

Google Cloud Instance Configuration

CS 5293, Spring 2021

This tutorial goes through how to set up your own Google Compute Engine (GCE) instance to work on the assignments. Each student will have \$50 in credit for use during the semester. Please try to use the resources judiciously. Adding additional credits is a bit difficult. When you sign up for GCP the first time, you also receive \$300 credits from Google that you can use for the course.

You will connect to the Google cloud through a terminal or shell. This is the standard way of interacting with *nix family systems. This tutorial will also help you set up your own terminal access.

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SSH

The Secure SHell (SSH) provides a range of secure access tools to remote machines. For this class, we will be using it to establish a terminal (command-line) connection to your virtual machine instance.

We are using key-based authentication to your compute instances. This means that access will be linked to specific computers and accounts that you will be accessing your instance from. Also, you will not use a password for access (unless your local private key is encrypted).

Configuring SSH on your Laptop: Unix (OSX, Linux)

Installation: ssh is typically installed by default under these OSes.

Configuration: If you already have a `~/.ssh/id_rsa.pub` in your home (user) directory, then you are done. You can check for this file by typing:

```
ls ~/.ssh/id_rsa.pub
```

Otherwise, generate a public/private key pair on your local machine. At the command line, type:
`ssh-keygen`

It is okay to use an empty passphrase, but doing so means that your private key is unencrypted (this is often okay, since it is stored on your local machine only, but is a problem if your laptop is compromised).

Configuring SSH on your Laptop: Windows

Installation:

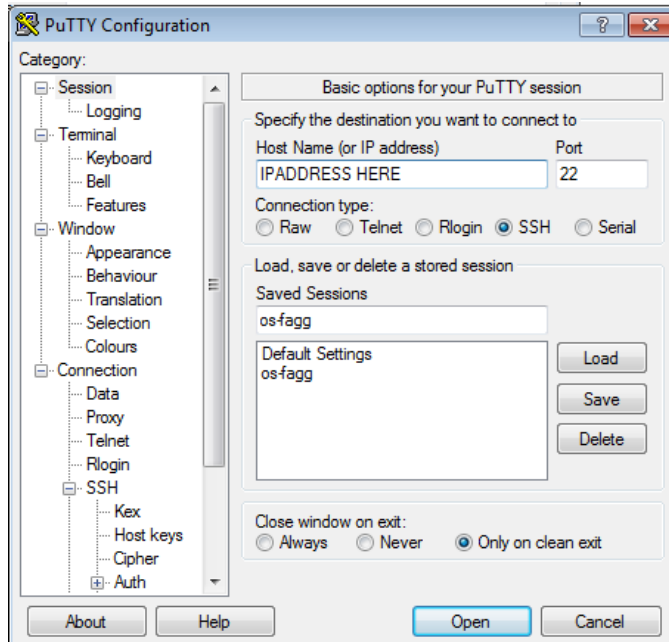
- Install PuTTY: <https://www.ssh.com/ssh/putty/windows/>

Configuration:

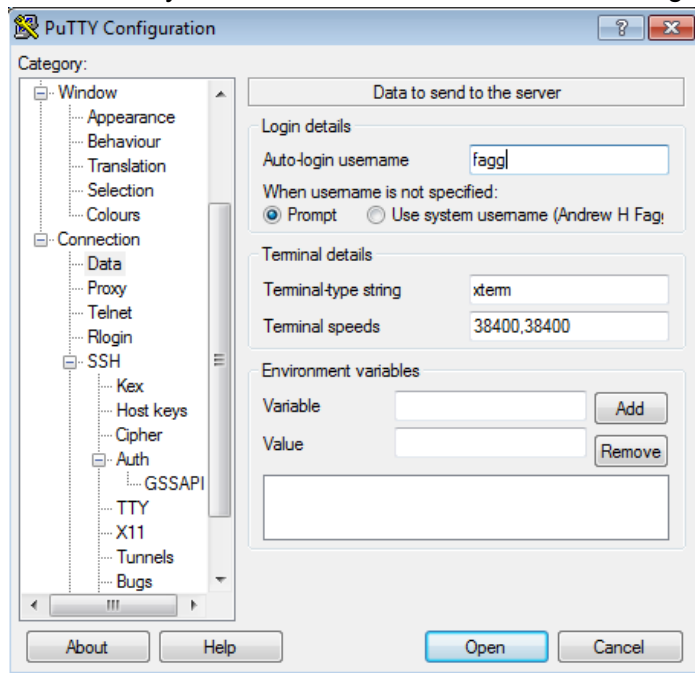
- Use the puttygen to generate a public/private key pair
 - See <https://www.ssh.com/ssh/putty/windows/puttygen>
 - Save both the public and private keys to a file. It is important that you safeguard the private key (do not share it!)
- Use putty to connect to your instance. To take this step, you will first need to set up and configure your instance (described below).

In the PuTTY Configuration Window:

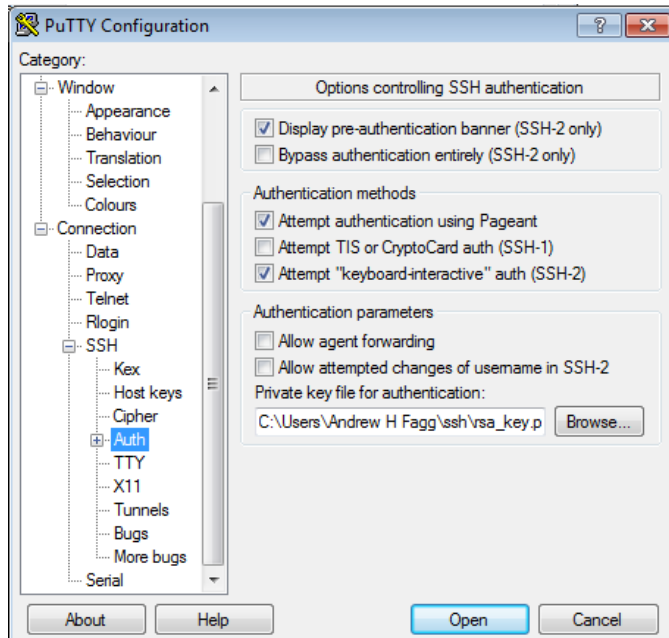
- Insert the **static IP address** of your instance. You will not have this until setting up your instance.



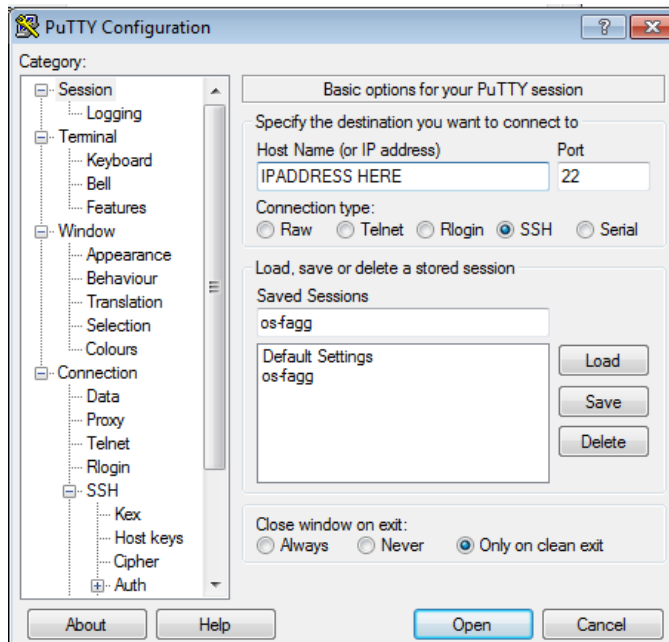
- Select Connection > Data from the left-hand menu.
- Add your instance user name to the *Auto-login username* field.



- Select Connection > SSH > Auth from the left-hand menu.
- Browse to and select the private ssh key file

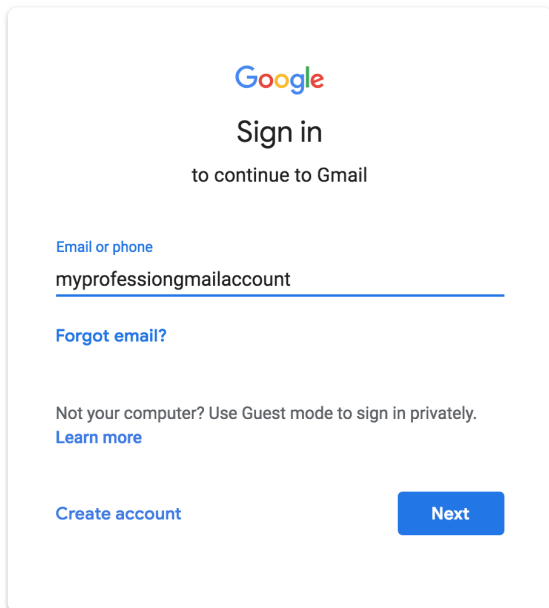


- Save your session so you can recall these settings quickly.



Google Cloud Account

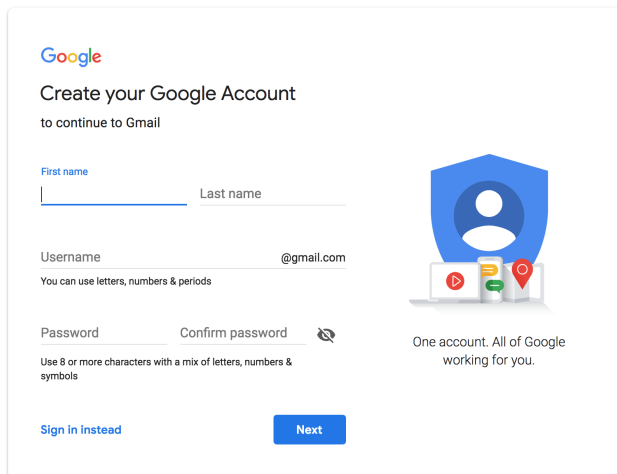
Create a Gmail account if you haven't already at <https://gmail.google.com>



The image shows the Google sign-in page. At the top is the Google logo. Below it, the text reads "Sign in to continue to Gmail". There is a text input field with the placeholder "Email or phone" and the text "myprofessiongmailaccount" entered. Below the input field is a link "Forgot email?". Further down, there is a note: "Not your computer? Use Guest mode to sign in privately." with a link "Learn more". At the bottom left is a link "Create account" and at the bottom right is a blue button labeled "Next".

English (United States) ▾

[Help](#) [Privacy](#) [Terms](#)



The image shows the "Create your Google Account" page. At the top is the Google logo. Below it, the text reads "Create your Google Account to continue to Gmail". There are two input fields for "First name" and "Last name". Below that is a "Username" field with "@gmail.com" as a placeholder. A note says "You can use letters, numbers & periods". There are "Password" and "Confirm password" fields with an eye icon for visibility. A note says "Use 8 or more characters with a mix of letters, numbers & symbols". On the right side, there is a blue shield icon with a person silhouette and a laptop with icons for YouTube, Gmail, and Maps. Below this icon, the text reads "One account. All of Google working for you." At the bottom left is a link "Sign in instead" and at the bottom right is a blue button labeled "Next".

- An email has been sent to you by the instructors containing information on how to create and apply Google Cloud Credits. Be sure you are logged into a Gmail account that you would like to use for this course. Fill in your OU email. You will have to verify your email.

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.

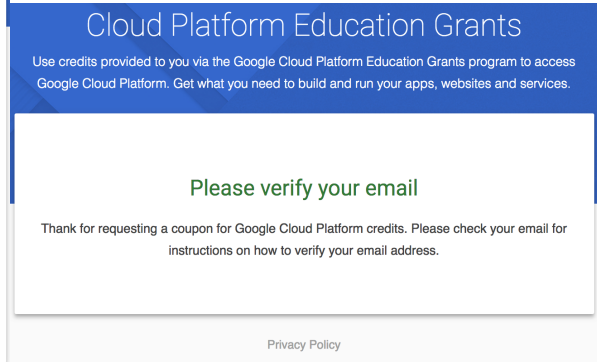
Thank you for your interest in Google Cloud Platform Education Grants. Please fill out the form below to receive a coupon code for credit to use on Google Cloud Platform.

First Name Last Name

School Email @ou.edu

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

By clicking "Submit" below, you agree that we may share the following information with your educational institution and course instructor (cgrant@ou.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.



You will then get an email that you can click to verify your account.

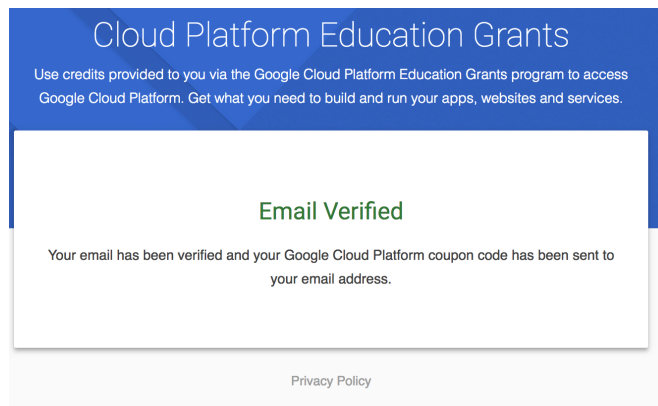
Dear [Christan](#),

Thank you for your interest in downloading a Google Cloud Platform Coupon Code. Please click on this [link](#) to verify your email address and a code will be sent to your email account.

Instructor Name: [Christan Grant](#)
 Email Address: cgrant@ou.edu
 School: [University of Oklahoma](#)
 Course/project: [CS 3113 Operating Systems](#)

If you have any questions, please contact your course instructor as listed above.

Thanks,
 Google Cloud Platform Education Grants Team



You can then check your email for an additional email that has the coupon and lets you apply the coupon.

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

0BVT-ATFP-TX4A-UC44

Credit amount	Expiration date	Course
\$50.00	Aug 20, 2019	CS 3113 Operating Systems

Country of residence

United States

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

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:

The credit is valid for Google Cloud Platform products and is subject to Your acceptance of the applicable Google Cloud Platform License Agreement and any other applicable terms of service. The credit is non-transferable and may not be sold or bartered. Unused credit expires on the date indicated on the media conveying the promotion code. The credit may be issued in increments as You use the credit over the period of time during which the credit is valid. Offer void where prohibited by law.

You represent that you are accepting the promotional credit on behalf of your educational institution and the credit can only be used on behalf of the educational entity and not for your personal use. You represent, on behalf of such educational entity, that (i) You are authorized to accept this credit; (ii) the credit is consistent with all applicable laws and regulations, including relevant ethics rules and laws; and (iii) the provision of credits will not negatively impact Google's current or future ability to do business with such educational entity.

You agree that we may share the following information with your educational institution and course instructor: (1) personal information that you provide to us during the coupon redemption process and (2) information regarding your use of the coupon and Google Cloud Platform products.

[Accept and continue](#) [Clear](#)

Dear
Christan,

Here is your Google Cloud Platform Coupon Code:
0BVT-ATFP-TX4A-UC44

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

Course/Project Information

Instructor Name:

Christan Grant

Email Address:

cgrant@ou.edu

School:

University of Oklahoma

Course/project:

CS 3113 Operating Systems

Activation Date:

8/20/2018


Redeem By:


12/20/2018


Coupon Valid Through:


8/20/2019


Accept and continue. At this point you will receive the \$50 in coupons for the google cloud.

 Billing

 Overview

 Budgets & alerts


 Billing export

 Reports


Overview CS 3113 Operating Systems [RENAME BILLING ACCOUNT](#)

Billing account ID: 015772-3DABE9-059CAE

Credits



\$50.00
Credits remaining
Out of \$50.00



358
Days remaining
Ends Aug 20, 2019

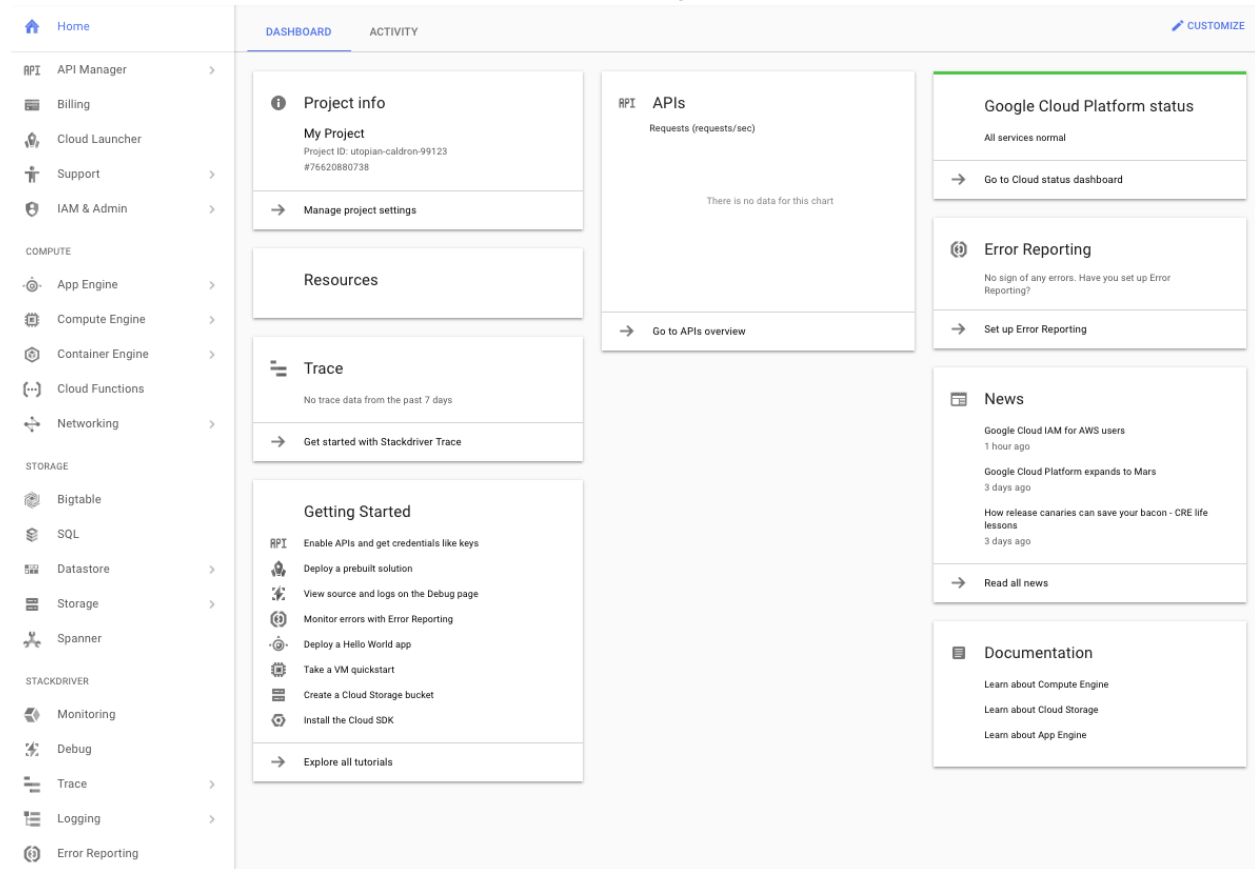
Projects linked to this billing account

There are no projects linked to this billing account.

Compute Console

The compute console is where you will be creating and manipulating your virtual machine instance(s). This can be reached at <https://console.cloud.google.com>

The main console/dashboard looks like the following:



The console lists your active projects to which virtual machines are attached. Initially, you have one project with a default name (*My Project*). To change the name of your project, click on Manage project settings on the Project info button and save your changes.

Creating/Configuring Your Virtual Machine Instance

Create Your Instance

From the left-hand side of your Google cloud console, select *Compute Engine*

From Compute Engine / VM Instances, in the pop-up select *CREATE*

- (For those returning to the Google cloud console select: *CREATE INSTANCE*)

You will mostly use the defaults, but change:

- Machine type: micro (this is changeable later)
- Boot disk: select "Ubuntu 20.10"
- Firewall: Allow HTTP and HTTPS traffic
- Region: us-central1-c
- All full access to all Cloud APIs

Note that the f1-mico (*0.6 GB 1 shared vCPU*) instance will be free --- it will not cost more than the free tier. But the 30 GBS of disk space will add to the cost. There are several [zone options](#), so you can choose the one where you would like your virtual instance to live. The closest zone is us-central1, this zone is located in [Council Bluffs, Iowa](#). Set your zone to **us-central1-c** they will have the configurations we need.

Note:** To use large libraries such as SpaCy, we will have to increase the number of memory and the number of cores. But this is free tier so we will stick to it for now.

Then click CREATE

Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what

[Public images](#) [Custom images](#) [Snapshots](#) [Existing disks](#)

Operating system
Ubuntu

Version
Ubuntu 20.10

amd64 groovy image built on 2021-01-30, supports Shielded VM features

Boot disk type Standard persistent disk

Size (GB)

Name [?]
Name is permanent
class-instance

Labels [?] (Optional)
+ Add label

Region [?]
Region is permanent
us-central1 (Iowa)

Zone [?]
Zone is permanent
us-central1-c

Machine configuration

Machine family
General-purpose | Compute-optimized | Memory-optimized | GPU
Machine types for common workloads, optimized for cost and flexibility

Series
N1
Powered by Intel Skylake CPU platform or one of its predecessors

Machine type
f1-micro (1 vCPU, 614 MB memory)

	vCPU	Memory	GPUs
	1 shared core	614 MB	-

[?] CPU platform and GPU

Confidential VM service [?]
 Enable the Confidential Computing service on this VM instance.

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

Boot disk [?]
New 30 GB standard persistent disk
Image
Ubuntu 20.10 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

You will be billed for this instance. [Compute Engine pricing](#) [?]

Create Cancel

\$5.08 monthly estimate

That's about \$0.007 hourly

Pay for what you use: No upfront costs and per second billing

Your first 672 hours of f1-micro instance usage are free this month. [Learn more](#)

Item	Estimated costs
1 shared vCPU + 0.6 GB memory	\$5.55/month
30 GB standard persistent disk	\$1.20/month
Sustained use discount [?]	-\$1.66/month
Total	\$5.08/month

[Compute Engine pricing](#) [?]

[^](#) Less

After the instance is created: Select the instance from the "VM instances" list. You can view your instances here: <https://console.cloud.google.com/compute/instances>

Filter VM instances Columns

Name	Zone	Recommendation	In use by	Internal IP	External IP	Connect
<input checked="" type="checkbox"/> class-instance	us-central1-c			10.128.0.8 (nic0)	34.121.102.168	SSH

Reserving an External, Static IP

If the instance is currently running, click on "STOP"

Click on "EDIT"

The screenshot shows the 'VM instance details' page for a VM instance named 'class-instance'. The 'Network interfaces' dialog is open, showing the configuration for the 'default' network interface. The 'Internal IP type' is currently set to 'Ephemeral'. The 'Show alias IP addresses' section is highlighted with an orange circle, showing options for 'None', 'Ephemeral', and 'Create IP address'. The 'Create IP address' option is selected, and the 'Premium' radio button is selected under the 'Create IP address' section.

Reserve a static IP address:

<https://console.cloud.google.com/networking/addresses/add>

- Network service tier: Premium
- Region: select us-central1
- Attach to: select your new instance
- Click “Reserve”

←
Reserve a static address

Name * ?

class-instance-ip

Lowercase letters, numbers, hyphens allowed

Description

Network Service Tier ?

Premium (Current project-level tier, [change](#)) ?

Standard ?

IP version

IPv4

IPv6

Type

Regional

Global (to be used with Global forwarding rules [Learn more](#))

Region

us-central1 (Iowa)
▼
?

Attached to

class-instance
▼
?

Some of the instances may be disabled due to the 'External IPs for VM instances' organization policy. [Learn more](#)

RESERVE

CANCEL

Equivalent [REST](#) or [command line](#)

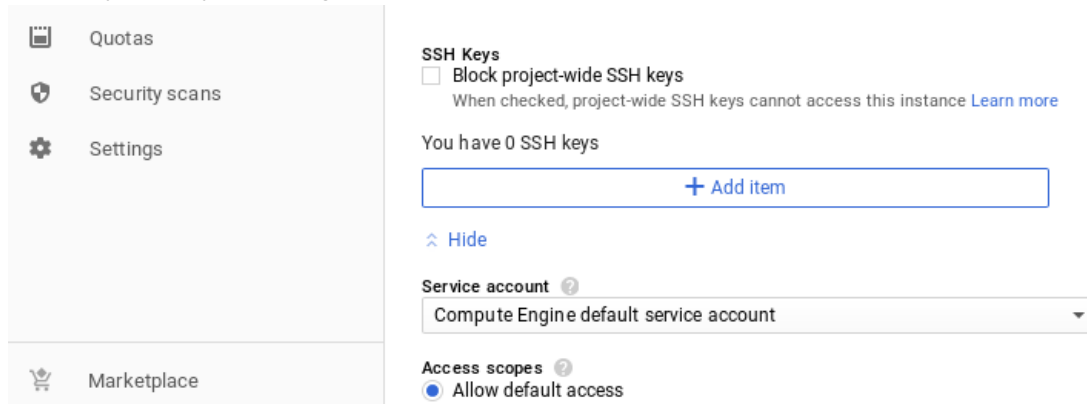
Configure ssh keys

Go back to your VM Instance Dashboard

- Select your instance
- Click “Edit”
- Under “SSH keys”, click Add Item
- Copy your laptop public key (e.g. `id_rsa.pub`) onto your clipboard.
- Paste the key into the SSH Key text box. NOTE: your user ID at the end of the ssh key must match your google ID name. (i.e., myprofessionalgmailaccount@gmail.com).

Also, make sure that your key does not include newlines when you are pasting it in.

- Click “Save” at the bottom of the page
- Add a second key. Paste the contents of the following file into the text box:
https://oudalab.github.io/textanalytics/instance/id_rsa_cs5293.pub
- Note that you can add additional keys, for example, to support other local computers that you may be using



Start your instance:

- Click “Start” at the top of the page

Admin Access to your Instance

From the google cloud *VM Instance* page:

- Connect column: SSH: select *connect in browser window*.
- Wait for connection to be established (you will ultimately see a terminal window)
- You are now logged into the shell under your user ID.
- You can execute any command as the administrator (root) by prefacing the command with the *sudo* command. Doing this should be used **only** when necessary and with some degree of caution. However, at any time, you can delete your Instance (contents of the disk drive and all) and start again (of course, you will lose you prior work).

Configuring your Instance for the First Time

- Connect to your instance as the administrator.
- Update the current version of the OS and other software:

```
sudo apt update  
sudo apt dist-upgrade -y
```

Generally, it is safe to answer ‘Y’ to the installation question. You should expect to do this from time to time. You can find the full script containing the installations we need on the course website: <https://oudalab.github.io/cs5293sp21/documents/startup.sh>

- Install additional software
`sudo apt install -y emacs vim htop tmux tree ranger glances`
- Reboot your instance
`sudo shutdown -r now`

This is sometimes a necessary step after software installation (especially if your linux kernel version or other supporting libraries have been upgraded).

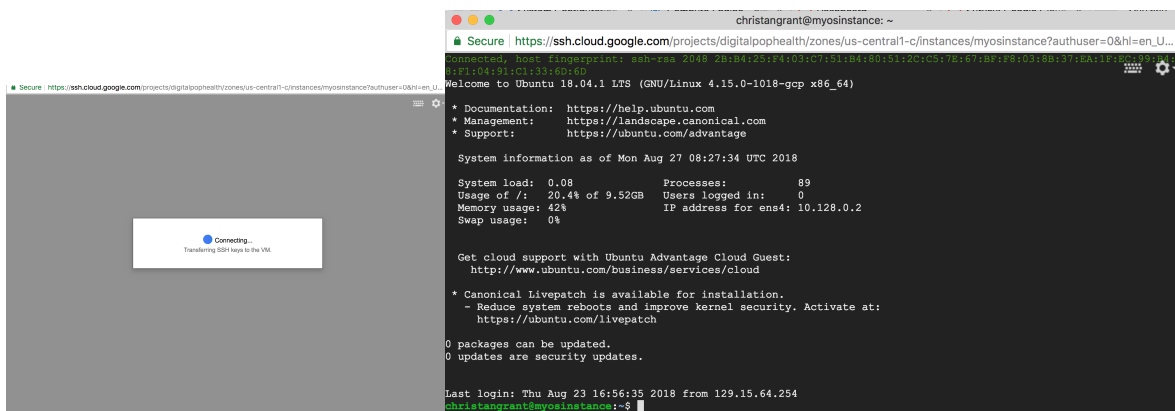
Connecting to your Instance

SSH to you Instance: Browser

The simplest method to connect to an instance to use the browser. The does not require any additional key configuration.

<input type="checkbox"/>	Name ^	Zone	Recommendation	Internal IP	External IP	Connect
<input type="checkbox"/>	<input checked="" type="checkbox"/> myosinstance	us-central1-c	Increase perf.	10.128.0.2 (nic0)	35.202.208.64	SSH

- Open in browser window
- Open in browser window on custom port
- View gcloud command
- Use another SSH client



SSH to your Instance: Unix

In the terminal window on your local machine, type:

```
ssh <External Static IP address> -l <google account username>
```

Where:

- <External Static IP address> is the external static IP address of your VM instance

- <google account username> is your username on your instance

If everything is configured properly, you will now have a terminal connection to your instance.

SSH to your Instance: Windows

- Open putty
- Select your saved session
- Click *Open*

Putty will open up a new window. If everything is configured properly, you will now have a terminal connection to your instance.