Grand Valley State University
www.gvsu.edu

Cloud Computing
Cloud Platforms

CIS437
Erik Fredericks // frederer@gvsu.edu

Adapted from Google Cloud Computing Foundations, Overview of Cloud Computing (Wufka & Canonico)

Today...

Overview of lab environments

What makes a cloud platform

First...lab environments!

We'll be using different forms of labs in this class to:

1) Keep you on your toes
2) Give you experience in different environments
3) ...
4) Profit!

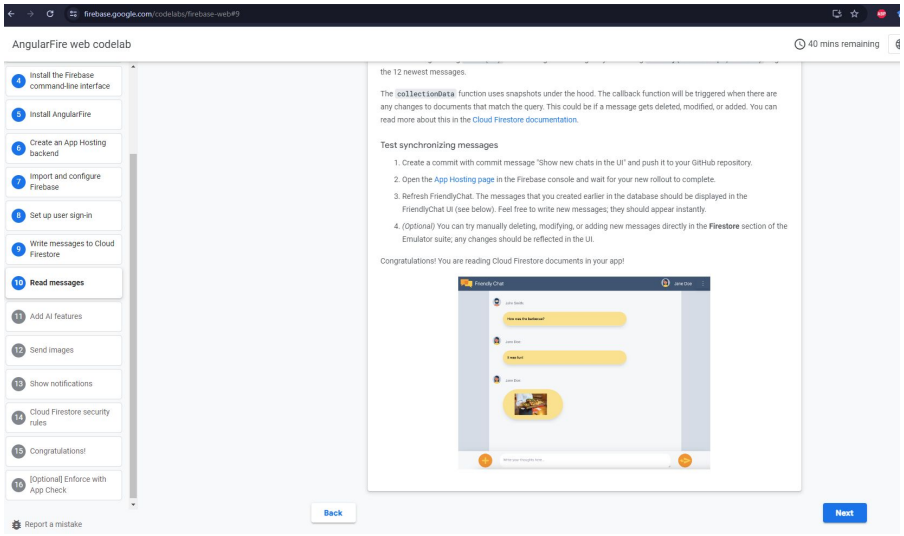
Codelabs

Either Google- or self-created labs

(essentially a transformed Markdown document into a nifty web format)

Generally nice, but **must be kept up to date**

- Meaning, screenshots and/or tech may not necessarily act nicely



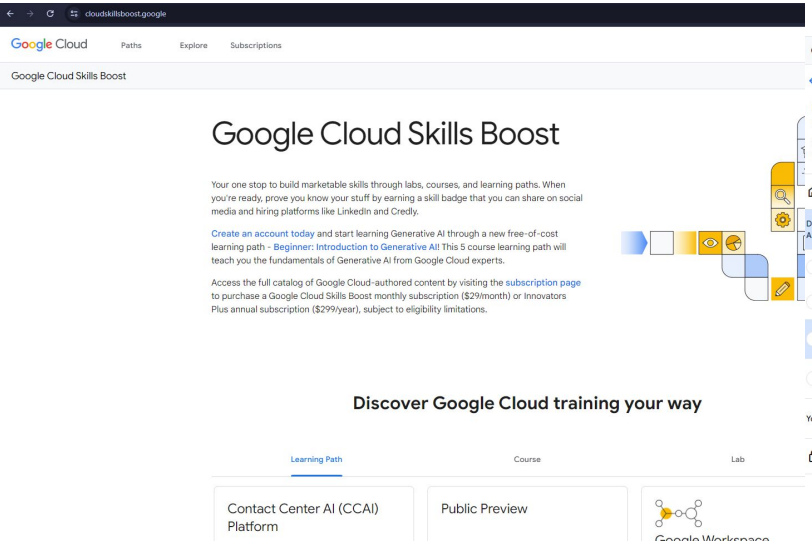
https://github.com/googlecodelabs

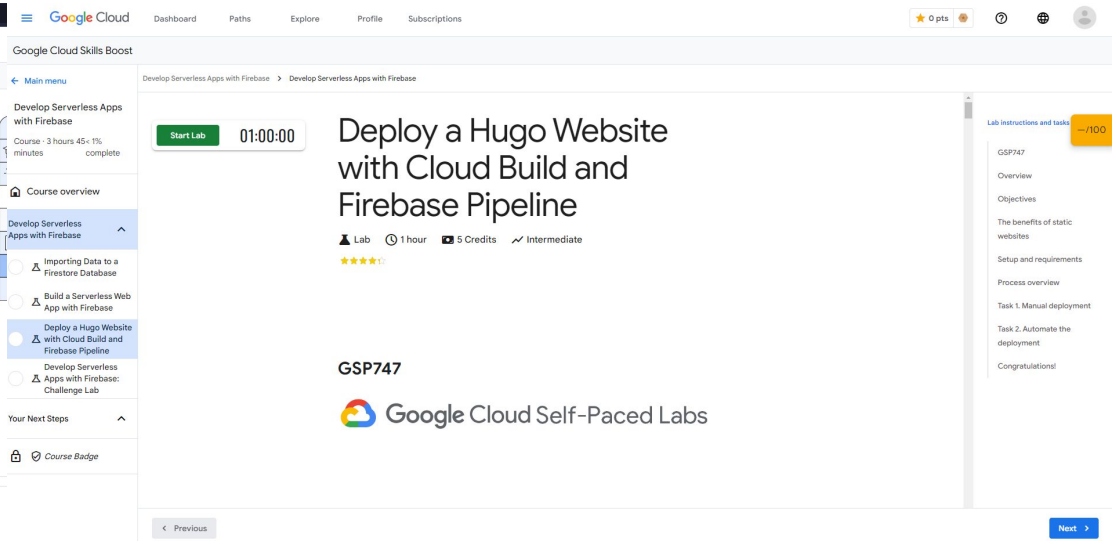
Google Cloud Skills Boost (formerly Qwiklabs)

Self-paced labs

Separate credits from Google Cloud!

- *You'll be using your mail.gvsu accounts*





AWS Academy

(deep breath)

- The "new thing" for me to give to you
- Meaning, there will probably be pain points throughout the semester

Their structure is non-ideal for education

- You are forced into lab modules and have **0 playtime**
- Everything is hand-held
- We'll mainly use it to show a different way of doing things

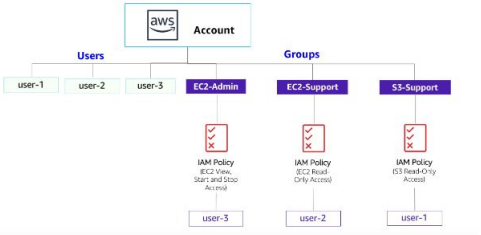
AWS Academy

Lab 1: Introduction to AWS IAM

AWS Identity and Access Management (IAM) is a web service that enables Amazon Web Services (AWS) customers to manage users and user permissions in AWS. With IAM, you can centrally manage **users**, **security credentials** such as access keys, and **permissions** that control which AWS resources users can access.

Lab overview and objectives

This lab will demonstrate:



- Exploring pre-created **IAM Users and Groups**
- Inspecting **IAM policies** as applied to the pre-created groups
- Following a **real-world scenario**, adding users to groups with specific capabilities enabled
- Locating and using the **IAM sign-in URL**
- **Experimenting** with the effects of policies on service access

Module 4 - AWS Cloud Security

- Introduction Video
- Section 1 Video - AWS Shared Responsibility Model
- Section 2 Video - AWS IAM
- Console Demonstration - Identity and Access Management
- Section 3 Video - Securing a New AWS Account
- Section 4 Video - Securing Accounts
- Section 5 Video - Securing Data
- Section 6 Video - Working to Ensure Compliance
- Wrap Up Video
- Student Guide
- Lab - 1 Introduction to AWS IAM
  100 pts
- Module 4 Knowledge Check
  100 pts

AWS Academy

You are going to be enrolled in **two** courses in their LMS
- For homeworks/labs, I'll tell you explicitly where to go
- Mainly will be looking for completion

AWS Cloud Fundamentals and AWS Cloud Operations
- Basics and more hands-on things

Typical process:
- I tell you to go to AWS Academy and:
  a) Watch a video
  b) Do a thing or two

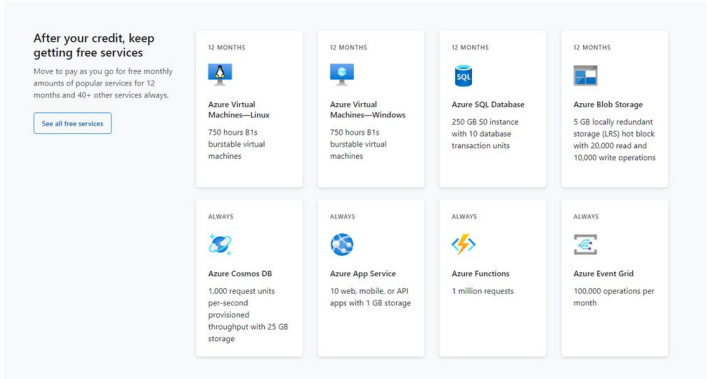
Microsoft Azure

You might be wondering....

What about those "free credit" offers I see popping up when logging in for the first time?

Cloud 66 101

How to claim your free $300 credit from Google Cloud



aws

Apply for a $300 AWS Credit

At AWS, we're focused on finding ways to improve our products and provide a better customer experience. We want to help you build out a proof of concept that works for your business.

AWS CREDITS

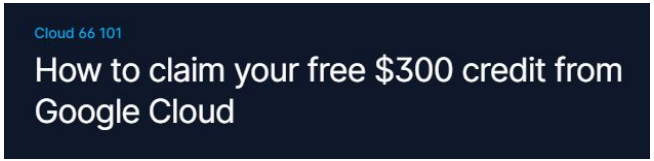
Our records indicate you recently registered an account with AWS. **Based on your profile, you may be eligible** for a $300 AWS credit. If approved, the credit will be applied to your AWS Account.

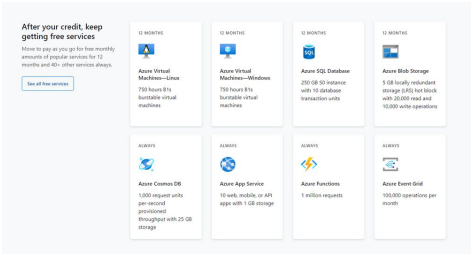
Apply for $300 AWS Credit

You might be wondering....

DON'T DO IT!

- You only can redeem it once!!!
  - If you wanted to use it in another class....
  - Or use it in a personal project...





To summarize:

You will receive $50 in Google Cloud credits to use for class projects
- Can be used on **anything** within the Google Cloud ecosystem

You will receive credits for Qwiklabs (amount TBD)
- Can be used for Qwiklabs only

You will be signed up for AWS Academy and can only complete modules within their predefined course structures

...Azure doesn't offer anything educational, sorry...

I will invite all of you based on you mail.gvsu accounts to all!

Next up - book author's slides...

Cloud computing more realistic definition

A cloud is a **group of machines** configured in such a way that an end-user can request **any number of VM**s of a **desired configuration.**

The **cloud platform will spawn these VMs somewhere** on the physical machines that it owns.

The word “**cloud**” in this context is **meant** to convey **the semi-ethereal nature of these VMs**.

The **end-user** neither knows **nor cares** where exactly these **VMs are physically located** or the configuration of the underlying hardware

Many platforms many standards

- Many attempts to provide a standard interface to cloud computing
  - **Open Cloud Computing Interface** (OCCI)
    - Protocol and API for IaaS
    - no activity since **October 2016**
  - **Open Cloud Consortium** (OCC)
    - Development of standards for cloud computing and frameworks for interoperating between clouds
    - Now it is called Open Commons Consortium
  - **Open Virtualization Format** (OVF)
    - an open standard for packaging and distributing virtual appliances or, more generally, software to be run in virtual machines.
    - Last release **January 2013**

The same action on different Cloud Platforms

```
$ aws ec2 run-instances \
    --image-id ami-1a2b3c4d \
    --count 1 \
    --instance-type c3.large \
    --key-name MyKeyPair \
    --security-groups MySecurityGroup
```

(a)

```
$ openstack server create --flavor 1 --image 397e713c-b95b-4186-ad46-6126863ea0a9 \
  --security-group default --key-name KeyPair01 --user-data cloudinit.file \
  myCirrosServer
```

(b)

```
$ gcloud compute instances create "my-new-instance" \
     --zone="us-west1-b" \
     --image-family="tf-latest-cu92" \
     --image-project=deeplearning-platform-release \
     --maintenance-policy=TERMINATE \
     --accelerator="type=nvidia-tesla-v100,count=8" \
     --machine-type="n1-standard-8" \
     --boot-disk-size=120GB \
     --metadata="install-nvidia-driver=True"
```

(c)

Fig. 1. How to run a new virtual machine by using the command-line client software provided by (a) AWS, (b) OpenStack and (c) GCP respectively.

Cloud Computing Platforms

Source: https://www.softwaretestinghelp.com/cloud-computing-service-providers/

Kamatera

phoenixNAP

Amazon Web Services

Microsoft Azure

Google Cloud Platform

Adobe

VMware

Dropbox

OpenStack

IBM Cloud

Rackspace

Red Hat

Salesforce

Oracle Cloud

SAP

Verizon Cloud

Navisite

Egnyte

OpenNebula

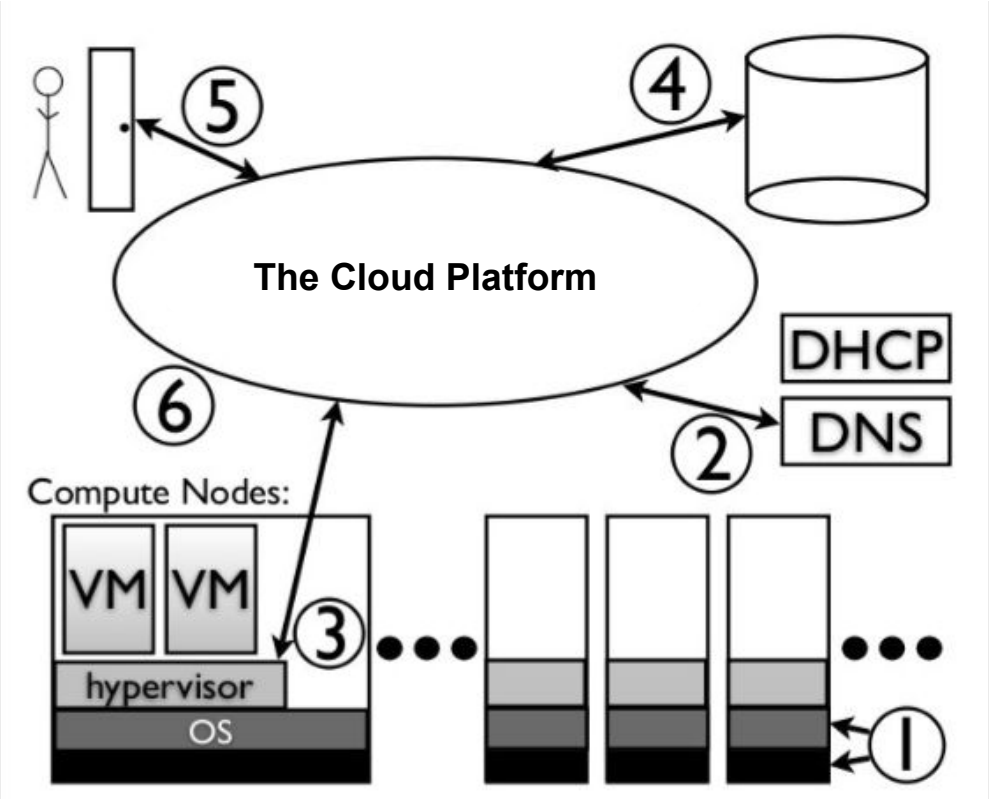
Features to compare

- API
  - Multiple API or open standard
- Availability zones
  - Isolate parts of the cloud for specific purpose
- Fault tolerance/Failover
  - Two instances of the same VM on two different physical machines. One physical machine died. Will the other VM take over?
- Live migration
  - Moving a virtual machine while it is still running (hot migration)

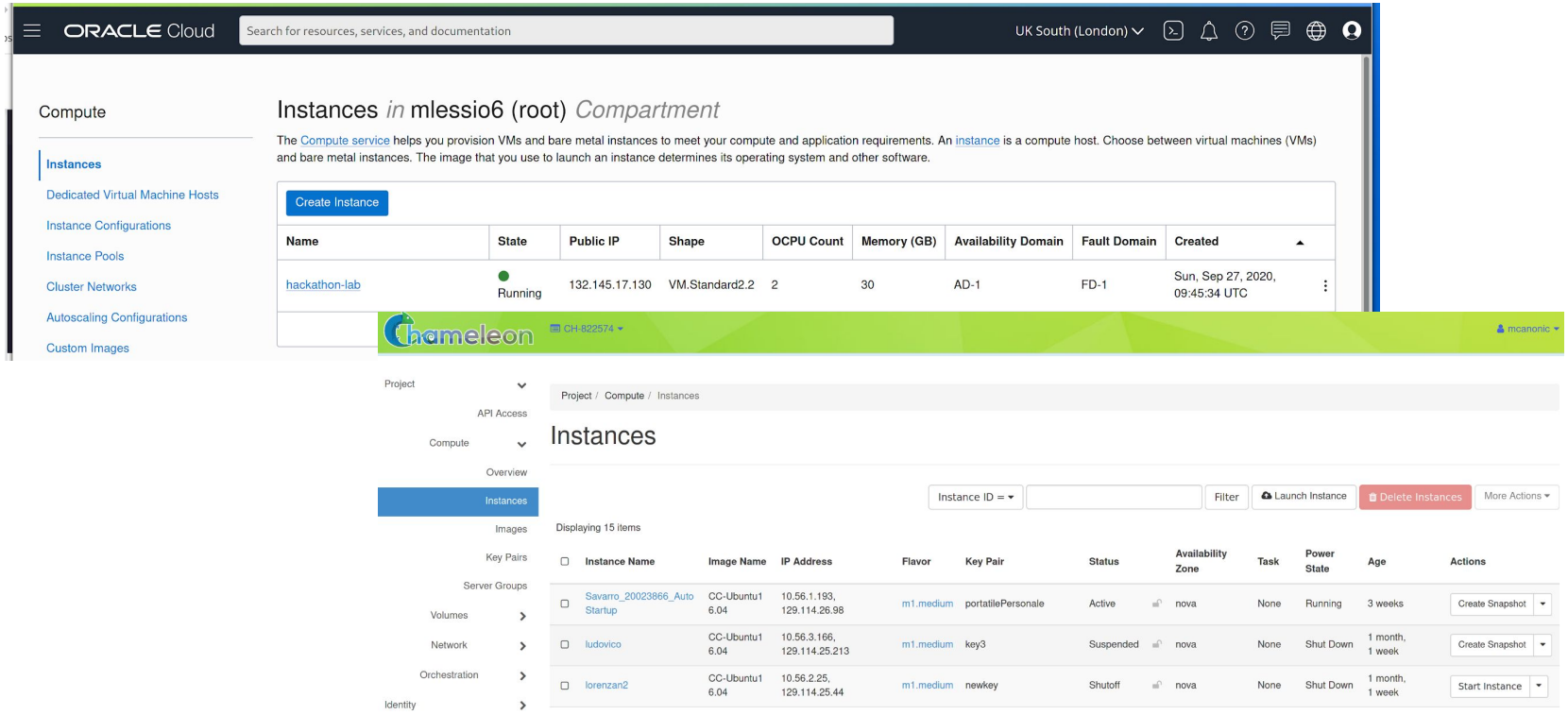
Features to compare (cont’d)

- Monitoring
  - With internal tool or external plug-in or program
- Multiple cloud
  - Offload processes to other private/public cloud
- Open Virtualization Format
  - Is it supported?
- Scaling
  - Is it possible to expand/shrink the resources automatically when needed?
- User management
  - Can user be managed and assign privileges to them. Is there a GUI?

Cloud platform architecture



Front-end user interface




(Less book author slides!)

Advantages of Cloud Computing

Elasticity

Cost savings

Reliability

Performance

Less on-prem

Disadvantages of Cloud Computing

Security / privacy concerns

Lock-in

Costs (and dealing with costs)

Expertise

Performance (?)

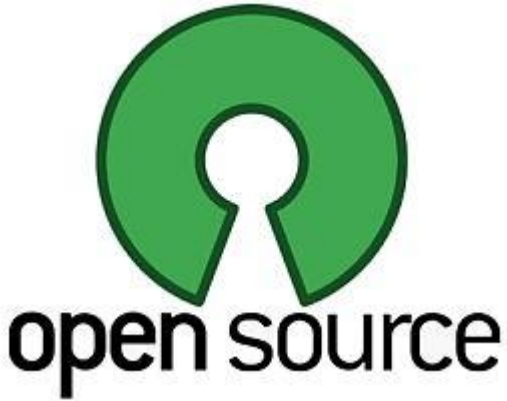
Organizational problems

Open source?

Clearly there are a lot of decent choices out there for $$

What about rolling your own?

- What are the considerations here?



OpenNebula

Open source cloud platform (i.e., install and manage yourself)

- https://opennebula.io/

https://www.youtube.com/watch?v=fMfUoG8JIjE
(marketing speak)

https://www.youtube.com/watch?v=AadOpQ-6nT
(video game server example)

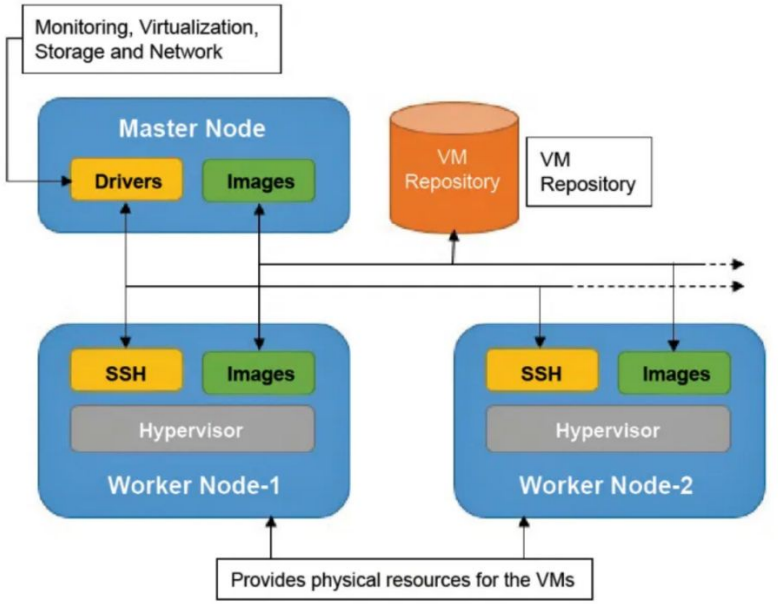


Figure 3.6: The OpenNebula Architecture

Let's do a Qwiklab!

Sorry, I mean a CloudSkillsBoost

Translate Text with the Cloud Translation API

https://www.cloudskillsboost.google/focuses/697?catalog_rank=%7B%22rank%22%3A40%2C%22num_filters%22%3A0%2C%22has_search%22%3Afalse%7D&parent=catalog

Translate Text with the Cloud Translation API

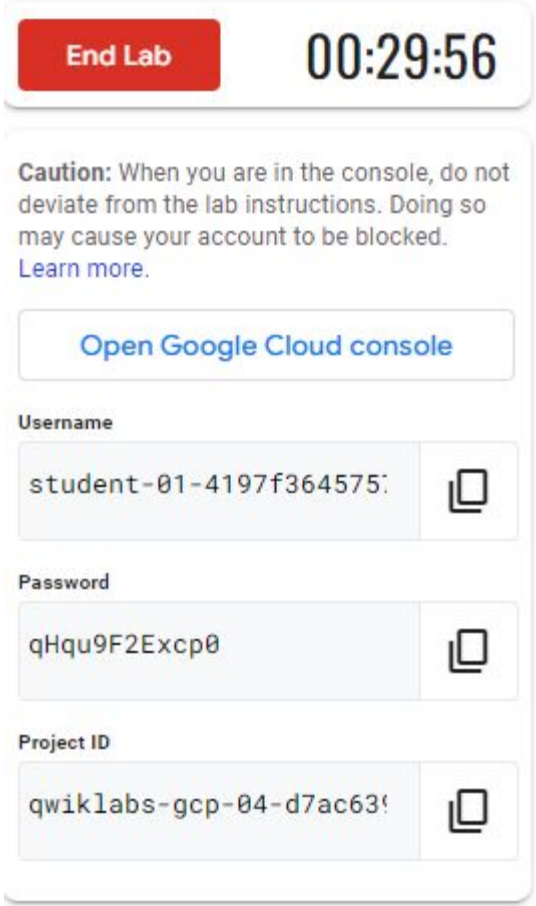
Lab 30 minutes 1 Credit Introductory

★★★★★

This lab may incorporate AI tools to support your learning.

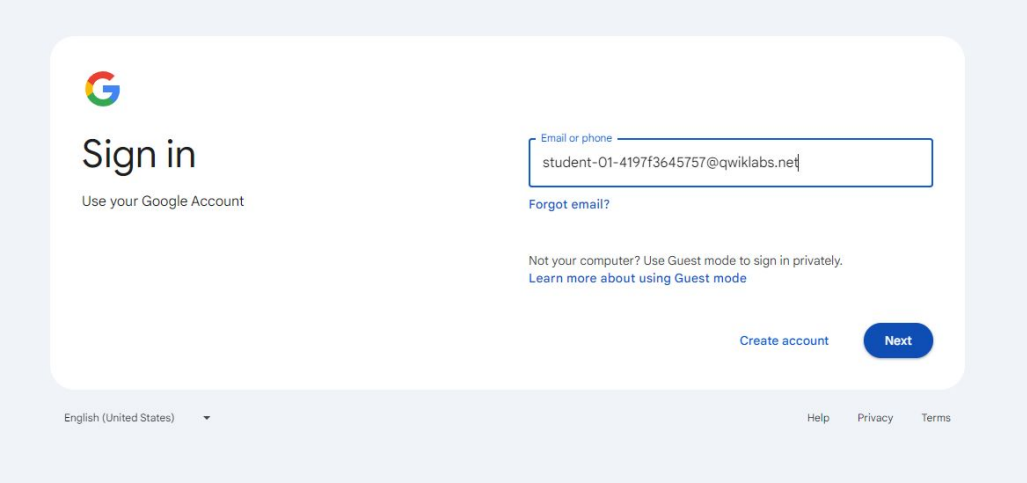
GSP049

Google Cloud Self-Paced Labs



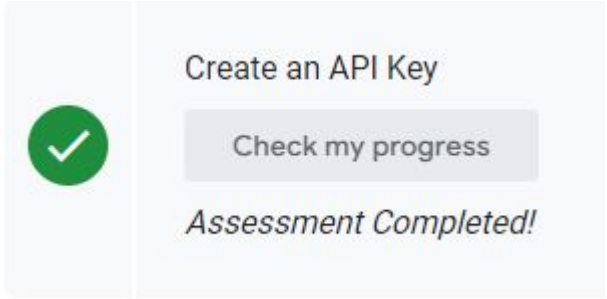
WARNING

- When you **always** get to this point, copy the 'Open Google Cloud console' link into an **INCOGNITO WINDOW**
  - You don't want these consuming your normal cloud credits!



Make sure you hit the objectives along the way

(Sometimes they take a minute or two to reflect if you did it correctly)



Upon completion, I will get a report from the admin panel, so if you didn't get it 100% ensure you either

1) Try again
2) Notify me something's broken (note - it usually isn't)

With the Cloud Skills Boost labs...

I recommend you actually type out the commands (where it makes sense) to help with muscle memory

- Otherwise, you're copy/pasting and just 'getting it done'
- Fine for the completion, but you learn nothing

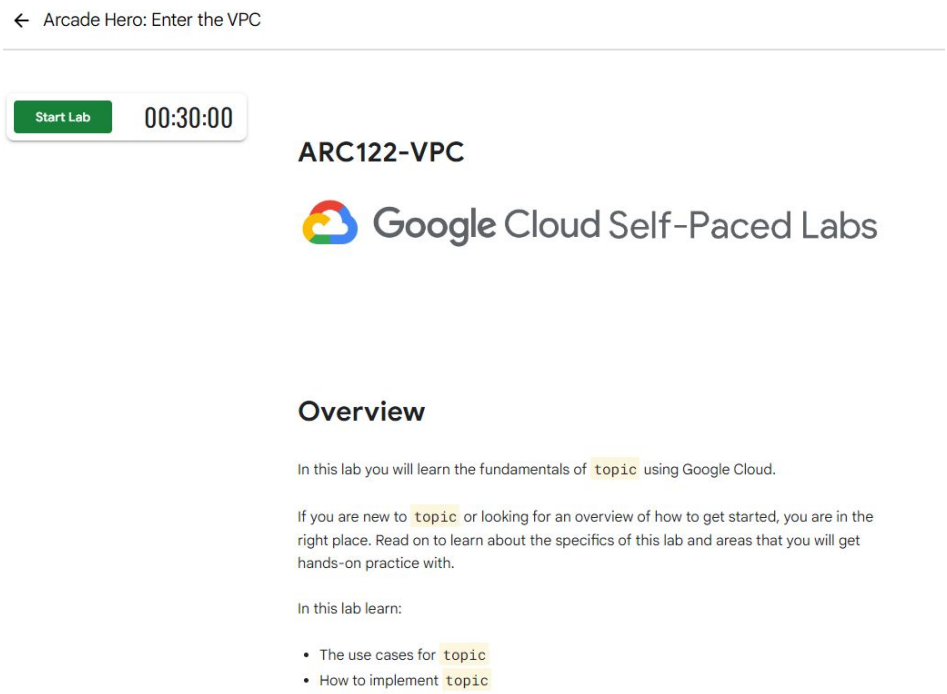
You are also welcome to do whatever labs you want that are available!

- Just ensure you don't burn through your credits, as there are labs I'll assign throughout the semester

If you decide to do the Arcade Hero labs

Yes they do work (I spent a half hour with their support)

- Once you click 'Start Lab' the "topic" fills in and you get a link to a Kanban board



And now, an *in-class assignment*!

(In Blackboard, but):

Select any Qwiklab (other than the one we did in class - Translate Text with the Cloud Translation API) and complete it.

For your submission, take a screenshot of your completed lab that includes both your completion score AND your profile visible (showing your name and picture) - click your profile icon for it to pop up.

You will be doing this for all completed labs here on out as well.