Google Cloud Instance Configuration

CS 3113, 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.

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).
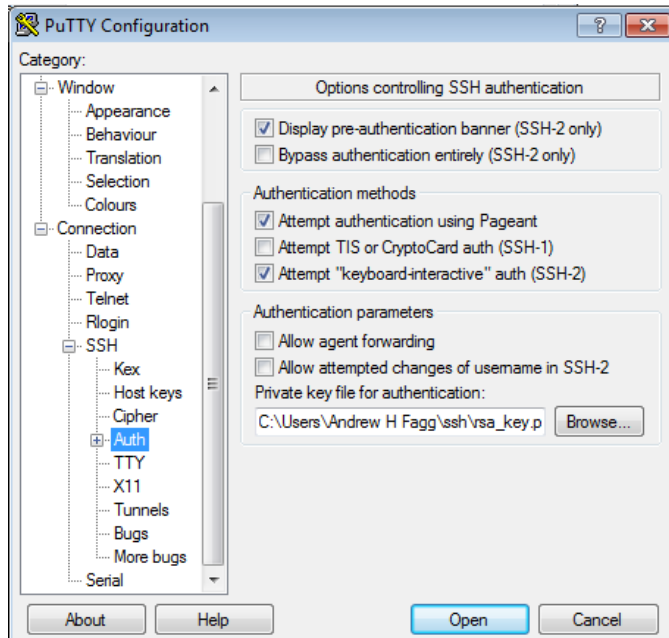
In the PuTTY Configuration Window:
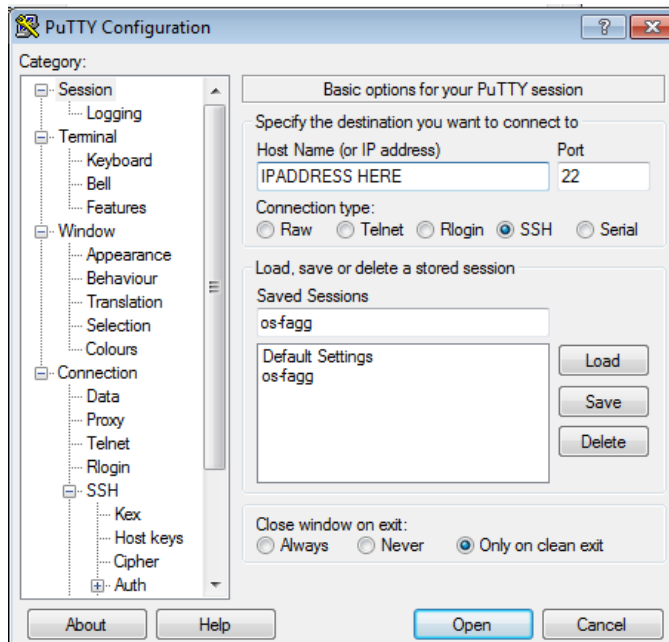- Insert the **static IP address** of your instance. You will not have this until setting up your instance.
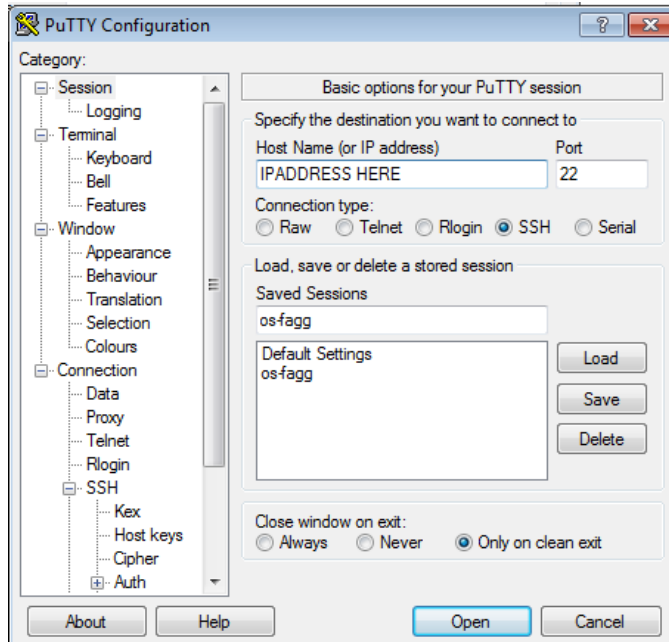
- Select Connection > Data from the left-hand menu.
- Add your instance user name to the *Auto-login username* field.
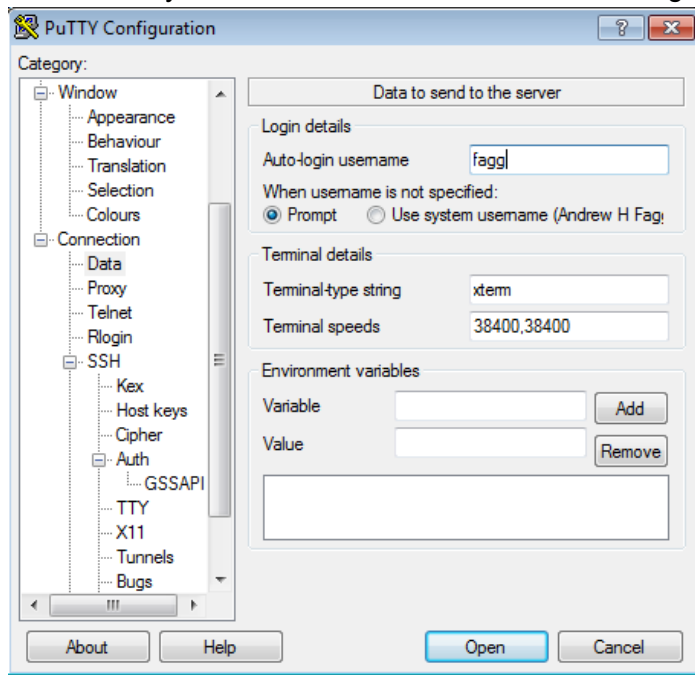
- Select Connection > SSH > Auth from the left-hand menu.
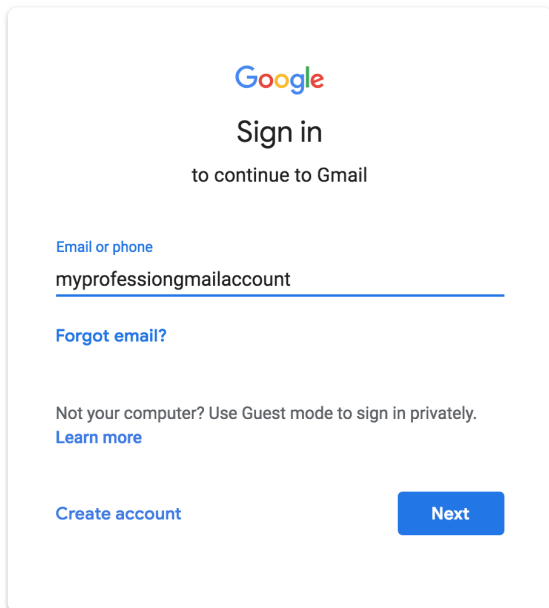- Browse to and select the private ssh key file

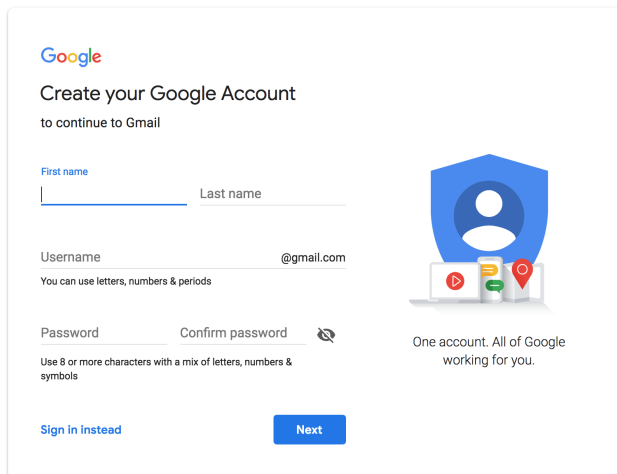- Save your session so you can recall these settings quickly.

Google Cloud Account

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

- 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.

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

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

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Course/Project Information
Instructor Name:
 Christan Grant
Email Address:
cgrant@ou.edu
School:
Univeristy 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:
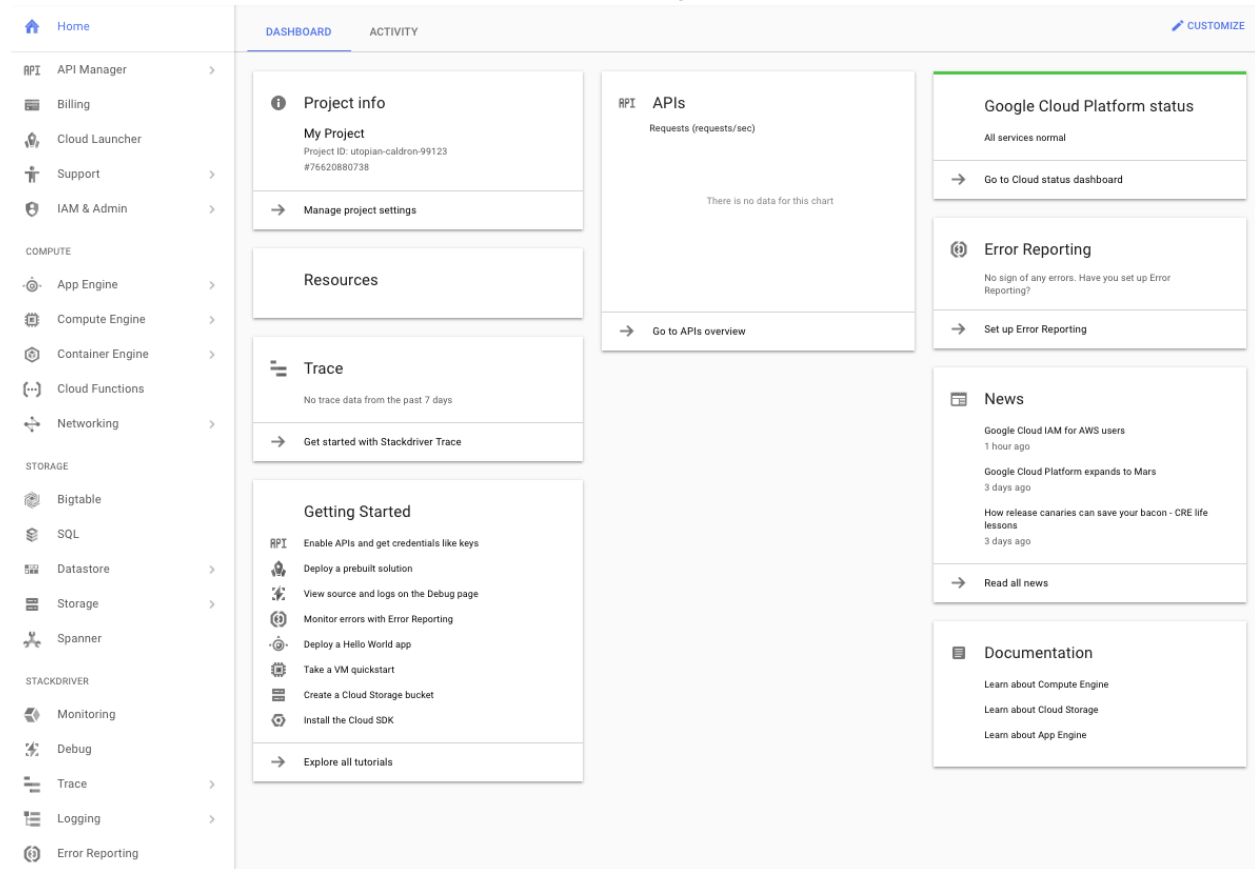
The console lists your active projects to which virtual machines are attached. Initially, you have one project with a default name (*My Project*). To change the name of your project, click on Manage project settings on the Project info button and save your changes.

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)
30

Name ⓘ
Name is permanent

```
class-instance
```

Labels ⓘ (Optional)

＋ Add label

Region ⓘ   **Zone** ⓘ
Region is permanent   Zone is permanent

us-central1 (Iowa)   ▾   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

10

Reserving an External, Static IP

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

Click on "EDIT"

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
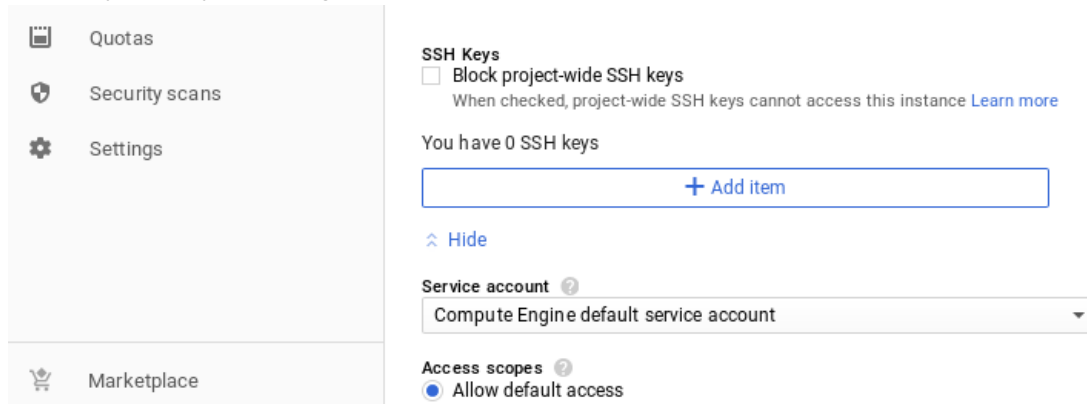- Click "Reserve"

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

Quotas

Security scans

Settings

Marketplace

SSH Keys

☐ Block project-wide SSH keys
When checked, project-wide SSH keys cannot access this instance Learn more

You have 0 SSH keys

+ Add item

⌃ Hide

Service account ⊙
Compute Engine default service account ▾

Access scopes ⊙
⦿ Allow default access

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/cs3113sp21/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.
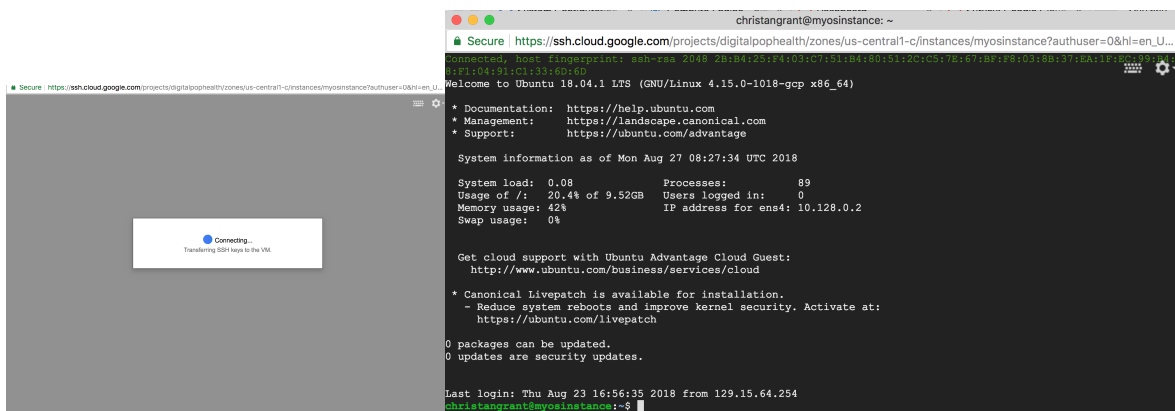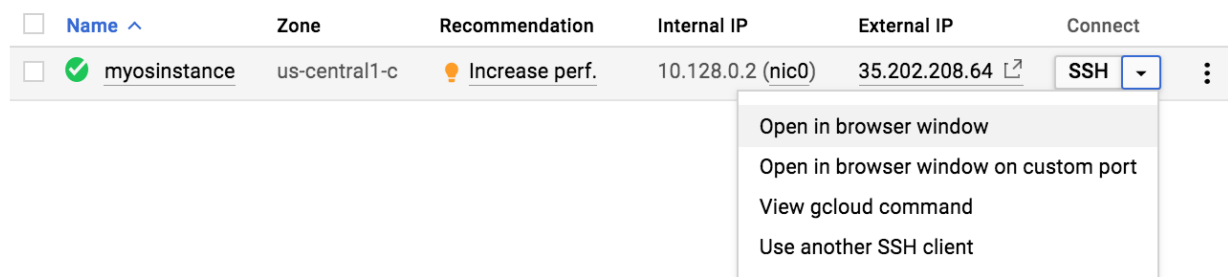
SSH to your Instance: Unix
In the terminal window on your local machine, type:
```
ssh <External Static IP address> -l <google account username>
```
Where:
- <External Static IP address> is the external static IP address of your VM instance

- <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.