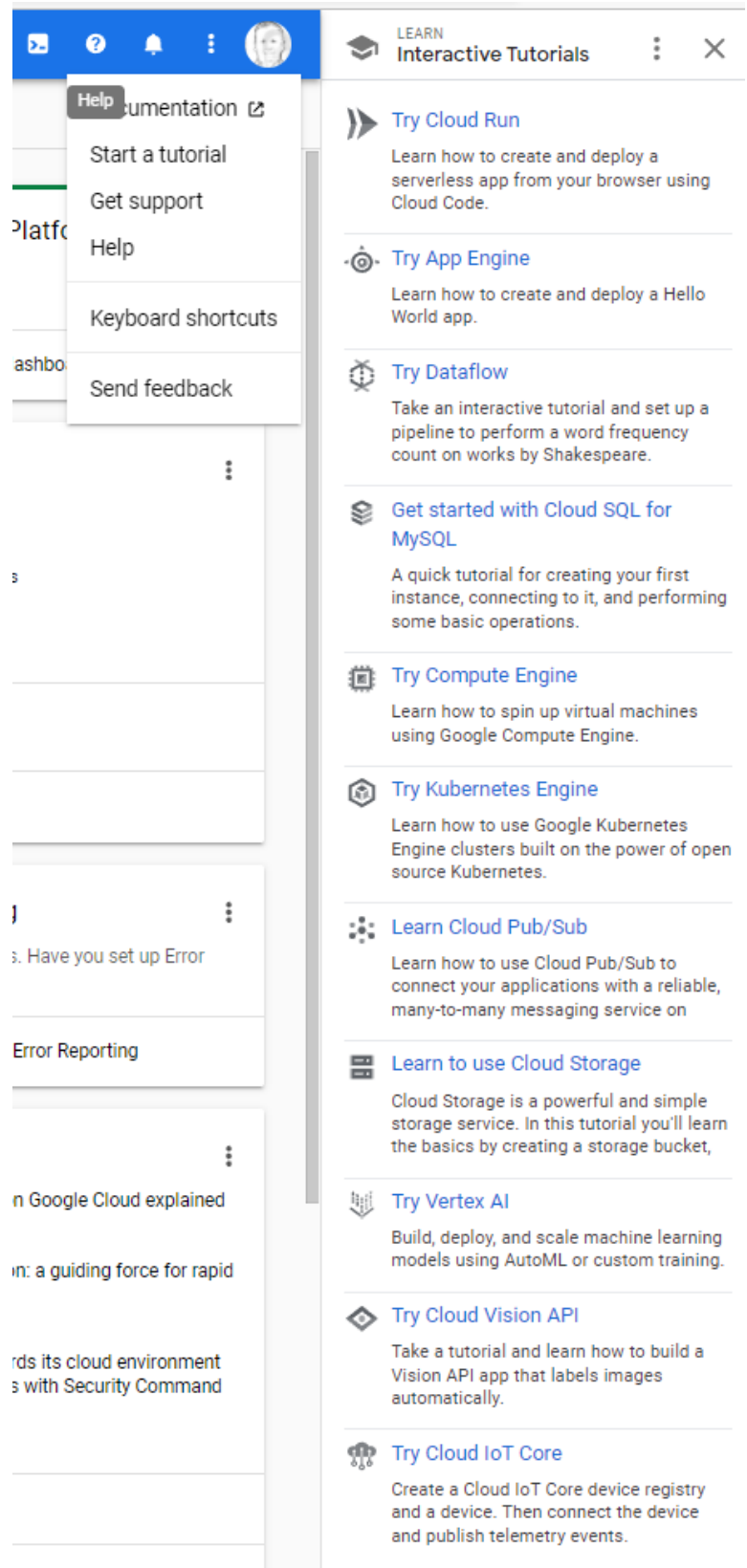
Login on to the GCP Console. On the main header, click the Support icon then "Start a tutorial"

You will see a series of interactive tutorials. If you take your time to read and understand what is going on, each tutorial will take 10-30 minutes. Some offer to the choice of which language you want to use. Pick the language you prefer.

For the lab report you do not need to capture every step. A single screenshot showing success is enough. Generally, this will be the third to last step, Cleanup and Conclusion are the last steps in each tutorial.

Tutorial Clean-up: If resources are created in the tutorial be sure to follow the cleanup steps provided. No need to have unused resources laying around. The tutorials make use of the interactive Cloud Shell.

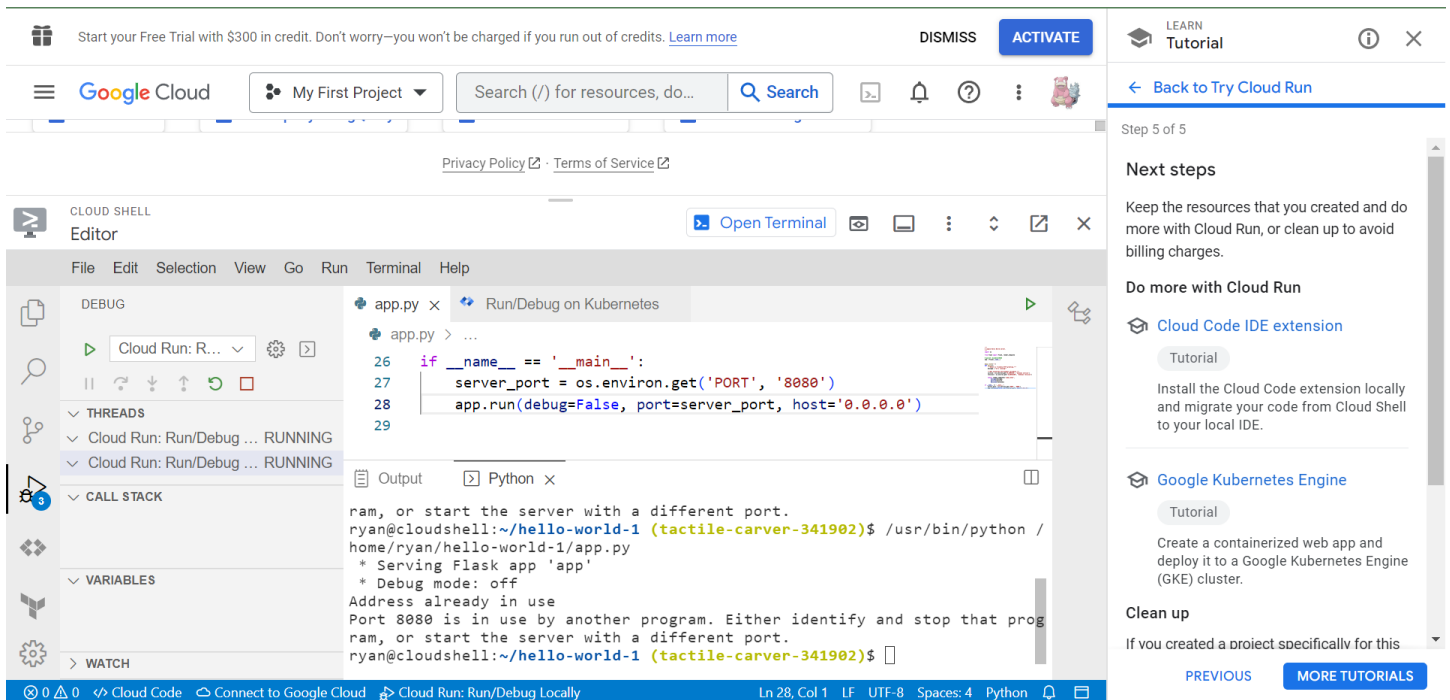
NOTE: The "Try Vertex API" tutorials and "Try Cloud Vision API" omitted from this lab. You are encouraged to try them if you have an interest in machine learning but the tutorials do have hour deployment lags and can occur costs.



Your lab report should replace all of the following example screenshots

Task 1: "Try Cloud Run"

Lab report: (10 points) Screen shot showing your Cloud Run view log (Sample below)



Start your Free Trial with \$300 in credit. Don't worry—you won't be charged if you run out of credits. [Learn more](#)

DISMISS [ACTIVATE](#)

LEARN Tutorial

Google Cloud My First Project Search (/) for resources, do... Search

Privacy Policy Terms of Service

CLOUD SHELL Editor

Open Terminal

DEBUG

Cloud Run: R... Cloud Run: Run/Debug ... RUNNING Cloud Run: Run/Debug ... RUNNING

THREADS

CALL STACK

VARIABLES

WATCH

app.py x Run/Debug on Kubernetes

```
app.py > ...
26 if __name__ == '__main__':
27     server_port = os.environ.get('PORT', '8080')
28     app.run(debug=False, port=server_port, host='0.0.0.0')
29
```

Output Python x

```
ram, or start the server with a different port.
ryan@cloudshell:~/hello-world-1 (tactile-carver-341902)$ /usr/bin/python /
home/ryan/hello-world-1/app.py
* Serving Flask app 'app'
* Debug mode: off
Address already in use
Port 8080 is in use by another program. Either identify and stop that prog
ram, or start the server with a different port.
ryan@cloudshell:~/hello-world-1 (tactile-carver-341902)$
```

Step 5 of 5

Next steps

Keep the resources that you created and do more with Cloud Run, or clean up to avoid billing charges.

Do more with Cloud Run

[Cloud Code IDE extension](#)

Tutorial

Install the Cloud Code extension locally and migrate your code from Cloud Shell to your local IDE.

[Google Kubernetes Engine](#)

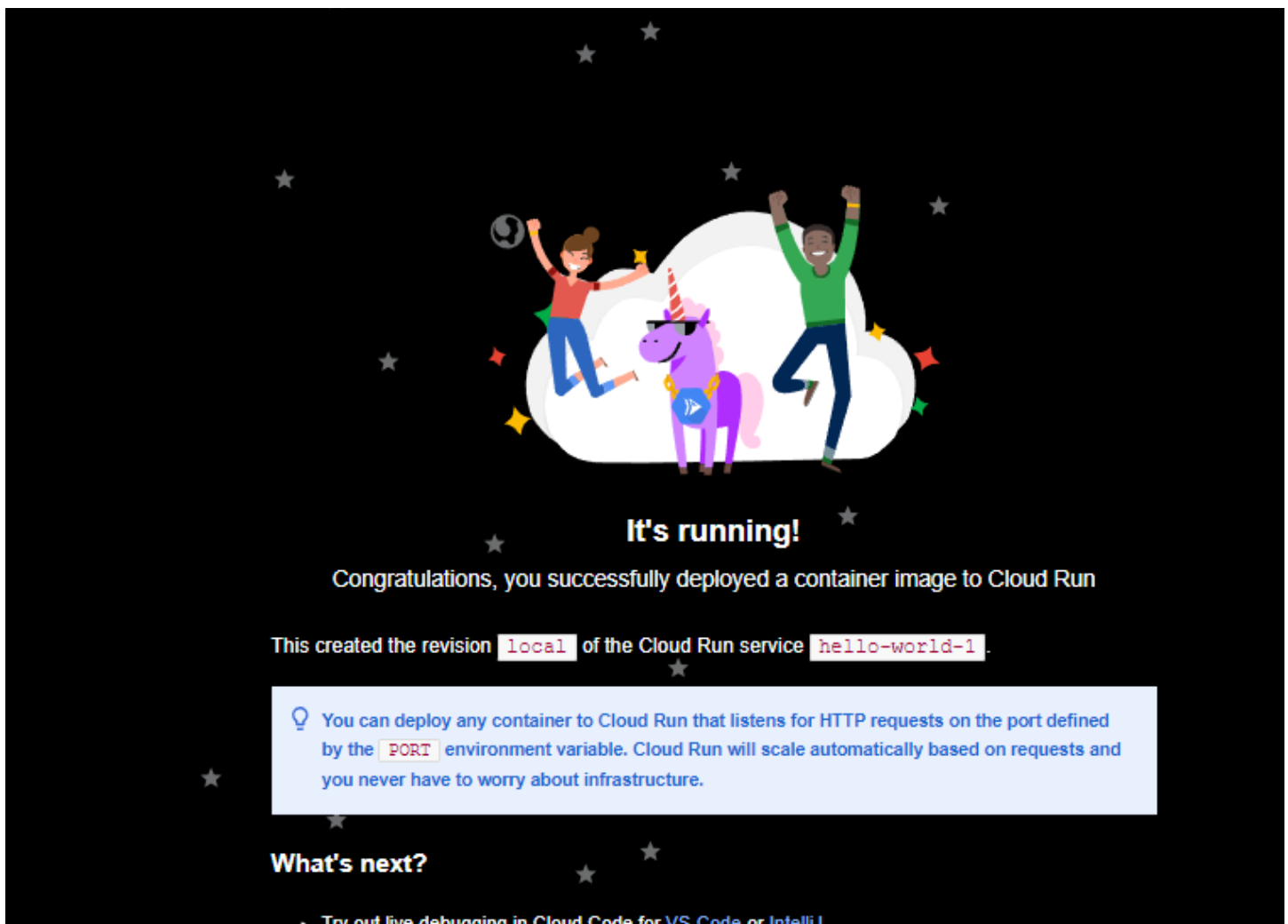
Tutorial

Create a containerized web app and deploy it to a Google Kubernetes Engine (GKE) cluster.

Clean up

If you created a project specifically for this

PREVIOUS [MORE TUTORIALS](#)



It's running!

Congratulations, you successfully deployed a container image to Cloud Run

This created the revision `local` of the Cloud Run service `hello-world-1`.

You can deploy any container to Cloud Run that listens for HTTP requests on the port defined by the `PORT` environment variable. Cloud Run will scale automatically based on requests and you never have to worry about infrastructure.

What's next?

- Try out live debugging in Cloud Code for VS Code or IntelliJ

Lab report: (10 points) Screenshot of your Cloud Shell showing "JOB_STATE_DONE"

Task 3: Try Cloud SQL

Lab report: (10 points) Screenshot of Cloud Shell showing SQL commands

Google Cloud

My Project 17146

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

Search

Overview

EDIT

IMPORT

EXPORT

RESTART

STOP

DELETE

CLONE

FAILOVER

HELP ASSISTANT

All instances > mysql-instance

CLOUD SHELL

Terminal

(fine-rite-380023) X +

Open Editor

Welcome to Cloud Shell! Type "help" to get started.

Your Cloud Platform project in this session is set to fine-rite-380023.

Use "gcloud config set project (PROJECT_ID)" to change to a different project.

ryan@cloudshell:~ (fine-rite-380023) \$ gcloud sql connect mysql-instance \

--user=root

WARNING: If you're connecting from an IPv6 address, or are constrained by certain organization policies (restrictPublicIP, restrictAuthorizedNetworks), consider running the beta version of this command b

y connecting through the Cloud SQL proxy: gcloud beta sql connect

ERROR: (gcloud.sql.connect) HTTPError 409: The instance or operation is not in an appropriate state to handle the request.

ryan@cloudshell:~ (fine-rite-380023) \$ gcloud sql connect mysql-instance --user=root

Allowlisting your IP for incoming connection for 5 minutes...done.

Connecting to database with SQL user [root]. Enter password:

Welcome to the MySQL monitor. Commands end with ; or \g.

Your MySQL connection id is 44

Server version: 8.0.26-google (Google)

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affiliates. Other names may be trademarks of their respective

owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> CREATE DATABASE guestbook;

Query OK, 1 row affected (0.04 sec)

mysql> USE guestbook; CREATE TABLE entries (guestName VARCHAR(255), content VARCHAR(255), entryID INT NOT NULL AUTO INCREMENT, PRIMARY KEY(entryID)); INSERT INTO entries (guestName, content) values ("Fir

st guest", "I got here."); INSERT INTO entries (guestName, content) values ("Second guest", "Me too.");

Database changed

Query OK, 0 rows affected (0.07 sec)

Query OK, 1 row affected (0.04 sec)

Query OK, 1 row affected (0.04 sec)

mysql> SELECT * FROM entries;

+-----+-----+-----+

| guestName | content | entryID |

+-----+-----+-----+

| First guest | I got here. | 1 |

| Second guest | Me too. | 2 |

+-----+-----+-----+

2 rows in set (0.03 sec)

mysql>

Step 4 of 5

\$ USE guestbook; CREATE TABLE \

entries (guestName \

VARCHAR(255), content \

VARCHAR(255), entryID INT N

NULL AUTO_INCREMENT, PRIMAR

KEY(entryID)); INSERT INTO

entries (guestName, content

values ("First guest", \

"I got here."); INSERT INT

entries (guestName, content

values ("Second guest", \

"Me too.");

3. Retrieve the data.

\$ SELECT * FROM entries;

The output should be similar to the

following:

+-----+-----+

| guestName | content |

+-----+-----+

| First guest | I got here. |

| Second guest | Me too. |

+-----+-----+

2 rows in set (0.00 sec)

You've successfully created a MySQL

instance, connected to it, and queried

data.

To learn more about MySQL instances or

clean up to avoid billing, click Next.

PREVIOUS

NEXT

Uploads and My Project 17146 operations

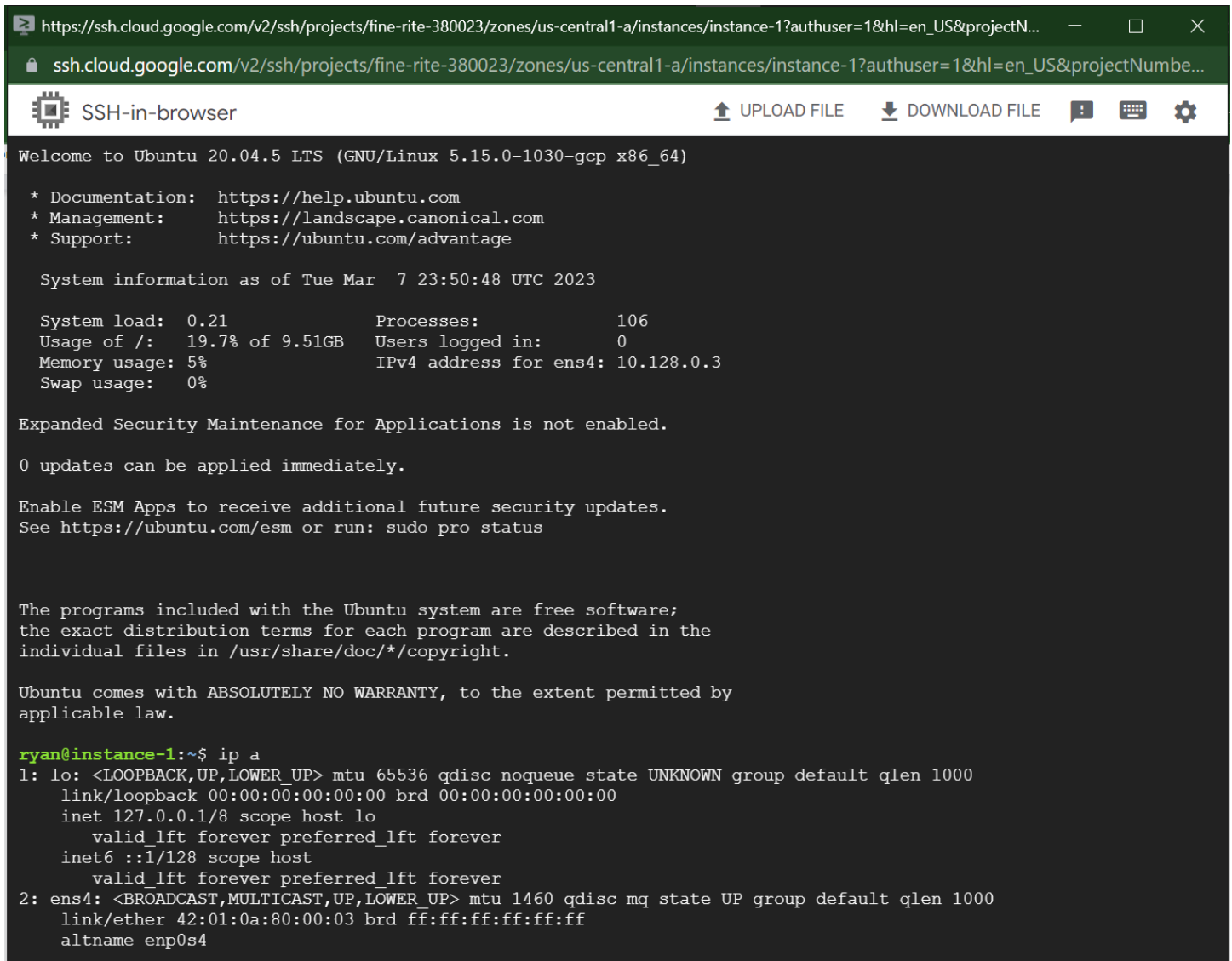
Created mysql-instance

6:38:52 PM GMT-5

Task 4: Try Compute Engine

The tutorial allows you create either a Linux or Windows VM. Pick either one for the lab. Although completing both is highly recommended if you are new to GCP.

Lab report: (10 points) Screenshot showing running instance



```
https://ssh.cloud.google.com/v2/ssh/projects/fine-rite-380023/zones/us-central1-a/instances/instance-1?authuser=1&hl=en_US&projectN...
ssh.cloud.google.com/v2/ssh/projects/fine-rite-380023/zones/us-central1-a/instances/instance-1?authuser=1&hl=en_US&projectNumbe...
SSH-in-browser
Welcome to Ubuntu 20.04.5 LTS (GNU/Linux 5.15.0-1030-gcp x86_64)

* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage

System information as of Tue Mar  7 23:50:48 UTC 2023

System load:  0.21           Processes:            106
Usage of /:   19.7% of 9.51GB Users logged in:        0
Memory usage: 5%           IPv4 address for ens4: 10.128.0.3
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

ryan@instance-1:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: ens4: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1460 qdisc mq state UP group default qlen 1000
    link/ether 42:01:0a:80:00:03 brd ff:ff:ff:ff:ff:ff
    altname enp0s4
```

Task 5: Try Kubernetes Engine

FYI: We will use "Build a guestbook on Kubernetes Engines" later in the semester.

Lab report: (10 points) Screenshot of Cloud Shell showing service is running

← Clusters

EDITDELETEDEPLOYCONNECTDUPLICATE

OPERATIONSHELP ASSISTANT

hello-cluster

DETAILSSTORAGEOBSERVABILITYLOGS

You can find your general cluster logs and your cluster's Autoscaler logs below.

CLUSTER LOGSAUTOSCALER LOGS

Suggested filters (0)

Severity: DefaultFilter Search all fields and values

SEVERITY	TIMESTAMP	SUMMARY
Scanned up to 3/7/23, 7:09PM. Scanned 778 KB.		
> *	2023-03-07 19:09:55.053 EST	Kubernetes Apiservice Requests update kube-node-lease:vk3-hello-cluster-def_ system:node:vk3-hello-cluster-default_ (@type: type.googleapis.com/google.cloud.audit.AuditLog, authentic...
> *	2023-03-07 19:09:55.212 EST	Kubernetes Apiservice Requests update kube-system:vpa-admission-controller system:vpa-admission-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: ...
> *	2023-03-07 19:09:55.288 EST	Kubernetes Apiservice Requests update kube-system:external-snapshotter-lead_ system:pdcsi-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, ...
> *	2023-03-07 19:09:55.381 EST	Kubernetes Apiservice Requests update kube-system:pd-csi-storage-gke-io system:pdcsi-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, author...
> *	2023-03-07 19:09:55.415 EST	Kubernetes Apiservice Requests update kube-node-lease:vk3-hello-cluster-def_ system:node:vk3-hello-cluster-default_ (@type: type.googleapis.com/google.cloud.audit.AuditLog, authentic...
> *	2023-03-07 19:09:55.657 EST	Kubernetes Apiservice Requests update kube-system:clustermetrics system:clustermetrics (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizationIn...
> *	2023-03-07 19:09:55.675 EST	Kubernetes Apiservice Requests update kube-system:kube-controller-manager system:kube-controller-manager (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, ...
> *	2023-03-07 19:09:55.768 EST	Kubernetes Apiservice Requests update kube-system:ingress-gce-lock system:l7-lb-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizati...
> *	2023-03-07 19:09:55.788 EST	Kubernetes Apiservice Requests update kube-system:ingress-gce-lock system:l7-lb-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizati...
> *	2023-03-07 19:09:56.333 EST	Kubernetes Apiservice Requests update kube-system:gcp-controller-manager system:gcp-controller-manager (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, ...
> *	2023-03-07 19:09:56.496 EST	Kubernetes Apiservice Requests update kube-system:addon-manager system:addon-manager (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizationInfo...
> *	2023-03-07 19:09:56.716 EST	Kubernetes Apiservice Requests update kube-system:cloud-provider-extraction_ system:kube-controller-manager (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo...
> *	2023-03-07 19:09:56.923 EST	Kubernetes Apiservice Requests update kube-system:external-attacher-leader_ system:pdcsi-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, ...
> *	2023-03-07 19:09:57.675 EST	Kubernetes Apiservice Requests update kube-system:clustermetrics system:clustermetrics (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizationIn...
> *	2023-03-07 19:09:57.798 EST	Kubernetes Apiservice Requests update kube-system:ingress-gce-lock system:l7-lb-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizati...
> *	2023-03-07 19:09:57.811 EST	Kubernetes Apiservice Requests update kube-system:ingress-gce-lock system:l7-lb-controller (@type: type.googleapis.com/google.cloud.audit.AuditLog, authenticationInfo: {...}, authorizati...

Step 3 of 3

Next Steps

Watch this [demo](#) to learn about Autopilot's features and how autoprovisioning works in Autopilot.

For a comprehensive overview use this [guide](#) and for Autopilot's cluster architecture refer to this [guide](#)

For more information on configuring networking and advance options please refer to this [guide](#)

Read this [guide](#) to see how Snap and Twitter cut costs and achieve leading price-performance for scale-out workloads by using [Tau VMs](#)

Learn how to:

1. Create a GKE cluster using Autopilot
2. Deploy an application to a cluster
3. Access the application from a public IP address

From this in depth Autopilot tutorial

Tutorial 20 min

Understand [pricing](#)

Congratulation You Created An Autopilot Cluster!

PREVIOUS

MORE TUTORIALS

Task 6: Learn Cloud Pub/Sub

Lab report: (10 points) Screenshot of Cloud Shell showing messaging

Google Cloud

My Project 17146

messages

Search

fine-rite-380023-topic-sub2

EDIT

CREATE SNAPSHOT

REPLAY MESSAGES

PURGE MESSAGES

DETACH

DELETE

HIDE INFO PANEL

Subscription name

projects/fine-rite-380023/subscriptions/fine-rite-380023-topic-sub2

Subscription state

active

Topic name

projects/fine-rite-380023/topics/fine-rite-380023-topic

METRICS

DETAILS

MESSAGES

Click Pull to view messages and temporarily delay message delivery to other subscribers. Select Enable ACK messages and then click ACK next to the message to permanently prevent message delivery to other subscribers.

PULL

Enable ack messages

Filter

Filter messages

Publish time	Attribute keys	Message body	Ordering key	Ack
Mar 7, 2023, 7:28:08 PM	—	hello	—	Deadline exceeded
Mar 7, 2023, 7:28:28 PM	—	hello	—	Deadline exceeded
Mar 7, 2023, 7:29:51 PM	—	goodbye	—	Deadline exceeded

fine-rite-380023-topic-sub2

PERMISSIONS

LABELS

ACTIVITY

Edit or delete permissions below, or select "Add Principal" to grant new access.

ADD PRINCIPAL

Show inherited permissions

Filter

Enter property name or value

Role / Principal

Inheritance

Cloud Dataflow Service Agent (1)

Editor (2)

Owner (1)

Step 5 of 6

Next steps

Clean up to avoid billing charges, or keep the resources you created and do more with Pub/Sub.

Clean up

If you want to clean up the Pub/Sub resources you created in this tutorial, you can delete the topic you created:

1. Return to the Topics page.

2. Check the checkbox next to fine-rite-380023-topic and click Delete.

3. Complete the steps in the confirmation window to permanently delete the topic.

Or you can delete the project that you created.

PREVIOUS

NEXT

CLOUD SHELL

Editor

Open Terminal

File

Edit

Selection

View

Go

Run

Terminal

Help

CLOUD CODE

DEVELOPMENT SESSIONS

KUBERNETES

CLOUD RUN

CLOUD APIS

Cloud Networking

Cloud DNS API

SECRET MANAGER

COMPUTE ENGINE

Google Cloud API Detail

Pub/Sub API

Service version: v1

View Documentation

Output

Python

Installing collected packages: google-cloud-pubsub

Successfully installed google-cloud-pubsub-2.15.0

python3 --help

Task 7: Learn to use Cloud Storage

Lab report: (10 points) Screenshot of bucket information after file upload

Google Cloud

My Project 17146

messages

Search

6

?

⋮

👤

LEARN Tutorial

ⓘ

×

← Bucket details

REFRESH

HELP ASSISTANT

LEARN

← Back to previous content

bucket-quickstart_fine-rite-380023

Public to internet: This bucket is publicly accessible because allUsers or allAuthenticatedUsers have one or more permissions. Remove these principals to stop public access.

EDIT ACCESS

DISMISS

Location

Storage class

Public access

Protection

us-central1 (Iowa)

Standard

Public to internet

None

OBJECTS

CONFIGURATION

PERMISSIONS

PROTECTION

LIFECYCLE

OBSERVABILITY

NEW

Buckets > bucket-quickstart_fine-rite-380023 > quickstart-folder

UPLOAD FILES

UPLOAD FOLDER

CREATE FOLDER

TRANSFER DATA

MANAGE HOLDS

DOWNLOAD

DELETE

Filter by name prefix only

Filter

Filter objects and folders

Show deleted data

<input type="checkbox"/>	Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption	Retention expiration		
<input type="checkbox"/>	kitten.png	54.4 KB	image/png	Mar 7, 2023, 7:51:37 PM	Standard	Mar 7, 2023, 7:51:37 PM	Public to internet	Copy URL	—	Google-managed key	—	⋮

Step 5 of 8

2. Click **Grant access**.

3. In the **Grant access to "bucket-quickstart_fine-rite-380023"** pane, do the following:

a. In the **New principals** field, enter **allUsers**.

b. In the **Select a role** field, select **Cloud Storage**, and then select **Storage Object Viewer**.

c. Click **Save**.

The **Are you sure you want to make this resource public?** window appears.

d. To confirm, click **Allow public access**.

4. Click the **Objects** tab.

5. In the **Name** column, click **quickstart-folder**.

6. In the row containing **kitten.png**, click the **Open object overflow** menu, and then select **Copy Authenticated URL**.

To verify if you can access the image, paste the URL in a new browser tab.

To remove public access to your Cloud Storage bucket, click **Next**.

PREVIOUS

NEXT

console.cloud.google.com/storage/browser/.../quickstart-folder?authuser=1...

Authenticated URL copied to clipboard

kitten.png

Show all

Task 8/9: Collaborative Realtime Mapping with Firebase

Lab Report: (20 points) Provide the URL of your customized Google maps application

Google provides complete tutorials on how to use their Maps JavaScript API. For this task follow this tutorial: <https://developers.google.com/maps/documentation/javascript/firebase>

If you are new to Google Maps API, you will want to start [here](#).

A live example from the UNH Gencyber summer camp can be found [here](#). There are NH, US, and WORLD editions of this app. The source code is on Github [here](#).

Your implementation should set its own location, zoom, and map features.

WARNING: Be sure to limit the use of your API key to your map application domain. Setting a wider more general use will allow others to use you API key in their application and potentially incurring expense for you.

Task 10: Show Billing Dashboard

Lab Report: (10 points) Replace this screenshot with your billing dashboard

<https://console.cloud.google.com/billing>

Note: My spend will be different than yours as I spent time experimenting with services not part of this lab. Assuming you had no existing deployments, your on-going daily spend should be zero when you are done with this lab.

