

Cloud Computing Cloud Platforms

CIS437

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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!

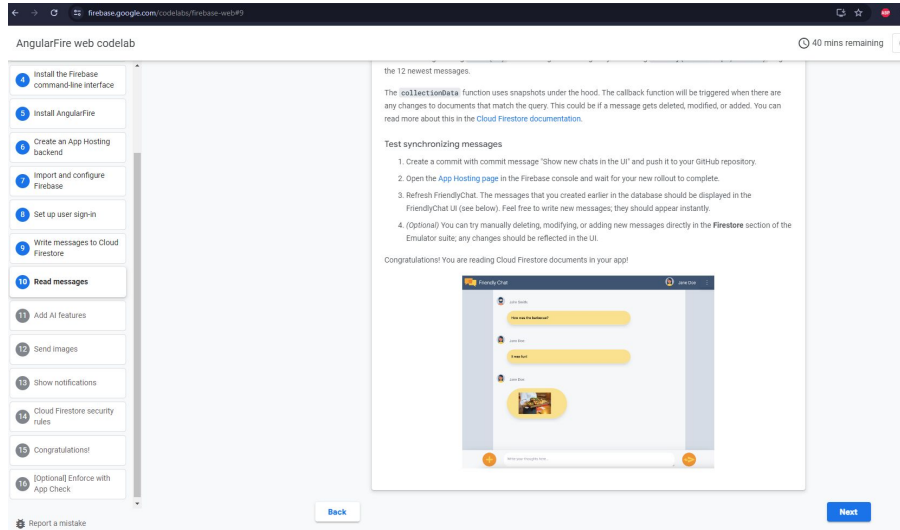
Codelabs

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*

The screenshot displays the Google Cloud Skills Boost interface. At the top, there's a navigation bar with the Google Cloud logo and links for Paths, Explore, Subscriptions, Dashboard, Paths, Explore, Profile, and Subscriptions. The main header reads "Google Cloud Skills Boost". Below this, a section titled "Discover Google Cloud training your way" features a "Learning Path" tab. A sidebar on the left lists various courses and labs, including "Develop Serverless Apps with Firebase" and "Deploy a Hugo Website with Cloud Build and Firebase Pipeline". The main content area shows the details for the selected lab, "Deploy a Hugo Website with Cloud Build and Firebase Pipeline", which is a 1-hour lab worth 5 credits. A "Start Lab" button is visible. On the right, a sidebar lists the lab's objectives and tasks, such as "Task 1. Manual deployment" and "Task 2. Automate the deployment".

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

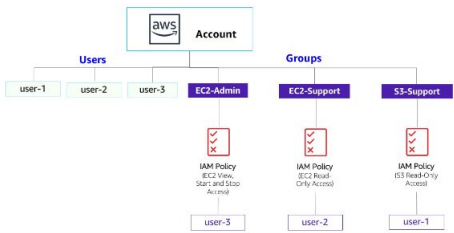
AWS Academy

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

After your credit, keep getting free services

Move to pay as you go for free monthly amounts of popular services for 12 months and 40+ other services always.

[See all free services](#)

12 MONTHS



Azure Virtual Machines—Linux
750 hours B1s
burstable virtual machines

12 MONTHS



Azure Virtual Machines—Windows
750 hours B1s
burstable virtual machines

12 MONTHS



Azure SQL Database
250 GB 50 instance
with 10 database
transaction units

12 MONTHS



Azure Blob Storage
5 GB locally redundant
storage (LRS) hot block
with 20,000 read and
10,000 write operations

ALWAYS



Azure Cosmos DB
1,000 request units
per-second
provisioned
throughput with 25 GB
storage

ALWAYS



Azure App Service
10 web, mobile, or API
apps with 1 GB storage

ALWAYS



Azure Functions
1 million requests

ALWAYS



Azure Event Grid
100,000 operations per
month



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.



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...

Cloud 66 101

How to claim your free \$300 credit from Google Cloud

After your credit, keep getting free services
Move to pay as you go for free monthly amount of popular services for 12 months and 40% off other services always.

[See all free services](#)

12 MONTHS AWS Virtual Machine—Linux 750 hours \$10, burstable virtual machines	12 MONTHS AWS Virtual Machine—Windows 750 hours \$10, burstable virtual machines	12 MONTHS AWS SQL Database 250 GB \$1 instance with 10 database transaction units	12 MONTHS AWS S3 Storage 5 GB locally redundant storage (S3) for S3 with 20,000 read and 10,000 write operations
ALWAYS AWS ElastiCache DB 1,000 request units per second provisioned throughput with 25 GB storage	ALWAYS AWS App Service 10 web, mobile, or API apps with 1 GB storage	ALWAYS AWS Lambda 1 million requests	ALWAYS AWS Event Console 100,000 operations per month



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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.



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[Apply for \\$300 AWS Credit](#)

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...

hooray!



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 VMs** 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

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

Source:

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

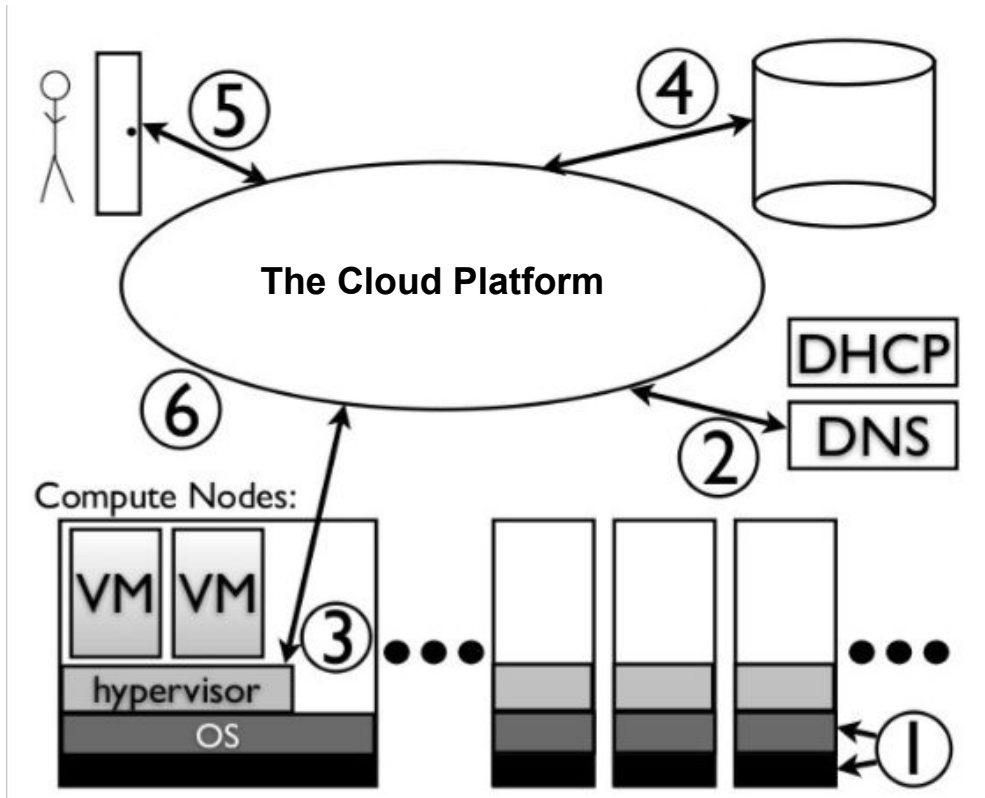
Features to compare

- 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

The screenshot displays the Oracle Cloud web interface. At the top, the Oracle Cloud logo is on the left, and a search bar is in the center. On the right, the region is set to 'UK South (London)' with various utility icons. The left sidebar contains a 'Compute' section with a list of links: 'Instances' (highlighted), 'Dedicated Virtual Machine Hosts', 'Instance Configurations', 'Instance Pools', 'Cluster Networks', 'Autoscaling Configurations', and 'Custom Images'. The main content area is titled 'Instances in mlessio6 (root) Compartment'. Below the title is a descriptive paragraph about compute services. A 'Create Instance' button is visible. A table lists instances, with one instance 'hackathon-lab' in a 'Running' state. Below the table is a 'Chameleon' banner. At the bottom, a secondary navigation pane shows a breadcrumb 'Project / Compute / Instances' and a list of navigation items: 'Project', 'API Access', 'Compute' (selected), 'Overview', 'Instances' (highlighted), 'Images', 'Key Pairs', 'Server Groups', 'Volumes', 'Network', 'Orchestration', and 'Identity'. The 'Instances' section includes a filter bar with 'Instance ID', a 'Filter' button, and action buttons for 'Launch Instance', 'Delete Instances', and 'More Actions'. Below this is a table of 15 items, showing details for three instances: 'Savarro_20023866_Auto Startup', 'ludovico', and 'lorenzani2'.

Compute

Instances

Dedicated Virtual Machine Hosts

Instance Configurations

Instance Pools

Cluster Networks

Autoscaling Configurations

Custom Images

Create Instance

Name	State	Public IP	Shape	OCPU Count	Memory (GB)	Availability Domain	Fault Domain	Created
hackathon-lab	Running	132.145.17.130	VM.Standard2.2	2	30	AD-1	FD-1	Sun, Sep 27, 2020, 09:45:34 UTC

Chameleon CH-822574

Project

API Access

Compute

Overview

Instances

Images

Key Pairs

Server Groups

Volumes

Network

Orchestration

Identity

Project / Compute / Instances

Instances

Instance ID = Filter [Launch Instance](#) [Delete Instances](#) [More Actions](#)

Displaying 15 items

<input type="checkbox"/>	Instance Name	Image Name	IP Address	Flavor	Key Pair	Status	Availability Zone	Task	Power State	Age	Actions
<input type="checkbox"/>	Savarro_20023866_Auto Startup	CC-Ubuntu1 6.04	10.56.1.193, 129.114.26.98	m1.medium	portatilePersonale	Active	nova	None	Running	3 weeks	Create Snapshot
<input type="checkbox"/>	ludovico	CC-Ubuntu1 6.04	10.56.3.166, 129.114.25.213	m1.medium	key3	Suspended	nova	None	Shut Down	1 month, 1 week	Create Snapshot
<input type="checkbox"/>	lorenzani2	CC-Ubuntu1 6.04	10.56.2.25, 129.114.25.44	m1.medium	newkey	Shutoff	nova	None	Shut Down	1 month, 1 week	Start Instance

(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

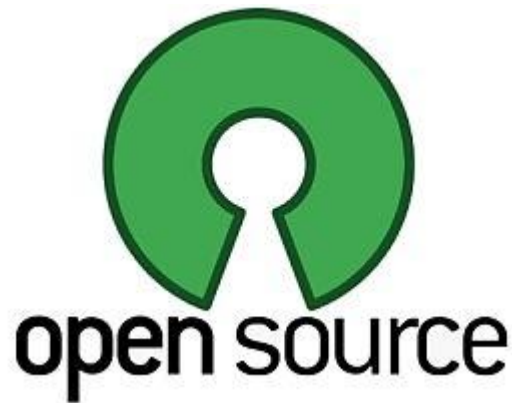


Open source?

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=fMfUoG8JljE>
(marketing speak)

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

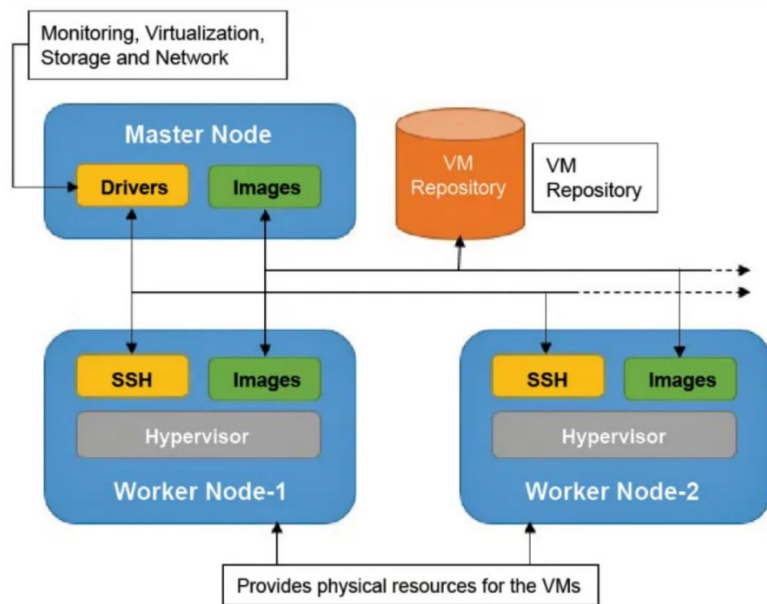


Figure 3.6: The OpenNebula Architecture

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

End Lab

00:29:56

Caution: When you are in the console, do not deviate from the lab instructions. Doing so may cause your account to be blocked.

[Learn more.](#)

[Open Google Cloud console](#)

Username

student-01-4197f3645757



Password

qHqu9F2Excp0



Project ID

qwiklabs-gcp-04-d7ac63f



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!



Sign in

Use your Google Account

Email or phone

student-01-4197f3645757@qwiklabs.net

[Forgot email?](#)

Not your computer? Use Guest mode to sign in privately.
[Learn more about using Guest mode](#)

[Create account](#)

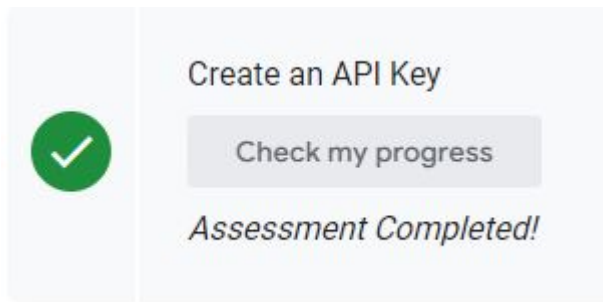
[Next](#)

English (United States) ▼

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

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

(From a random gamedev tutorial I was doing)

https://kidscancode.org/godot_recipes/4.x/games/first_2d/first_2d_end/index.html

The secret to learning effectively

Here's my big secret for getting the most out of tutorials like this and others you may find online. At the end, once you've finished building the project, immediately delete it and start over. This time, try and re-create it without looking at the tutorial. If you get stuck, look at *just* that part, then close it again.

It may sound repetitive, but that is how we learn: by doing things repeatedly. If you follow this tip, you'll be amazed at how quickly you level up your gamedev skills.

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

← Arcade Hero: Enter the VPC

Start Lab 00:30:00

ARC122-VPC



Google Cloud Self-Paced Labs

Overview

In this lab you will learn the fundamentals of **topic** using Google Cloud.

If you are new to **topic** or looking for an overview of how to get started, you are in the right place. Read on to learn about the specifics of this lab and areas that you will get hands-on practice with.

In this lab learn:

- The use cases for **topic**
- How to implement **topic**

And now, an *in-class assignment*!

(In Blackboard, but):

(note - this was not assigned - don't worry about it until a future date)

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.