

ECE599/692 - Deep Learning



THE UNIVERSITY OF
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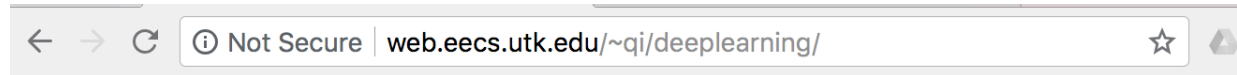
Chengcheng Li

Date: 08/23/2018

Content

- Course Information
- Google Cloud Platform

Course Website



ECE599/692 - Deep Learning

[Course Information](#)

[Syllabus](#)


[References](#)

[Datasets](#)

Instructor

- [Dr. Hairong Qi](#)
- Office Hour: MW 1:00pm-3:00pm, MK304
- Lectures: TR 2:10pm-3:25pm, MK405
- Email: hqi@utk.edu

Course Material

- Course Website: <http://web.eecs.utk.edu/~qi/deeplearning> 
- Prerequisite: ECE471/571 (Pattern Recognition) or COSC425/528 (Machine Learning), basic linear algebra, probability, and statistics

Teaching Assistant

- Chengcheng Li
- Email: cli42@vols.utk.edu
- Office Hour: TR 3:30-5:30pm, MK539

Google Cloud Platform (GCP)


- Deep learning/neural network usually takes lots of computation resource
 - Storage
 - Memory
 - GPU
- GCP consists of a set of physical assets, such as computers and hard disk drives, and virtual resources, such as virtual machines (VMs).
- Use GPC for course projects

Google Cloud Platform (GCP)

- Education grants have been applied for this course. \$50 credits are available for each student. To get the credits, you need:
 - Email Chengcheng with Subject "**599 - Google Cloud Account Request**" or "**692 - Google Cloud Account Request**"
 - Redeem your code
- Pricing
 - Calculate based on resource
 - Remove unnecessary occupations to avoiding incurring charges
- What if I use up all credits?

Redeem Students Code

Step 1: receive email from Dr. Qi, me or maybe GCP, which looks like the following figure

Fwd: Your Google Cloud Platform Education Grant for **Students** - University of Tennessee - Knoxville Inbox x  

 **Qi, Hairong**
to me 

Aug 20 (1 day ago)   

Begin forwarded message:

From: Google Cloud Platform Education Grants <cloudedugrants@google.com>
Subject: Your Google Cloud Platform Education Grant for **Students** - University of Tennessee - Knoxville
Date: July 12, 2018 at 2:03:56 PM EDT
To: "hqi@utk.edu" <hqi@utk.edu>
Cc: "cloudedugrants@google.com" <cloudedugrants@google.com>



Dear
[Prof.](#)
[Hairong Qi,](#)

Redeem Students Code

Step 2: find and click the *Student Coupon Retrieval Link*

Here is the URL

you will need to access in order to request a Google Cloud Platform 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.

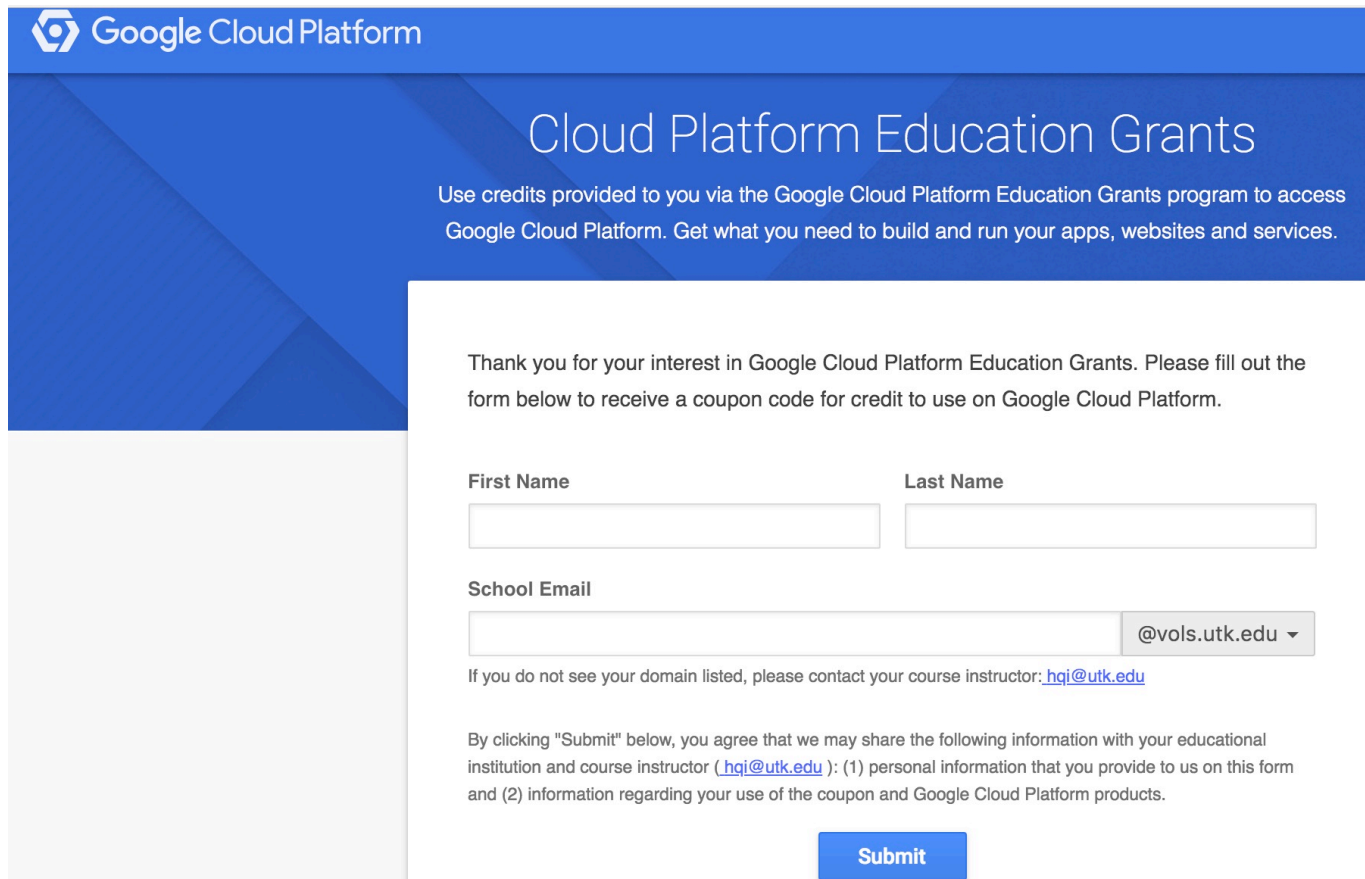
[Student Coupon Retrieval Link](#)



- You will be asked for a name and email address, which needs to match the 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: [12/22/2018](#)
- Coupon valid through: [8/22/2019](#)
- You

Redeem Students Code

Step 3: fill out the form. UTK email is required.



The screenshot shows the Google Cloud Platform Education Grants redemption form. The header includes the Google Cloud Platform logo and the text "Google Cloud Platform". Below the header, the title "Cloud Platform Education Grants" is displayed, followed by a brief description: "Use credits provided to you via the Google Cloud Platform Education Grants program to access Google Cloud Platform. Get what you need to build and run your apps, websites and services." The main content area contains a thank-you message: "Thank you for your interest in Google Cloud Platform Education Grants. Please fill out the form below to receive a coupon code for credit to use on Google Cloud Platform." The form fields are: "First Name" and "Last Name" (two separate text input boxes), "School Email" (a text input box with a dropdown menu showing "@vols.utk.edu"), and a "Submit" button. A note below the email field states: "If you do not see your domain listed, please contact your course instructor: hqi@utk.edu". A privacy notice at the bottom reads: "By clicking 'Submit' below, you agree that we may share the following information with your educational institution and course instructor (hqi@utk.edu): (1) personal information that you provide to us on this form and (2) information regarding your use of the coupon and Google Cloud Platform products."

Google Cloud Platform

Cloud Platform Education Grants

Use credits provided to you via the Google Cloud Platform Education Grants program to access Google Cloud Platform. Get what you need to build and run your apps, websites and services.

Thank you for your interest in Google Cloud Platform Education Grants. Please fill out the form below to receive a coupon code for credit to use on Google Cloud Platform.

First Name

Last Name

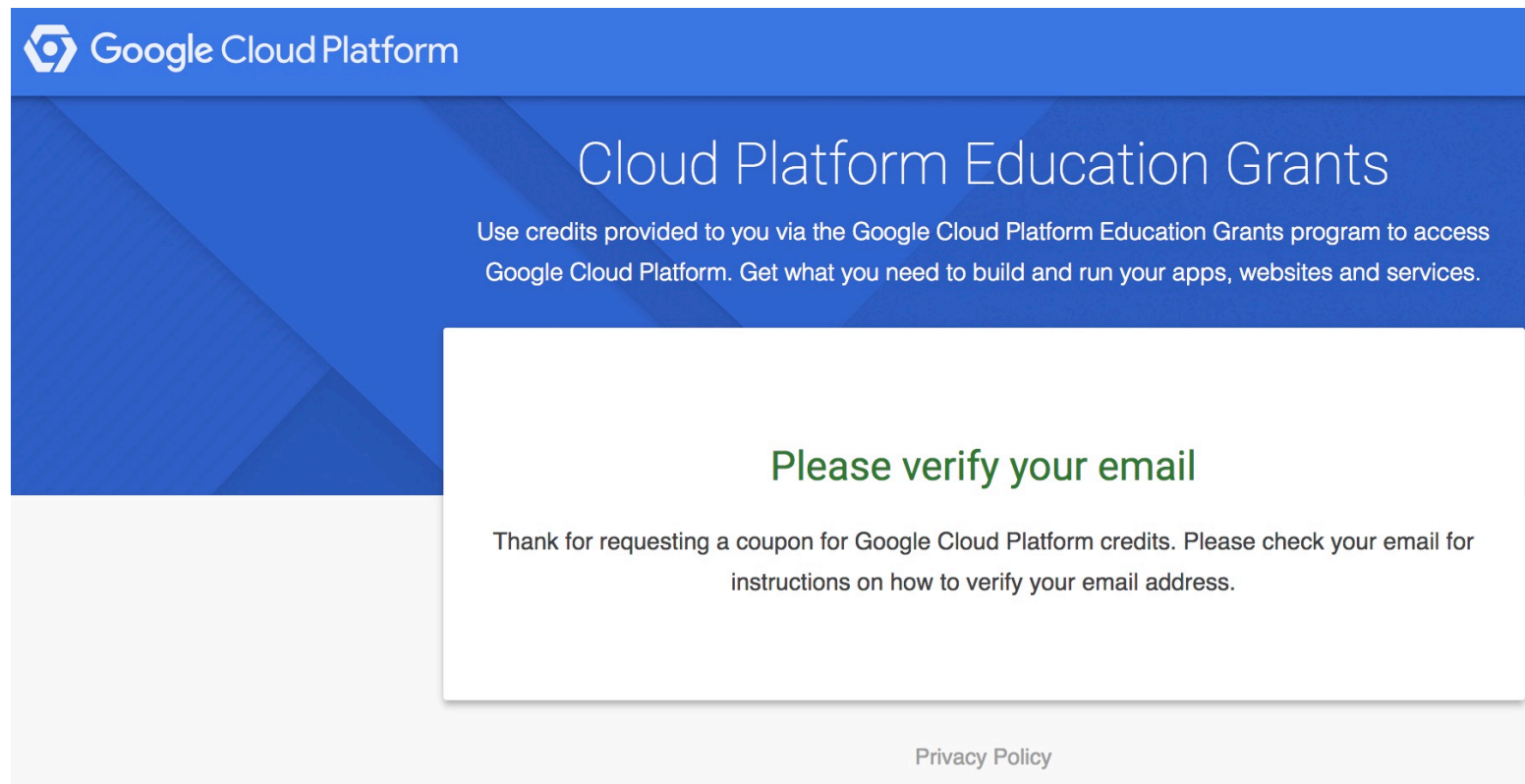
School Email @vols.utk.edu ▾

If you do not see your domain listed, please contact your course instructor: hqi@utk.edu

By clicking "Submit" below, you agree that we may share the following information with your educational institution and course instructor (hqi@utk.edu): (1) personal information that you provide to us on this form and (2) information regarding your use of the coupon and Google Cloud Platform products.

Redeem Students Code

Step 4: verify your email



The screenshot shows the Google Cloud Platform Education Grants redemption page. At the top left is the Google Cloud Platform logo. The main heading is "Cloud Platform Education Grants". Below this, a sub-heading reads: "Use credits provided to you via the Google Cloud Platform Education Grants program to access Google Cloud Platform. Get what you need to build and run your apps, websites and services." A white box in the center contains the text: "Please verify your email" in green, followed by "Thank for requesting a coupon for Google Cloud Platform credits. Please check your email for instructions on how to verify your email address." At the bottom of the page, there is a "Privacy Policy" link.

Google Cloud Platform

Cloud Platform Education Grants

Use credits provided to you via the Google Cloud Platform Education Grants program to access Google Cloud Platform. Get what you need to build and run your apps, websites and services.


Please verify your email


Thank for requesting a coupon for Google Cloud Platform credits. Please check your email for instructions on how to verify your email address.

[Privacy Policy](#)

Redeem Students Code

Step 5: receive email from GCP, find the Coupon Code and click [here] to redeem

 **Google Cloud Platform Education Grants** <cloudedugrants@google.com>
to me ▾

 Google Cloud Platform

Dear [Chengcheng](#),

Here is your Google Cloud Platform Coupon Code: **04YC-JVD7-C60J-DAEY**

Click [\[here\]](#) to redeem.

Course/Project Information

Instructor Name: [Hairong Qi](#)

Email Address: hqi@utk.edu

School: [University of Tennessee - Knoxville](#)

Course/project: [ECE599/692 - Deep Learning](#)

Activation Date: [8/22/2018](#)

Redeem By: [12/22/2018](#)

Coupon Valid Through: [8/22/2019](#)



Redeem Students Code

Step 5: paste your code and fill out the form. It's done.

☰ Google Cloud Platform 🔍

Education grants

Please enter the coupon code provided to you via the Google Cloud Platform Education Grants program to receive credit for Google Cloud Platform. Get what you need to build and run your apps, websites and services.

Coupon code

Credit amount	Expiration date	Course
\$50.00	Aug 21, 2019	ECE599/692 - Deep Learning

Country of residence

Please email me updates regarding feature announcements, performance suggestions, feedback surveys and special offers.

Yes No

I agree that my use of any [services and related APIs](#) is subject to my compliance with the applicable [Terms of Service](#).

Yes No

Google Cloud Platform education grants credits terms and conditions

By clicking "Accept and continue" below, you, on behalf of yourself and the organization you represent ("You") agree to these terms and conditions:

Checking Credits

The screenshot shows the Google Cloud Platform Billing Overview page. The left sidebar contains navigation options: Billing, Overview (selected), Budgets & alerts, Billing export, and Reports. The main content area displays the following information:

- Overview:** ECE599/692 - Deep Learning (with a RENAME BILL link)
- Billing account ID:** 0100C3-060AAE-5BA2A5
- Organization:** utk.edu
- Credits:** \$50.00 Credits remaining (Out of \$50.00)
- Days remaining:** 364 Days remaining (Ends Aug 22, 20...)
- Projects linked to this billing account:**

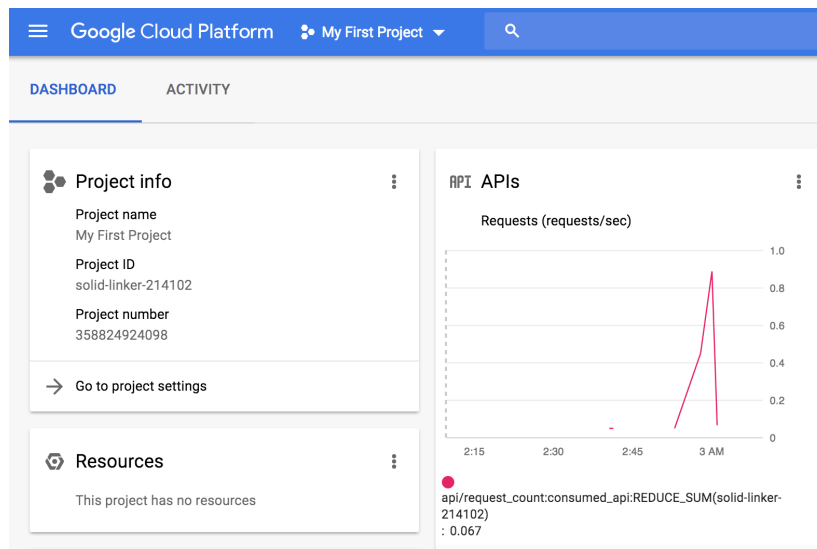
Project name	Project ID	
My First Project	solid-linker-214102	⋮
ProjectDemo	projectdemo-214204	⋮

Concepts

- Projects
- Instances
 - Virtual machine
- Buckets
 - Data/objects storage

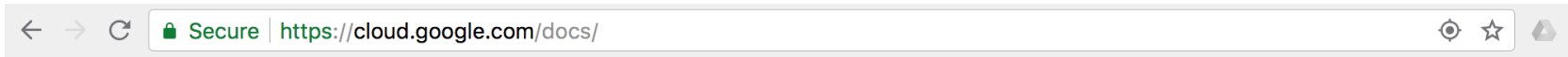
Ways to Interact With GCP

- Google Cloud Platform Console



- Command-line interface
 - gcloud
 - cloud shell

GCP Docs



[Overview](#)

- ▶ Platform Overview
- ▶ Getting Started
- ▶ APIs & Libraries
- ▶ Application Development
- ▶ Big Data and Machine Learning
- ▶ Infrastructure and Operations

Google Cloud Platform Documentation



[SEND FEEDBACK](#)

With Google Cloud Platform (GCP), you can build, test, and deploy applications on Google's highly-scalable and reliable infrastructure for your web, mobile, and backend solutions.

For a high-level, technical look at how GCP works, read the GCP platform overview.

[SEE THE OVERVIEW](#)

GCP Help



A screenshot of the GCP Help interface. At the top, there is a blue navigation bar with icons for messages, alerts, help, notifications, and a user profile. Below this is a grey bar with a 'CUSTOMIZE' button. The main content area is a dark grey 'Help' window with a search bar containing the text 'Search Help'. Underneath the search bar, there is a 'Popular' section with three items: 'Cloud Platform support', 'Billing during the free trial', and 'Sending Email from an Instance | Compute Engine Documentation ...'. Each item has a blue menu icon or a globe icon to its left.

Projects

- Any GCP resources that you allocate and use must belong to a project.
- Each GCP project has:
 - A project name, which you provide.
 - A project ID, which you can provide or GCP can provide for you.
 - A project number, which GCP provides.
- Existing projects vs new self-created projects

Check Projects

Select from **UTK.EDU** NEW PROJECT ⋮

Search projects and folders

RECENT ALL

Name	ID
✓ My First Project ?	solid-linker-214102
utk.edu ?	480913795485
ProjectDemo ?	projectdemo-214204

CANCEL OPEN

Project info ⋮

Project name
My First Project

Project ID
solid-linker-214102

Project number
358824924098

[→ Go to project settings](#)

Create Projects

The screenshot shows the Google Cloud Platform console interface. A modal dialog titled "NEW PROJECT" is open, allowing the user to select a project. The dialog is titled "Select from UTK.EDU" and features a search bar with the text "Search projects and folders". Below the search bar, there are two tabs: "RECENT" (selected) and "ALL". A table lists the available projects:

Name	ID
✓ My First Project ?	solid-linker-214102

At the bottom of the dialog, there are two buttons: "CANCEL" and "OPEN". A red pushpin icon is located in the top right corner of the dialog. The background shows the Google Cloud Platform dashboard with sections for "Project info", "Resources", and "Trace".

Remove Projects

Google Cloud Platform

Manage resources [+ CREATE PROJECT](#) [+ CREATE FOLDER](#) [MOVE](#) [DELETE](#)

utk.edu Filter by name, ID, project number, or label Columns

<input type="checkbox"/>	Project name	Project ID	
<input type="checkbox"/>	My First Project	solid-linker-214102	⋮
<input checked="" type="checkbox"/>	ProjectDemo	projectdemo-214204	⋮



Shut down project "ProjectDemo"

When you shut down a project, this immediately happens:

- All billing and traffic serving stops
- You lose access to your entire project
- Project owners will be notified and can stop the shutdown within 30 days

The entire project will be scheduled to be deleted after 30 days.

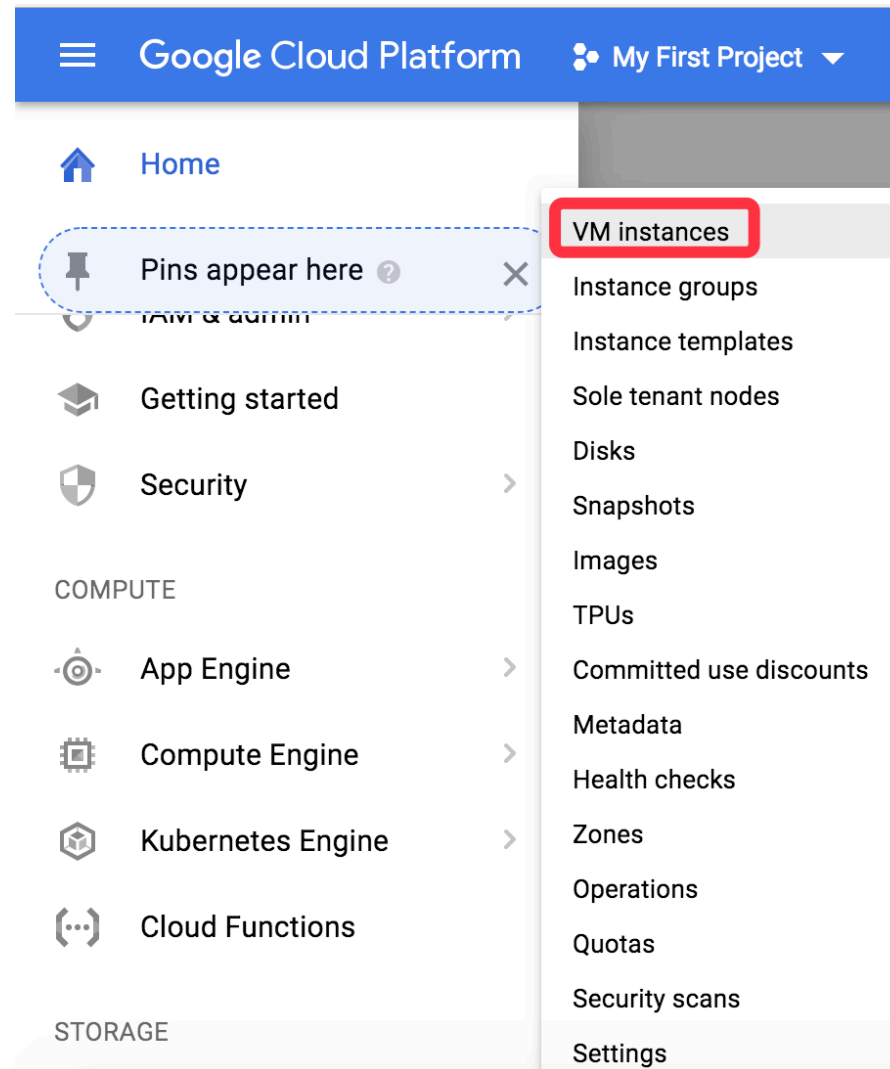
To shut down project "ProjectDemo", type your project ID: `projectdemo-214204`

[CANCEL](#) [SHUT DOWN](#)

Instances

- An *instance* is a virtual machine (VM)
- Create an instance by using the Google Cloud Platform Console or the *gcloud* command-line tool
- Each instance belongs to a project, and a project can have one or more instances.
- Remove unnecessary instances to avoid incurring charge

Create New Instances




← Create an instance

Name ?
instance-1

Region ? **Zone** ?
us-east1 (South Carolina) us-east1-b

Machine type
Customize to select cores, memory and GPUs.
1 vCPU 3.75 GB memory [Customize](#)

Container ?
 Deploy a container image to this VM instance. [Learn more](#)

Boot disk ?
 New 10 GB standard persistent disk
Image
Debian GNU/Linux 9 (stretch) [Change](#)

Identity and API access ?
Service account ?
Compute Engine default service account

Access scopes ?
 Allow default access
 Allow full access to all Cloud APIs
 Set access for each API

Firewall ?
Add tags and firewall rules to allow specific network traffic from the Internet
 Allow HTTP traffic
 Allow HTTPS traffic

[Management, security, disks, networking, sole tenancy](#)

\$24.67 per m
Effective hourly
[Details](#)

You will be billed for this instance. [Learn more](#)

[Create](#) [Cancel](#)



Remove Instances

My First Project

VM instances

CREATE INSTANCE

IMPORT VM

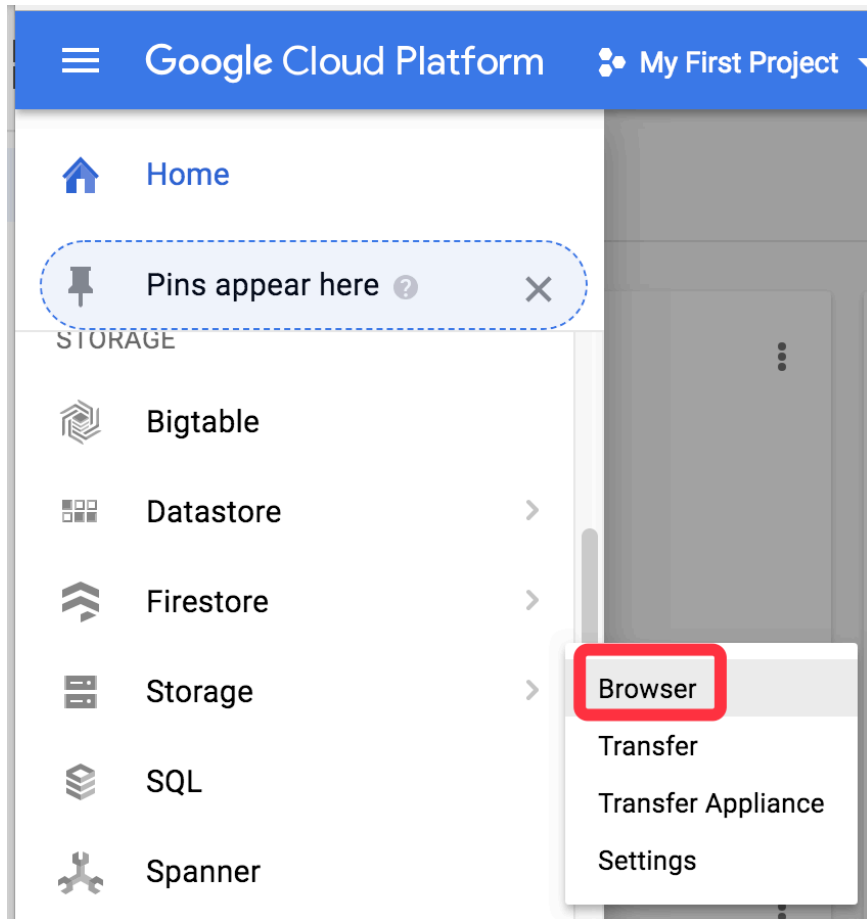
Filter VM instances

<input checked="" type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> instance-1	us-east1-b		10.142.0.2 (nic0)	104.196.32.197	SSH

Bucket

- Buckets contain objects/datasets.
- A bucket is always owned by the project team owners group.
- Creating Storage Buckets
 - console
 - GSUTIL
- Access Cloud Storage bucket

Create Bucket



Cloud Storage Buckets

Cloud Storage lets you store unstructured objects in containers called buckets. You can serve static data directly from Cloud Storage, or you can use it to store data for other Google Cloud Platform services.

[Create bucket](#)

or

[Take the quickstart](#)

Upload Data

[←](#) Bucket details [EDIT BUCKET](#) [REFRESH BUCKET](#)

projectdemoece599

[Objects](#) [Overview](#) [Permissions](#)

[Upload files](#) [Upload folder](#) [Create folder](#) [Delete](#)

[Buckets](#) / projectdemoece599

There are no live objects in this bucket. If you have object versioning enabled, this bucket may contain archived versions of objects, which can list archived object versions using [gsutil](#) or [the APIs](#).

Access Public Bucket

To access public data:

CONSOLE

GSUTIL

API LINK

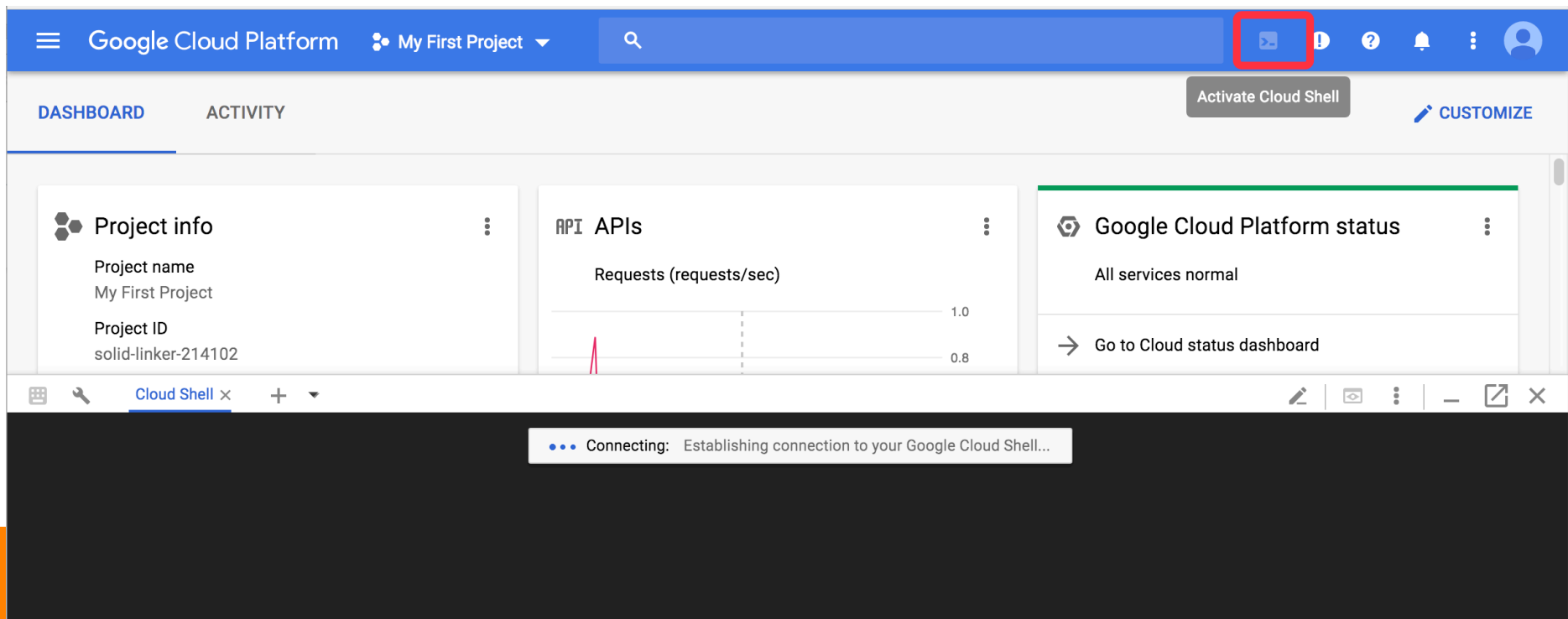
1. Get the name of the public bucket.
2. Using a web browser, access the bucket with the following URI (you will be asked to sign in if necessary):

```
https://console.cloud.google.com/storage/[BUCKET_NAME]/
```

- gsutil is a Python application that lets you access Cloud Storage from the command line.
- Every bucket has its unique name.

gcloud

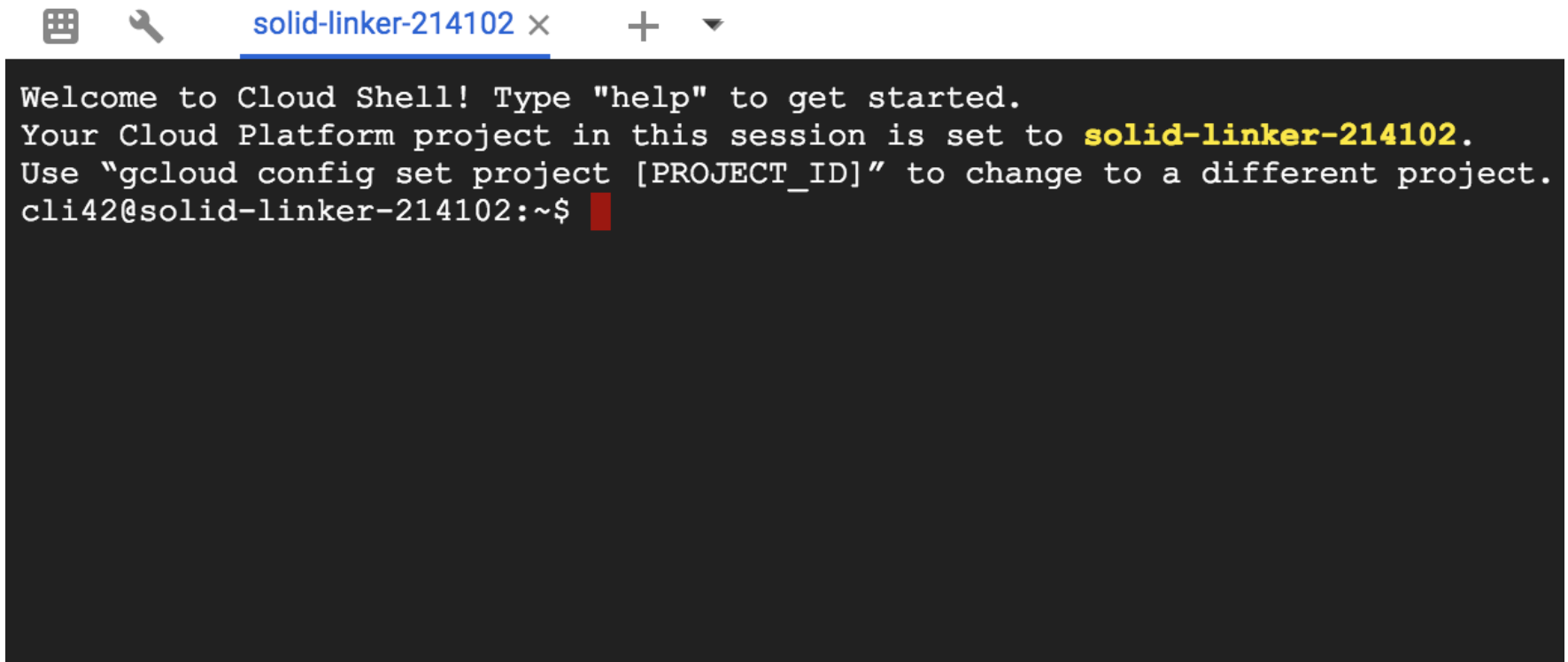
- Gcloud is a tool that provides the primary command-line interface to Google Cloud Platform.
- You can use this tool to perform many common platform tasks either from the command-line or in scripts and other automations.
- Click the Active Cloud Shell button in the toolbar to access it



The screenshot displays the Google Cloud Platform (GCP) dashboard interface. At the top, the navigation bar includes the GCP logo, the project name 'My First Project', and a search icon. On the right side of the navigation bar, a red box highlights the 'Active Cloud Shell' button, which is represented by a terminal icon. Below the navigation bar, the dashboard is divided into several sections: 'DASHBOARD' and 'ACTIVITY'. The main content area features three panels: 'Project info' (showing project name 'My First Project' and ID 'solid-linker-214102'), 'API APIs' (showing a line graph for 'Requests (requests/sec)' with a peak at 1.0 and a trough at 0.8), and 'Google Cloud Platform status' (showing 'All services normal' and a link to 'Go to Cloud status dashboard'). At the bottom of the dashboard, a 'Cloud Shell' tab is open, and a status bar indicates 'Connecting: Establishing connection to your Google Cloud Shell...'. The bottom right corner of the image features the 'GEAS' logo.

gcloud

- It is a terminal where you can create files, install package, run your code and etc.



The screenshot shows a terminal window with a dark background and white text. At the top, there is a tab labeled 'solid-linker-214102' with a close button (x) and a plus sign (+). Below the tab, the terminal displays the following text:

```
Welcome to Cloud Shell! Type "help" to get started.  
Your Cloud Platform project in this session is set to solid-linker-214102.  
Use "gcloud config set project [PROJECT_ID]" to change to a different project.  
cli42@solid-linker-214102:~$
```

Walkthrough

- Set up your project
 - Select or create a GCP project
- Set up your environment
 - Install packages and dependences
- Prepare data
 - Create a bucket or access an public bucket
- Prepare your code
 - Write or download the code
- Run the code with gcloud

<https://cloud.google.com/ml-engine/docs/tensorflow/getting-started-training-prediction>



