

## Cloud Computing Cloud Shell

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



## The shell



(AWS CloudShell is quite similar)

(Microsoft? Also has a shell)

- → Currently PowerShell though
  - → Planning on being a sysadmin? LEARN POWERSHELL
    - → It's pretty good!

#### Features: https://cloud.google.com/shell/



Ephemeral mode - 1-off sessions

## For Google

Shell is a Linux environment that can control pretty much **all** (Google) services (Same applies to AWS, but not the Google part)

Also, nicely just highlighting something auto-copies it to your clipboard

## One thing to keep in mind

We're going to be playing with a handful of different Google Cloud products here

- Most of which we'll be covering in depth later
- So don't get too flustered if you don't "understand" what it is yet
  - That comes later



## There are four ways to interact with Google Cloud





## Example 1: Basic usage

File management (i.e., common commands)

- **move file**: mv file1 file2
- **copy file**: cp file1 file2
- copy directory: cp -r dir1 dest\_directory
- delete file: rm file
- **delete directory**: rm -rf dir1

#### Git

- **clone**: git clone <repository url>

Effective June 17, 2024, Cloud Source Repositories isn't available to new customers. If your organization hasn't previously used Cloud Source Repositories, you can't enable the API or use Cloud Source Repositories. New projects not connected to an organization can't enable the Cloud Source Repositories API. Organizations that have used Cloud Source Repositories prior to June 17, 2024 are not affected by this charge.

Cloud Source Repositories documentation

View all product documentation



- (If managing git in the Cloud Shell then all your common commands work)
  - (There's also a Cloud Source Repositories that seems to be being actively deprecated)

## Common GCP commands

Setting environment variables (not strictly GCP, but you'll do it a lot) \$ myvar="HELLO THERE" \$ echo \$myvar

**Setting region** 

\$ gcloud config set compute/region us-east1

Setting project IDs \$ gcloud config set project PROJECT\_ID

...essentially everything is wrapped around the gcloud command

- Use gcloud --help to learn more
  - e.g., gcloud config --help to learn about the config parameter

## Common issues from IC2

1) Didn't authenticate somehow (not sure how this happened as you are already logged in, but)

gcloud init

2) Wrong project ID

gcloud config set project <ID>

## Example 2: Creating a VM

Many different ways to configure a VM

- Manual, from a template, cloning, etc.

We'll use a publicly available image for the purposes of this demo

- Just know that you can configure everything to your heart's content



https://cloud.google.com/compute/docs/instances/cr

eate-start-instance#gcloud

\$ gcloud compute images list

NAME: ubuntu-2204-jammy-v20240801 PROJECT: ubuntu-os-cloud FAMILY: ubuntu-2204-lts DEPRECATED: STATUS: READY

Then, let's look at a bit more

\$ gcloud compute images describe ubuntu-2204-jammy-v20240801
--project ubuntu-os-cloud

erik fredericks@cloudshell:~ (cloud-apps-demos-w24) \$ gcloud compute images describe ubuntu-2204-jammy-v20240801 --project ubuntu-os-cloud architecture: X86 64 archiveSizeBytes: '3287029440' creationTimestamp: '2024-07-31T22:16:10.913-07:00' description: Canonical, Ubuntu, 22.04 LTS, amd64 jammy image built on 2024-08-01 diskSizeGb: '10' enableConfidentialCompute: false family: ubuntu-2204-lts guestOsFeatures: - type: VIRTIO SCSI MULTIQUEUE - type: SEV CAPABLE - type: SEV SNP CAPABLE type: SEV LIVE MIGRATABLE - type: SEV LIVE MIGRATABLE V2 - type: IDPF - type: UEFI COMPATIBLE - type: GVNIC id: '6773999173680669941' kind: compute#image labelFingerprint: 42WmSpB8rSM= licenseCodes: - '5511465778777431107' licenses: https://www.googleapis.com/compute/v1/projects/ubuntu-os-cloud/global/licenses/ubuntu-2204-lts name: ubuntu-2204-jammy-v20240801 rawDisk: containerType: TAR source: " selfLink: https://www.googleapis.com/compute/v1/projects/ubuntu-os-cloud/global/images/ubuntu-2204-jammy-v20240801 shieldedInstanceInitialState: dbxs: 

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## Also need the zone and machine type

First, what zones are there?

\$ gcloud compute zones list

And what machine types in that zone?

\$ gcloud compute machine-types list --zones us-east5-a

Let's go e2-medium

## Now let's create it

```
$ gcloud compute instances create VM_NAME \
    --zone=ZONE \
    [--image=IMAGE | --image-family=IMAGE_FAMILY] \
    --image-project=IMAGE_PROJECT \
    --machine-type=MACHINE_TYPE
```

#### i.e.,

\$ gcloud compute instances create ubuntu-test-vm \

- --zone=us-east5-a \
- --image-family=ubuntu-2204-lts \
- --image-project=ubuntu-os-cloud \
- --machine-type=e2-medium

## And...

Created [https://www.googleapis.com/compute/v1/projects/cloud-apps-demos-w24/zones/us-east5-a/instances/ubuntu-test-vm]. NAME: ubuntu-test-vm ZONE: us-east5-a MACHINE TYPE: e2-medium PREEMPTIBLE: INTERNAL\_IP: 10.202.0.2 EXTERNAL\_IP: 34.162.203.115 STATUS: RUNNING

#### VM instances

**Filter** Enter property name or value

Status	Name 个	Zone	Recommendations	In use by	Internal IP	External IP	Connec	t	
0	cis655-microinstance-1	us-east1-b	-		10.142.0.2 ( <u>nic0</u> )		SSH	•	÷
0	ubuntu-test-vm	us-east5-a	-		10.202. <mark>0.2 (nic0</mark> )	34.162.203.115 ( <u>nic0</u> )	SSH	-	:

## Neat, HOWEVER

Your VM is now running



#### MEANING IT IS CONSUMING RESOURCES

 Always shut your (non free-tier) VMs off when done, otherwise they'll eat up your available credits Monthly estimate

\$25.46

That's about \$0.03 hourly

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

Item	Monthly estimate
2 vCPU + 4 GB memory	\$24.46
10 GB balanced persistent disk	\$1.00
Total	\$25.46

Compute Engine pricing 🛽

∧ LESS

## But wait

We don't need this pesky thing anymore!

Connect SSH -



We have the Cloud Shell

\$ gcloud compute ssh <vm> --zone=<zone>

also! allows for tab completion!

## Cloud ... Code Editor

(this is new to me - not sure how long it has been added)

- double note - you'll see this quite often as all cloud providers like to change their interface at what feels like a daily rate

Essentially, VSCode in the cloud

Can hook nicely into your cloud apps if you'd like

https://cloud.google.com/shell/docs/launching-cloud-shell-editor

>	Cloud Shell Editor	🔁 🖬 🖾 🖬 🚱	Tutorial		
=	B Welcome X	□ …	Creating and deploying a Cloud Run service		
Ċ			Set up a Hello World service, deploy it to Cloud Run, and view the status of your service's resources.		
Q ₽ ₽	Start Copen Home Directory H New File Copen File Copen File	Set Started with Code OSS for the Web         Customize your editor, learn the basics, and start coding         Customize Cloud Code Sidebar New	This walkthrough shows you how to work in Cloud Shell Edi You can use a similar process if you use the Cloud Code extension in your IDE. Pick your preferred language to get started. Language options So Go		
:>	Recent	Gemini Code Assist New	Tutorial Create and deploy a Go Cloud Run service		
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	Show welcome pa	ige on startup	Create and deploy a Python Cloud Run service		
	PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL <pre>oerik_fredericks@cloudshell:~\$ ]</pre>		S Java Tutorial Create and deploy a Java Cloud Run service		
			S .NET Tutorial Create and deploy a .NET Cloud Run service		

## Local tools (!!)

Can install in a local environment as well

https://cloud.google.com/shell/docs/using-cloud-shell-with-gcloud-cli

(Note - comes pre-installed in Compute Engine instances)

(Installation instructions directly) <u>https://cloud.google.com/sdk/docs/install#deb</u>

## Authorization flows (outside of Cloud Shell)

This leads us to the topic of authorization

- You don't want just anybody able to remote in and run commands, right?

#### When running \$ gcloud init:

```
Welcometop:~$ gcloud init
Welcome! This command will take you through the configuration of gcloud.
Your current configuration has been set to: [default]
You can skip diagnostics next time by using the following flag: gcloud init ---skip-diagnostics
Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).
You must sign in to continue. Would you like to sign in (Y/n)?
```

## 0

## Google Cloud SDK wants to access your Google Account

#### erik.fredericks@gmail.com

#### This will allow Google Cloud SDK to:

- See, edit, configure, and delete your Google Cloud
   data and see the email address for your Google
   Account.
- View and sign in to your Google Cloud SQL instances (i)
- View and manage your Google Compute Engine
   resources
- View and manage your applications deployed on
   Google App Engine

#### Make sure you trust Google Cloud SDK

You may be sharing sensitive info with this site or app. Learn about how Google Cloud SDK will handle your data by reviewing its terms of service and privacy policies. You can always see or remove access in your Google Account.

#### Learn about the risks

## Let's try that last one again, but *locally*

\$ gcloud compute instances create ubuntu-test-vm-local \

- --zone=us-east5-a \
- --image-family=ubuntu-2204-lts \
- --image-project=ubuntu-os-cloud \
- --machine-type=e2-medium

You may need other libraries to get going (e.g., AppEngine specific)



VIE)

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## Example 3: Creating and filling a Bucket

What is a bucket?

- Place to store files!

Naturally could do this through the Console, but let's try in the shell

\$ gcloud storage buckets create gs://BUCKET\_NAME
--location=BUCKET\_LOCATION

SO...

gcloud storage buckets create gs://fredericks-test-bucket
--location=us-east1

Bucket name must be **globally** unique

## Adding to the bucket

Let's grab a file first

Naturally...

\$ wget https://gifdb.com/images/high/obi-wan-kenobi-well-hello-there-hzgu i7yr5ketac2c.gif

Then to make life easier \$ mv obi-wan-kenobi-well-hello-there-hzgui7yr5ketac2c.gif hello.gif

## Uploading

\$ gcloud storage cp OBJECT\_LOCATION gs://DESTINATION\_BUCKET\_NAME
ergo

\$ gcloud storage cp hello.gif gs://fredericks-test-bucket

## Example 4: RESCUING AN SSH SESSION

One of the most common problems you'll have with VMs (i.e., Compute Engine)

How does this happen?

- 1) You create a VM
- 2) You connect to the VM and spend a *lot* of time getting it just so
- 3) You enable the firewall
- 4) You close the SSH session
- 5)

...

- 6) You re-open the SSH session?
  - a) You re-open the SSH session?



# Weirdly, the video I've posted for CIS655 that has the most comments from people around the world

Not trying to flex, just weird getting YT notifications for class material

Highligh	ted comment
	@TejasPaliya 1 month ago
	thanks bro. you are a lifesaver
	ti y ∨ Reply
1	It's always the accounts with small subscribers that usually have the solutions to problems. Thank you Lrik, solved a problem of over 2 months, I just used to create a new virtual machine.
	凸 2 🖓 💊 Reply
	V 🕐 • 2 replies
	@annanevesdevops 4 months ago
1.1	you have no idea how you saved me m, thank you!
	n/h 与J 🔥 Reply
N	@noor-ul-qumar3078 3 months ago
N	thanks a lot, very helpful, keep going, best of luck
	A CI CO Benly
	@GizmoHev 1 month ago
	Thank you so much you're a life saver
	tr v ∧ Reply
M	generation of financia ago
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9	@SameerPanda006 1 year ago
	It worked for me. Great Job!
	rf5 🖓 🐁 Reply
	V 🚱 • Treply
N	@inarehorikumar3547 / U months ago
	ns worked periods y
	凸 ⑦ 💊 Reply

# Anyway, what we need to do is enable the serial console

(This is assuming you made a Debian-flavored server and can use the ufw command - you'd have to use whichever firewall you enabled for other server OSs)

- 1. Shut the machine off
- 2. Edit it and click the checkbox for remote access via the serial console
- 3. Add the bash script mentioned in the link above, replacing USERNAME with your Google Cloud username and password with a temporary one
- 4. Save it, turn on your machine, connect via serial console, login with the username/pw you just added
- 5. sudo ufw allow 22
- 6. Shut off, edit machine again, disable serial and remove bash script, done

## What just happened?

We connected via serial

- Pretend we plugged in a keyboard instead of remoted in



We used our local account with a temporary password to access the VM

We opened the SSH port (22) so that it wasn't blocked

Then, we cleaned up after ourselves so that there aren't any dangling login methods others can exploit

### Welcome to App Engine

Build scalable apps in any language on Google's infrastructure

## Deploying an App Engine .... app

## ONE THING TO KEEP IN MIND THAT \*CAN\* BE THE MOST FRUSTRATING THING IN THE WORLD WITH APP ENGINE

- Once you enable App Engine on a project, it **cannot** be deleted **or** disabled
  - (Unless if this has been changed, but for the past 5 years you can't)
- Meaning, you have to **delete the project** if you don't want it active anymore

# So first, let's try to be smart about this since we know we'll be deleting it anyway



## So first, let's try to be smart about this since we know we'll be deleting it anyway

≡ Google Cloud	
New Project	
Project name * cloudshell-appengine-test	
Project ID: composite-bruin-431819-a0. It cannot be changed later. EDIT	
Location * BROWSE BROWSE	
Parent organization or folder	But we still have to deal with this!
CREATE CANCEL	
CLOUD SHELL Terminal (cloud-apps-demos-w24) × + •	erik_fredericks@cloudshell:~ (cloud-apps-demos-w24) \$

gcloud config set project <project id>

## Anyway, here's the deployment

https://cloud.google.com/shell/docs/deploy-app-engine-app BROKEN!

https://codelabs.developers.google.com/codelabs/cloud-app-engine-python3

We'll step through it together...

(After we get to the code, move on to the next slide because we have **EXTRA CONTENT TO SEE**)

## Testing!

Prior to deploying to App Engine, we can test it locally

First, install the Python libraries

- A better Python program would do this in a virtual environment...
- python3 -m pip install -r requirements.txt

And then run the program

- python3 main.py

And then open the proxied debug view



## Permissions error

If we see this:

ERROR: (gcloud.app.deploy) Permissions error fetching application [apps/cloudshell-appengine-test]. Please make sure that you have permission to view applications on the project and that <email> has the App Engine Deployer (roles/appengine.deployer) role

Then go to Cloud Build and enable it



## Cloud Build API

Google Enterprise API

Continuously build, test, and deploy.



## Permissions error

If we see this:

ERROR: (gcloud.app.deploy) Permissions error fetching application [apps/cloudshell-appengine-test]. Please make sure that you have permission to view applications on the project and that <email> has the App Engine Deployer (roles/appengine.deployer) role

Then go to IAM and give yourself the App Engine Deployer role

 If that doesn't work, try App Engine Admin



## End result



So what do we have here?

- A Flask application running on the cloud
  - Could become anything! But, you now have a backend server that can do all kinds of incredible things
- Anything supported by App Engine can be hosted here!
  - Per usual though, check the \$\$ guide

Delete the project when done! You don't want bots hitting that URL! ...why?

## Updating!

We have a neat thing in a bucket somewhere...

Update the HTML page:

- Grab the URL to the GIF and paste into the HTML

<img src="link\_to\_gif.gif" />

Redeploy app

\$ gcloud app deploy --quiet

## But wait...

Didn't work?

What's wrong?

## Permissions!

#### Need to be very careful with this

- Public access means anybody/thing can access
- What happens if somebody bots your site?
  - \$\$\$

But, assume we have the cash to support it, let's make it public

- Alternatively, you can grant fine-grained access to whatever cloud product needs the file

https://cloud.google.com/storage/docs/access-control/making-data-public

\$ gcloud storage objects update gs://BUCKET\_NAME/OBJECT\_NAME
--add-acl-grant=entity=AllUsers,role=READER

## Ok...

Short little bit of teamwork - think for ~5 minutes and then I'll ask teams to share...

Assume we have the following **two** use cases:

- 1) I need your teams to host a **static HTML** web application for our small family-based business
  - a) What product/tools would you use?
  - b) What concerns do you have?
- 2) I need your teams to build a mobile application that can serve customers in our different world-wide regions (e.g., North America, Europe, Asia, etc.)
  - a) What product/tools would you use?
  - b) What concerns do you have?