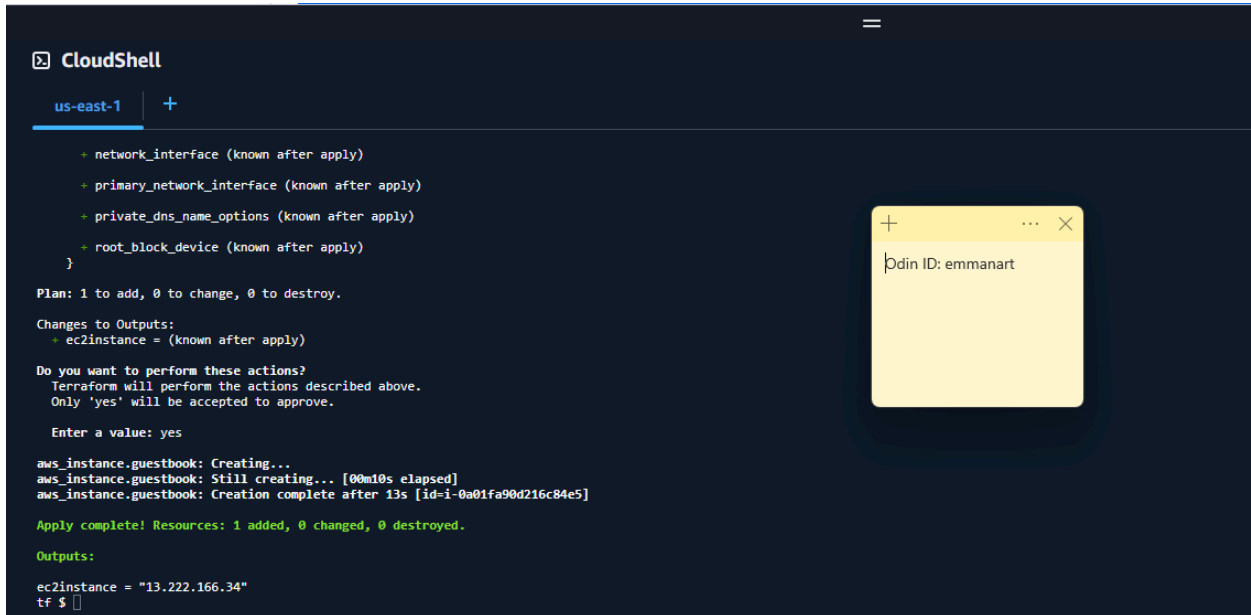


## Lab 7.1 a

- Take a screenshot showing the completion of the command including its output



```
CloudShell
us-east-1 +

+ network_interface (known after apply)
+ primary_network_interface (known after apply)
+ private_dns_name_options (known after apply)
+ root_block_device (known after apply)
}

Plan: 1 to add, 0 to change, 0 to destroy.

Changes to Outputs:
+ ec2instance = (known after apply)

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

aws_instance.guestbook: Creating...
aws_instance.guestbook: Still creating... [00m10s elapsed]
aws_instance.guestbook: Creation complete after 13s [id=i-0a01fa90d216c84e5]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

Outputs:

ec2instance = "13.222.166.34"
tf $
```

- Take a screenshot that includes the VM's IP addresses

The screenshot shows the AWS Management Console for an EC2 instance named `i-0a01fa90d216c84e5`. The instance is in the `us-east-1` region. The instance summary shows the following details:

- Instance ID: `i-0a01fa90d216c84e5`
- Public IPv4 address: `13.222.166.34` (highlighted with a yellow circle and a link to `open address`)
- Instance state: `Running`
- Private IPv4 addresses: `172.31.29.250`
- Public DNS: `ec2-13-222-166-34.compute-1.amazonaws.com` (with a link to `open address`)
- Private IP DNS name (IPv4 only): `ip-172-31-29-250.ec2.internal`

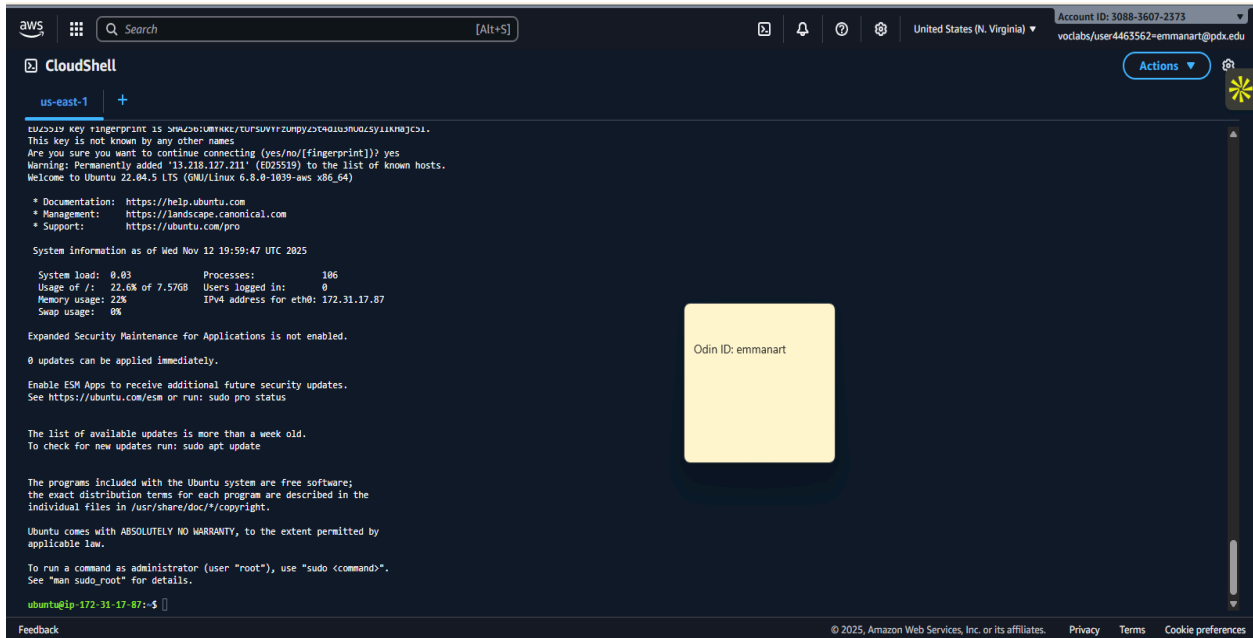
Below the instance summary, the CloudShell terminal shows the output of the `tf state show` command, which displays the instance's public IP address: `ec2instance = "13.222.166.34"`. A yellow sticky note with the text `ipin ID: emmanart` is placed over the terminal output.

- Take a screenshot of the successful ssh login from Cloud Shell.

The screenshot shows the AWS CloudShell terminal with the output of the `tf state show` command. The terminal output includes the following information:

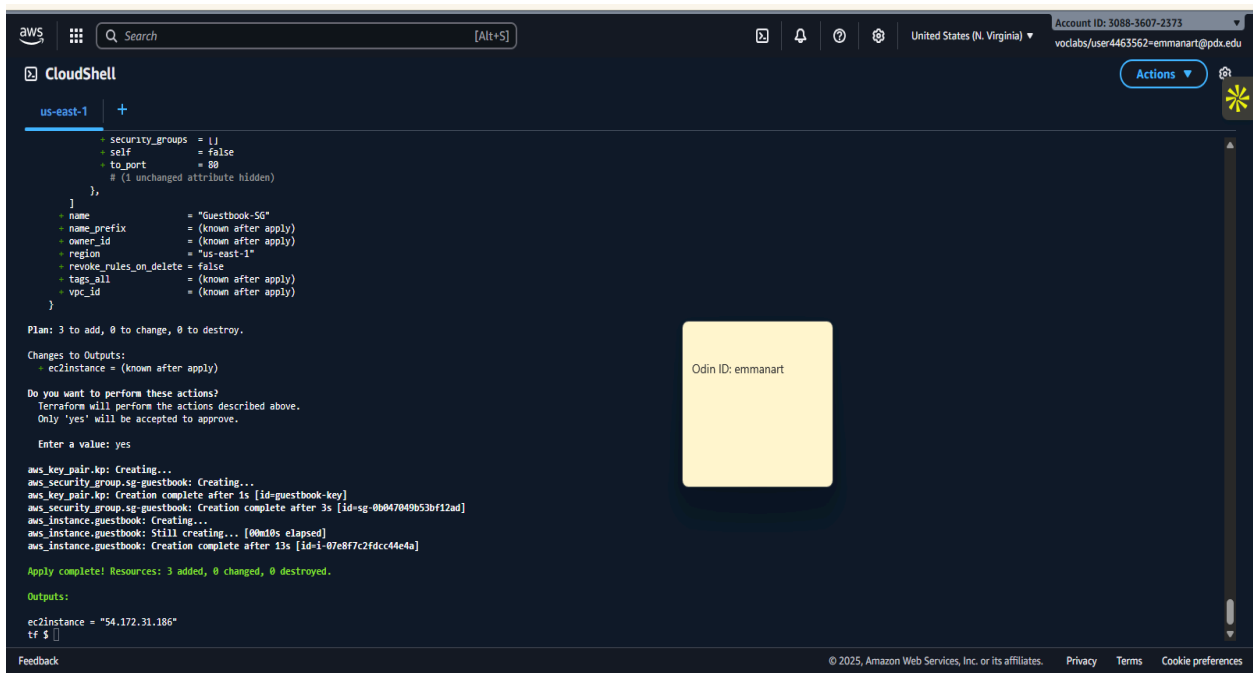
- Instance ID: `i-0a01fa90d216c84e5`
- Public IPv4 address: `13.222.166.34`
- Instance state: `Running`
- Private IPv4 addresses: `172.31.29.250`
- Public DNS: `ec2-13-222-166-34.compute-1.amazonaws.com`
- Private IP DNS name (IPv4 only): `ip-172-31-29-250.ec2.internal`

The terminal also shows the output of the `ssh` command, which displays the SSH key fingerprint and the warning: `Warning: Permanently added '13.222.166.34' (EC2) to the list of known hosts.` A yellow sticky note with the text `ipin ID: emmanart` is placed over the terminal output.



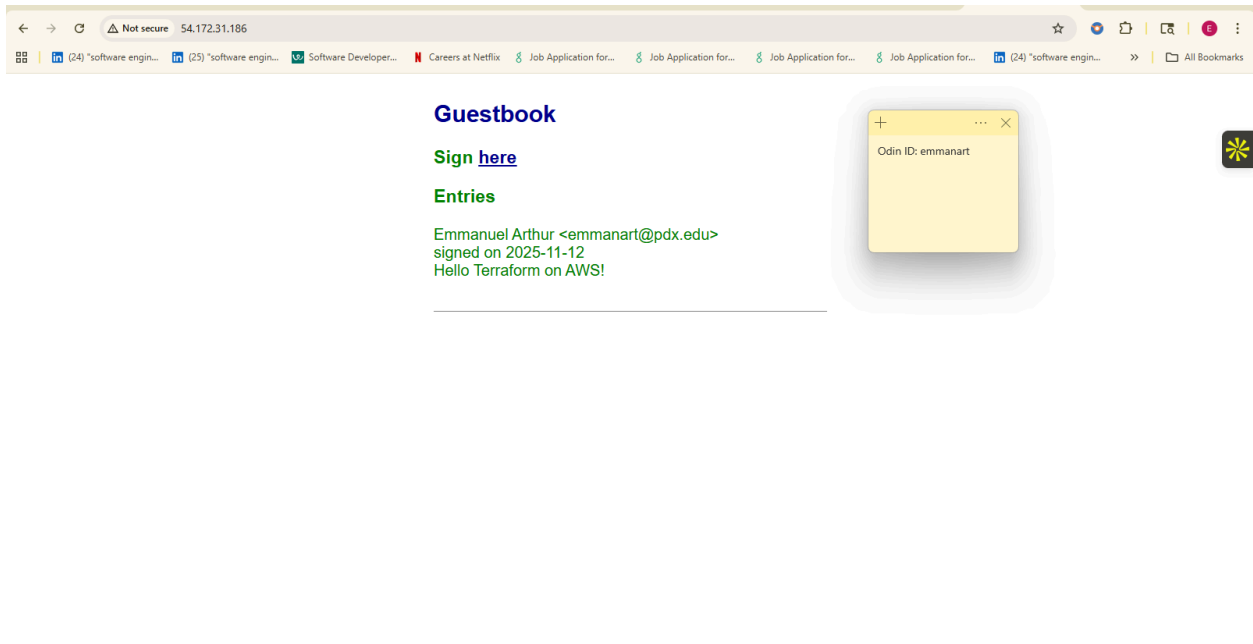
The screenshot shows the AWS CloudShell interface with a terminal window. The terminal output displays the Ubuntu 22.04.5 LTS boot sequence, including the fingerprint warning, system information (System load: 0.03, Processes: 106, Memory usage: 22%), and the prompt 'ubuntu@ip-172-31-17-87:~\$'. A yellow sticky note with the text 'Odin ID: emmanart' is placed over the terminal output.

- Take a screenshot of the output of the command that includes the IP address of the instance

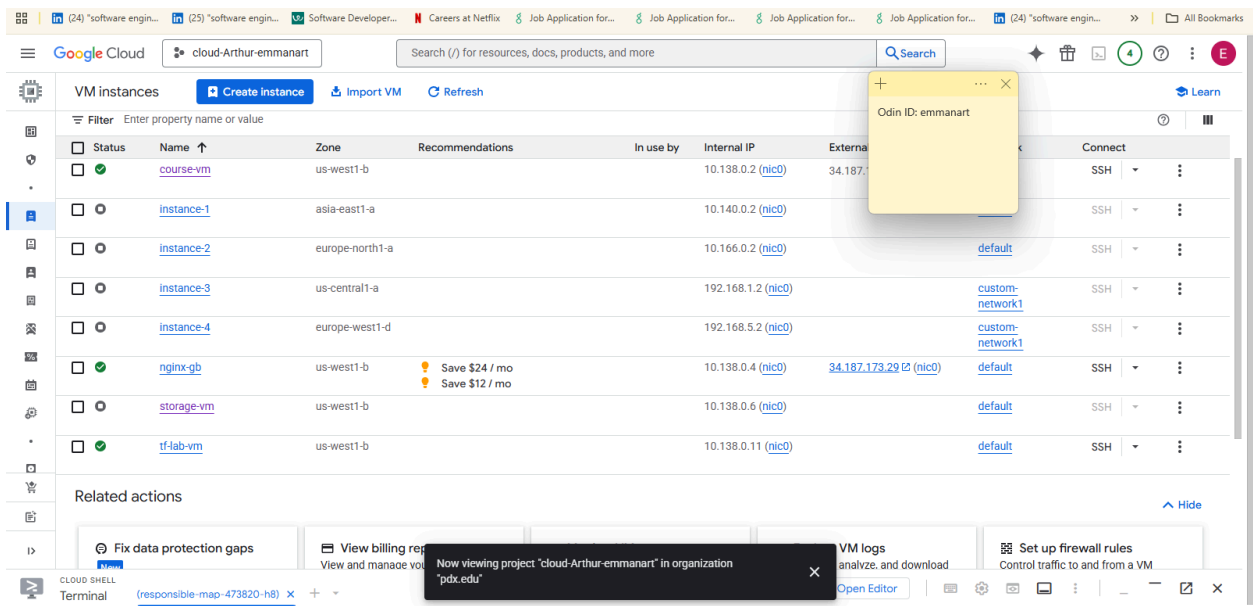


The screenshot shows the AWS CloudShell interface with a terminal window. The terminal output displays the Terraform plan and apply results for creating an EC2 instance. The plan shows the creation of an EC2 instance with the name 'Guestbook-SG'. The apply output shows the successful creation of the instance, with the IP address '54.172.31.186' displayed. A yellow sticky note with the text 'Odin ID: emmanart' is placed over the terminal output.

- Take a screenshot of the Guestbook including the URL with the entry in it.



- Take a screenshot that includes the VM's IP addresses



- Take a screenshot showing the completion of the command including its output

The screenshot shows the Cloud Shell Editor interface. At the top, there's a menu bar with File, Edit, Selection, View, Go, Run, Terminal, and Help. Below it is a toolbar with icons for Explorer, Run, and Terminal. The main area displays the output of a Terraform command. A yellow sticky note with the text "Odin ID: emmanart" is placed over the top right corner of the terminal window.

```
access_config {
  nat_ip = (known after apply)
}
# (3 unchanged blocks hidden)

Plan: 1 to add, 1 to change, 0 to destroy.

Changes to Outputs:
  ip = (known after apply)

Do you want to perform these actions?
Terraform will perform the actions described above.
Only 'yes' will be accepted to approve.

Enter a value: yes

google_compute_address.static: Creating...
google_compute_address.static: Still creating... [10s elapsed]
google_compute_address.static: Creation complete after 10s [id-projects/cloud-arthur-emmanart/regions/us-west1/addresses/ipv4-address]
google_compute_instance.default: Modifying... [id-projects/cloud-arthur-emmanart/zones/us-west1-b/instances/tf-lab-vm]
google_compute_instance.default: Still modifying... [id-projects/cloud-arthur-emmanart/zones/us-west1-b/instances/tf-lab-vm, 10s elapsed]
google_compute_instance.default: Modifications complete after 11s [id-projects/cloud-arthur-emmanart/zones/us-west1-b/instances/tf-lab-vm]

Apply complete! Resources: 1 added, 1 changed, 0 destroyed.

Outputs:
ip = "136.117.52.160"
emmanart@cloudshell:~/tf (cloud-arthur-emmanart)$
```

- Take a screenshot that includes the VM's IP addresses

The screenshot shows the Google Cloud console's VM instances page. A yellow sticky note with the text "Odin ID: emmanart" is placed over the top right corner of the page. The table below lists several VM instances with their respective IP addresses.

Status	Name	Zone	Internal IP	External IP	Network	Connect
<input checked="" type="checkbox"/>	course-vm	us-west1-b	10.138.0.2 (nic0)	34.187.138.60 (nic0)	default	SSH
<input type="checkbox"/>	instance-1	asia-east1-a	10.140.0.2 (nic0)		default	SSH
<input type="checkbox"/>	instance-2	europa-north1-a	10.166.0.2 (nic0)		default	SSH
<input type="checkbox"/>	instance-3	us-central1-a	192.168.1.2 (nic0)		custom-network1	SSH
<input type="checkbox"/>	instance-4	europa-west1-d	192.168.5.2 (nic0)		custom-network1	SSH
<input checked="" type="checkbox"/>	nginx-gb	us-west1-b	10.138.0.4 (nic0)	34.187.173.29 (nic0)	default	SSH
<input type="checkbox"/>	storage-vm	us-west1-b	10.138.0.6 (nic0)		default	SSH
<input checked="" type="checkbox"/>	tf-lab-vm	us-west1-b	10.138.0.11 (nic0)	136.117.52.160 (nic0)	default	SSH

- Take a screenshot of the successful ssh login from Cloud Shell.

A screenshot of a Cloud Shell terminal window. The terminal displays the output of the 'ip' command, showing the IP address 136.117.52.160. It then shows the user 'emmanart' logging in to an Ubuntu 20.04.6 LTS instance. The terminal output includes system information such as system load, processes, memory usage, and swap usage. It also mentions that expanded security maintenance for infrastructure is enabled and that 0 updates can be applied immediately. A yellow note box is overlaid on the terminal, displaying 'Odin ID: emmanart'. The terminal prompt is 'emmanart@tf-lab-vm:~\$'.

- What resources are being added, changed, or destroyed?

The google\_compute\_instance.default resource is being replaced (destroyed and recreated). No new standalone resources are being added. The replacement is triggered because the metadata\_startup\_script field was added, and this field forces Terraform to recreate the entire VM instead of updating it in place.

- What part of the configuration forces a replacement to occur?

The addition of the metadata\_startup\_script field forces the replacement.

- Take a screenshot of the Guestbook including the URL with the entry in it.



## Guestbook

[Sign here](#)

### Entries

Emmanuel Arthur <emmanart@pdx.edu>  
signed on 2025-11-13  
Hello Terraform on GCP!

Odin ID: emmanart

## Lab 7.2g

- What is the name of the Instance Template dynamically generated to create the two nodes (VMs)?

gke-guestbook-default-pool-b823f3e2

- What is the name of the Instance Group dynamically generated that the two nodes belong to?

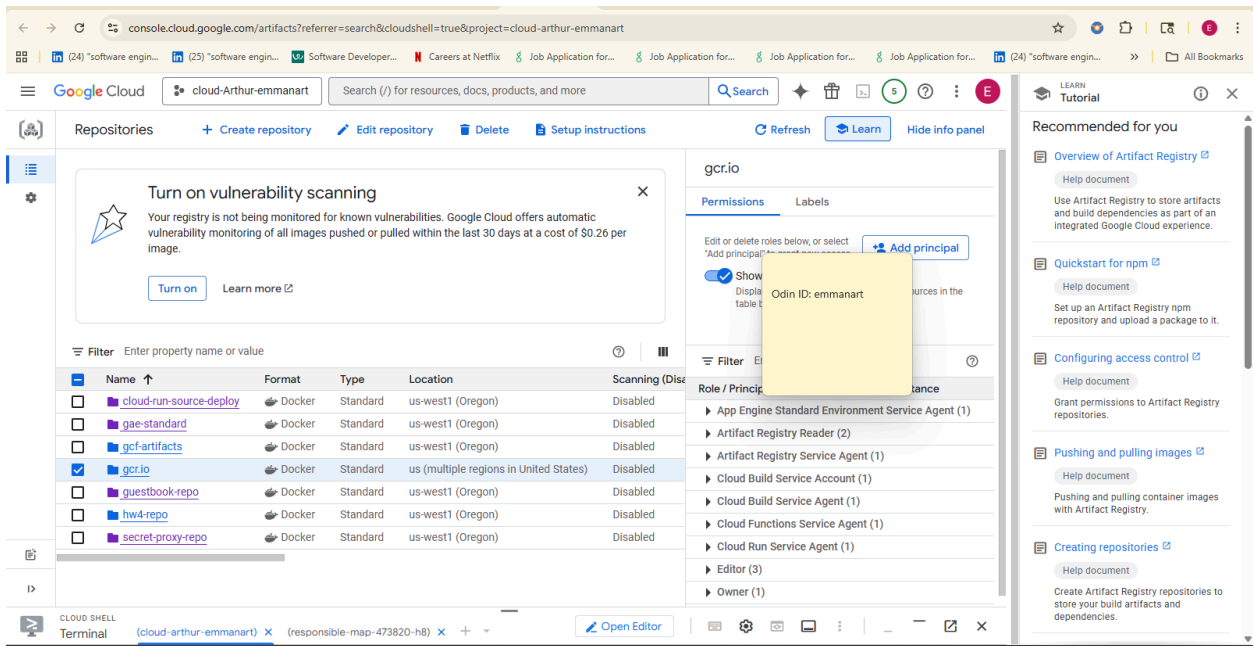
gke-guestbook-default-pool-b823f3e2-grp

- What are the names of the two nodes?

gke-guestbook-default-pool-b823f3e2-mnv2 and

gke-guestbook-default-pool-b823f3e2-pxwq

- Take a screenshot of the container image created



- Take a screenshot of the output of the following command when all 3 replicas reach a "Running" state.

```

1 warning found (use docker --debug to expand):
- 3500msRecommended: JSON arguments recommended for CMD to prevent unintended behavior related to OS signals (line 21)
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ docker push gcr.io/${GOOGLE_CLOUD_PROJECT}/gcp_gb
Using default tag: latest
The push refers to repository [gcr.io/cloud-arthur-emmanart/gcp_gb]
f610ca938f6: Pushed
3f70bf18a086: Pushed
3496d84bd4ef: Pushed
83fe212b80f: Layer already exists
8a0241c81595: Layer already exists
2ade6c66d55a: Layer already exists
125a03a06a50: Layer already exists
7d7a2f20a40: Layer already exists
f80db5cf5608: Layer already exists
latest: digest: sha256:4b1247e89dcafb4f495570f663564379a020e79ecbe2cc51d2f5299966e93b4 size: 2210
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ ls
app.py  app.yaml  Dockerfile  env  gomod  index.py  Kubernetes.yaml  pyroscope  python-docs-samples  requirements.txt  secret-proxy  sign.py  static  templates
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ nano Kubernetes.yaml
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ qcloud container clusters get-credentials guestbook --zone us-west1-b
Fetching cluster endpoint and auth data.
kubectl entry generated for guestbook.
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl create -f Kubernetes.yaml
replicationcontroller/guestbook-replicas created
service/guestbook-lb created
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl get pods
NAME                                READY    STATUS    RESTARTS   AGE
guestbook-replicas-hm6dx            0/1      ContainerCreating    0          19s
guestbook-replicas-jbvp5            0/1      ContainerCreating    0          20s
guestbook-replicas-ttkd6            0/1      ContainerCreating    0          19s
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl get pods
NAME                                READY    STATUS    RESTARTS   AGE
guestbook-replicas-hm6dx            1/1      Running    0          2m15s
guestbook-replicas-jbvp5            1/1      Running    0          2m16s
guestbook-replicas-ttkd6            1/1      Running    0          2m15s
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$

```

- Take a screenshot of listing services with LoadBalancer indicating an external IP address that is ready for access.

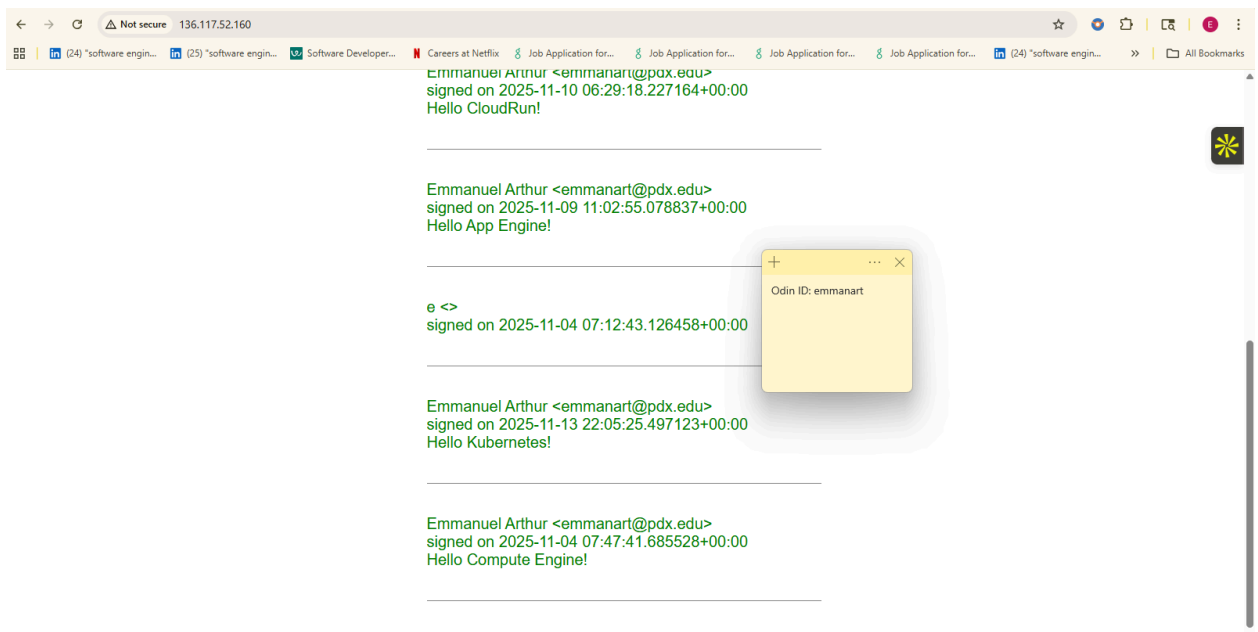


```
(cloud-arthur-emmanart) X +
-> writing image sha256:35 Open a new tab with project... 793967030d3719fd2efcf28fca071420fefc2
-> naming to gcr.io/cloud-arthur-emmanart/gcp_yu

1 warning found (use docker --debug to expand):
- JSONArgsRecommended: JSON arguments recommended for CMD to prevent unintended behavior related to OS signals (line 21)
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ docker push gcr.io/$(GOOGLE_CLOUD_PROJECT)/gcp_gb
Using default tag: latest
The push refers to repository [gcr.io/cloud-arthur-emmanart/gcp_gb]
f616bca958f6: Pushed
5f70bf19a086: Pushed
34960d4ed1cf: Pushed
86fe21d8bc0f: Layer already exists
8a0261c81595: Layer already exists
2ade6c6ed55a: Layer already exists
125a03a06a58: Layer already exists
7d7a2f20aa40: Layer already exists
f80db3cf5608: Layer already exists
latest: digest: sha256:4b1247e89ddea7b4f495570f663564379a020e79ecbe2cc51d2f5299966e93b4 size: 2210
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ ls
app.py app.yaml Dockerfile env gbmodel index.py kubernetes.yaml pyocache python-docs-samples requirements.txt static templates
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ nano kubernetes.yaml
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ gcloud container clusters get-credentials guestbook --zone us-west1-a
Fetching cluster endpoint and auth data.
kubeconfig entry generated for guestbook.
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl create -f kubernetes.yaml
replicationcontroller/guestbook-replicas created
service/guestbook-lb created
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl get pods
NAME READY STATUS RESTARTS AGE
guestbook-replicas-hm6dx 0/1 ContainerCreating 0 19s
guestbook-replicas-jbvp5 0/1 ContainerCreating 0 20s
guestbook-replicas-tkkd6 0/1 ContainerCreating 0 19s
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl get pods
NAME READY STATUS RESTARTS AGE
guestbook-replicas-hm6dx 1/1 Running 0 2m15s
guestbook-replicas-jbvp5 1/1 Running 0 2m16s
guestbook-replicas-tkkd6 1/1 Running 0 2m15s
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$ kubectl get services
NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE
guestbook-lb LoadBalancer 34.119.236.185 136.117.52.160 80:31940/TCP 3m51s
kubernetes ClusterIP 34.119.224.1 <none> 443/TCP 26m
emmanart@cloudshell:~/cs430-src/05_gcp_datastore (cloud-arthur-emmanart)$
```

+ ... X  
Odin ID: emmanart

- Take a screenshot of the Guestbook including the URL with the entry in it.



- Take a screenshot of the managed guestbook pods and the service being exposed.

**Replication Controller details**

Pod specification

- Labels: app: guestbook, tier: frontend
- Termination grace period: 30
- Restart policy: Always
- Containers: guestbook-app

Managed pods

Name	Status	Restarts	Created on
guestbook-replicas-jbvp5	Running	0	Nov 13, 2025, 1:58:49 PM
guestbook-replicas-hm6dx	Running	0	Nov 13, 2025, 1:58:50 PM
guestbook-replicas-ttkd6	Running	0	Nov 13, 2025, 1:58:50 PM

Exposing services

Name	Type	Endpoints
guestbook-lb	Load balancer	136.117.52.160:80

- Take a screenshot of the load balancer and its details

**Load balancing**

Get started with real-time analytics

- Visualize your network resources
- Diagnose and prevent connectivity issues
- View packet loss and latency metrics
- Keep your firewall rules strict and efficient

Load balancers

Name	Load balancer type	Access type	Protocols	Region	Backends	Actions
a4c612bf1080d4e34ae58ab3687df15	Network (Passthrough target-pool)	External	TCP	us-west1	1 target pool (2 instances)	

- Take a screenshot of the addresses allocated and indicate the ones associated with nodes versus the one associated with the load balancer.

Google Cloud | cloud-Arthur-emmanart | vpc

VPC Network / IP addresses

IP addresses		Reserve external	Reserve internal	Refresh	Release static address	Learn	Show info panel
	All	Internal IP addresses	External IP addresses	IPv4 addresses	IPv6 addresses		
<input type="checkbox"/>	10.138.0.17	Internal	us-west1	Ephemeral	IPV4	VM instance gke-guestbook-default-pool-b823f3e2-pxwq (Zone us-west1-b)	
<input type="checkbox"/>	10.138.0.18	Internal	us-west1	Ephemeral	IPV4	VM instance gke-guestbook-default-pool-b823f3e2-mnv2 (Zone us-west1-b)	
<input type="checkbox"/>	10.140.0.2	Internal	asia-east1	Ephemeral	IPV4	VM instance instance-1 (Zone asia-east1-a)	
<input type="checkbox"/>	10.166.0.2	Internal	europa-north1	Ephemeral	IPV4	VM instance instance-2 (Zone europa-north1-a)	
<input type="checkbox"/>	34.127.80.30	External	us-west1	Ephemeral	IPV4	VM instance gke-guestbook-default-pool-b823f3e2-pxwq (Zone us-west1-b)	
<input type="checkbox"/>	34.187.138.60	External	us-west1	Ephemeral	IPV4	VM instance course-vm (Zone us-west1-b)	
<input type="checkbox"/>	34.187.173.29	External	us-west1	Ephemeral	IPV4	VM instance gke-guestbook-default-pool-b823f3e2-mnv2 (Zone us-west1-b)	
<input type="checkbox"/>	136.117.52.160	External	us-west1	Ephemeral	IPV4	Forwarding rule a4c612bf1080d4e34ae58ab3687fdf15	
<input type="checkbox"/>	192.168.1.2	Internal	us-central1	Ephemeral	IPV4	VM instance instance-3 (Zone us-central1-a)	

Cloud Assist Preview

Access type columns. Here's how to interpret the information in your provided list:

- VM instances and GKE Nodes:**
  - IP addresses used by virtual machines (VMs) or GKE nodes will have VM instance [instance name] or VM instance gke-guestbook-default-pool... listed under the

Odin ID: emmanart

Typically be associated with a "Forwarding rule" in the "In use by" column. Load balancers utilize forwarding rules to direct incoming traffic to backend services.

From your list, the following IP address is associated with a load balancer:

- 136.117.52.160 (External, Ephemeral, In use by Forwarding rule a4c612bf1080d4e34ae58ab3687fdf15)

In summary, the "In use by" column is the primary indicator. If it lists a "VM instance" or similar, it's a VM instance. If it lists a "Forwarding rule", it's a load balancer.

Enter a prompt

- Take a screenshot of the Guestbook including the URL with the entry in it.

Not secure | 34.53.51.225

Emmanuel Arthur <emmanart@pdx.edu>  
signed on 2025-11-09 11:02:55.078837+00:00  
Hello App Engine!

signed on 2025-11-04 07:12:43.126458+00:00

Emmanuel Arthur <emmanart@pdx.edu>  
signed on 2025-11-13 22:05:25.497123+00:00  
Hello Kubernetes!

Emmanuel Arthur <emmanart@pdx.edu>  
signed on 2025-11-13 22:36:26.095524+00:00  
Hello Cloud Build!

Emmanuel Arthur <emmanart@pdx.edu>  
signed on 2025-11-04 07:47:41.685528+00:00  
Hello Compute Engine!

Odin ID: emmanart

## Lab 7.3g

- Does Google provide a Python package specifically for accessing the Knowledge Graph API?

No there are no Python packages specifically for accessing the Knowledge Graph API

- Show the source line that constructs the query we wish to send to the Knowledge Graph API.

```
req = kgsearch.entities().search(query=query, limit=1)
```

- Show the source line that then executes the query and saves the response. What is the name of the method that sends the query to the Knowledge Graph API?

```
res = req.execute()
```

The name of the method that sends the query is execute()

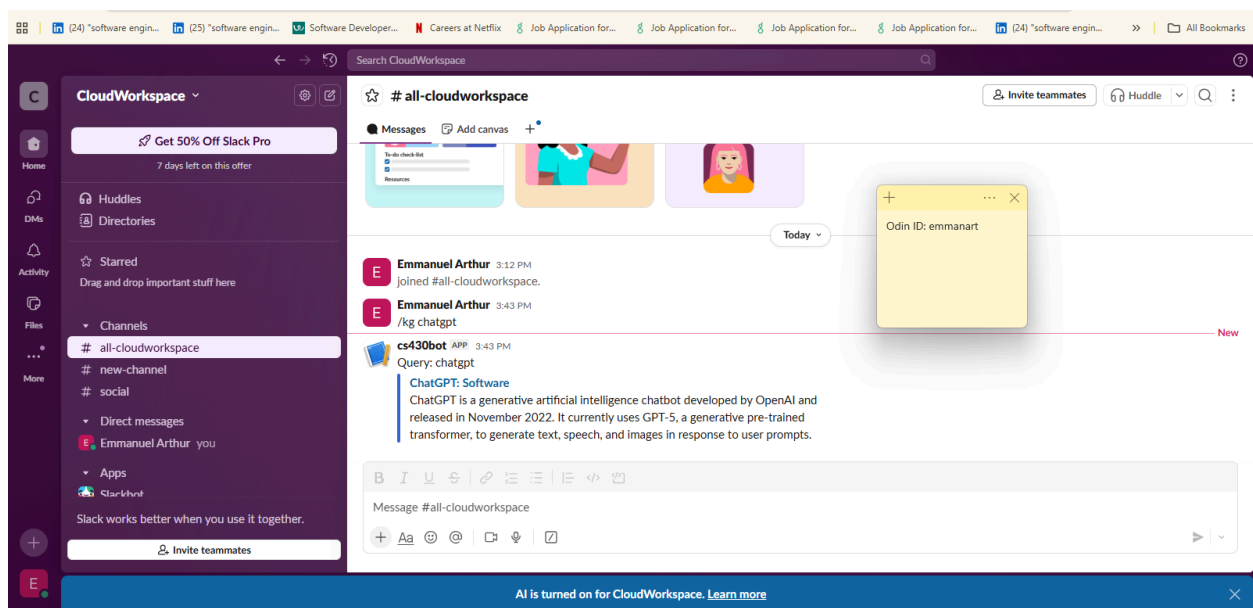
- What is the Python data type that is used to represent the formatted message?

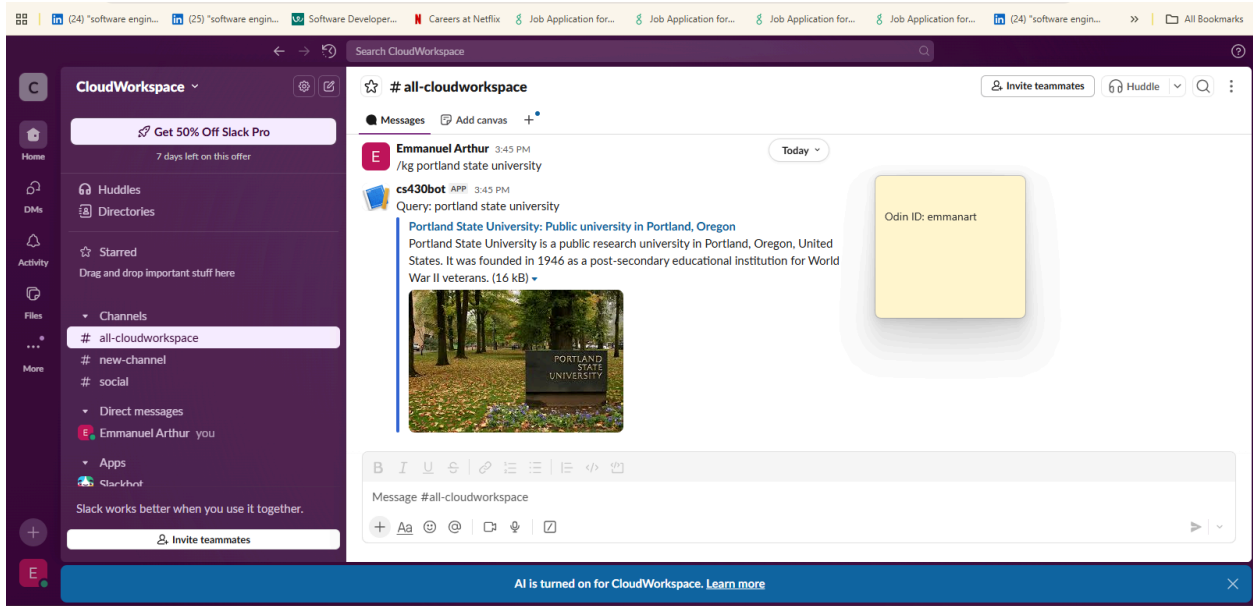
Dictionary

- What are the three main attributes of the formatted message passed back to Slack?

response\_type , text, attachments

- Take a screenshot of its response for your lab notebook.





## Lab 7.4g

- Show the output for your lab notebook

```

shell.cloud.google.com/?hl=en_US&fromcloudshell=true&show=terminal

Cloud Shell Editor

Gemin CLI is available in Cloud Shell terminal! Type gemini to try it. Learn more

*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision (1.71.0)
Requirement already satisfied: requests<3.0.0>=>2.18.0 in ./env/lib/python3.12/site-packages (from google-api-core!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision (2.32.5))
Requirement already satisfied: grpcio-status<2.0.0>=>1.59.2 in ./env/lib/python3.12/site-packages (from google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision (1.76.0))
Requirement already satisfied: cachetools<7.0>=>2.0.0 in ./env/lib/python3.12/site-packages (from google-auth!2.24.0!2.25.0<3.0.0>=>2.14.1->google-cloud-vision) (6.2.1)
Requirement already satisfied: pyasn1-modules<0.2.1 in ./env/lib/python3.12/site-packages (from google-auth!2.24.0!2.25.0<3.0.0>=>2.14.1->google-cloud-vision) (0.4.2)
Requirement already satisfied: rsa<5>=>3.1.4 in ./env/lib/python3.12/site-packages (from google-auth!2.24.0!2.25.0<3.0.0>=>2.14.1->google-cloud-vision) (4.9.1)
Requirement already satisfied: typing-extensions<4.12 in ./env/lib/python3.12/site-packages (from grpcio<2.0.0>=>1.33.2->google-cloud-vision) (4.15.0)
Requirement already satisfied: charset-normalizer<4>=>2 in ./env/lib/python3.12/site-packages (from requests<3.0.0>=>2.18.0->google-api-core!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision) (3.4.4)
Requirement already satisfied: idna<3>=>2.5 in ./env/lib/python3.12/site-packages (from requests<3.0.0>=>2.18.0->google-api-core!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision) (3.11)
Requirement already satisfied: urllib3<3>=>1.21.1 in ./env/lib/python3.12/site-packages (from requests<3.0.0>=>2.18.0->google-api-core!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision) (2.5.0)
Requirement already satisfied: certifi<2017.4.17 in ./env/lib/python3.12/site-packages (from requests<3.0.0>=>2.18.0->google-api-core!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-api-core[grpc]!2.0.*1.2.1.*1.2.10.*1.2.2.*1.2.3.*1.2.4.*1.2.5.*1.2.6.*1.2.7.*1.2.8.*1.2.9.*<3.0.0>=>1.34.1->google-cloud-vision) (2025.10.5)
Requirement already satisfied: pyasn1<0.1.3 in ./env/lib/python3.12/site-packages (from rsa<5>=>3.1.4->google-auth!2.24.0!2.25.0<3.0.0>=>2.14.1->google-cloud-vision) (0.6.1)
Downloading google_cloud_vision-3.11.0-py3-none-any.whl (529 kB)
Installing collected packages: google-cloud-vision
Successfully installed google-cloud-vision-3.11.0

[notice] A new release of pip is available: 25.2 -> 25.3
[notice] To update, run: pip install --upgrade pip
(emv) emmanuel@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanuel)$ python detect.py labels-uri gs://cloud-samples-data/ml-api-codelab/birds.jpg
Labels:
Bird
Baitte
Common ostrich
Flightless bird
Bear
Vertebrate
Wildlife
Terrestrial animal
Greater rhea
Feather
(emv) emmanuel@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanuel)$

```

- What is the name of the function?

- What type of Vision client is instantiated in it?

Image Annotator client (`vision.ImageAnnotatorClient()`)

- What method is invoked in the Vision client to perform the detection?

The `label_detection` method

- What is the name of the attribute in the response object that contains the results we seek?

The `label_annotations` attribute

- Take a screenshot of the output for the above commands

```

batch      cloud-sql      datalabeling  faricon.ico    language      notebooks     README.md     storage      vmwareengine
bigquery   cloud-tasks    dataplex      firestore      LICENSE       noxfile.config.py  recaptcha.enterprise  storagecontrol  webrisk
bigquery-connection  CODE_OF_CONDUCT.md  dataproc      functions      logging       noxfile-template.py  renovate.json  storagetransfer  workflows
bigquery-datatransfer  composer        datastore     gemma2         MAC_SETUP.md  optimization     retail         tables          workflows
bigquery-migration    compute        dialogflow    gemini         Marfile       CWIbot.py       run           talent          workflows
bigquery-reservation  connectgateway  dialogflow-cx  generative-ai  managedkafka  parametermanager  scripts       testing          workflows

emmanart@cloudshell:~/python-docs-samples (cloud-arthur-emmanart)$ cd vision
emmanart@cloudshell:~/python-docs-samples/vision (cloud-arthur-emmanart)$ cd snippets
emmanart@cloudshell:~/python-docs-samples/vision/snippets (cloud-arthur-emmanart)$ cd detect
emmanart@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanart)$ ls
beta_snippets.py  detect_test.py  requirements-test.txt  set_endpoint.py  vision_async_batch_annotate_images_test.py  vision_batch_annotate_files_test.py
beta_snippets_test.py  README.rst  requirements.txt  set_endpoint_test.py  vision_batch_annotate_files_gcs.py  vision_batch_annotate_files_test.py
detect.py  README.rst.in  resources  vision_async_batch_annotate_images.py  vision_batch_annotate_files_gcs_test.py
emmanart@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanart)$ wget https://1000logos.net/wp-content/uploads/2022/07/Portland-State-University-Logo.png psu_logo.png
--2025-11-14 23:27:47-- https://1000logos.net/wp-content/uploads/2022/07/Portland-State-University-Logo.png
Resolving 1000logos.net (1000logos.net)... 104.26.9.175, 172.67.71.45, 104.26.8.175, ...
Connecting to 1000logos.net (1000logos.net)|104.26.9.175|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 89725 (88K) (image/png)
Saving to: 'Portland-State-University-Logo.png'

Portland-State-University-Logo.png
100%[=====] 87.62K 530KB/s in 0.2s

2025-11-14 23:27:48 - 'Portland-State-University-Logo.png' saved [89725/89725]

--2025-11-14 23:27:48-- http://psu_logo.png/
Resolving psu_logo.png (psu_logo.png)... failed: Name or service not known.
wget: unable to resolve host address 'psu_logo.png'
FINISHED --2025-11-14 23:27:48--
Total wall clock time: 0.7s
Downloaded: 1 files, 88K in 0.2s (530 KB/s)
emmanart@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanart)$ ls
beta_snippets.py  detect_test.py  README.rst.in  resources  vision_async_batch_annotate_images.py  vision_batch_annotate_files_gcs_test.py
beta_snippets_test.py  Portland-State-University-Logo.png  requirements-test.txt  set_endpoint.py  vision_async_batch_annotate_images_test.py  vision_batch_annotate_files_test.py
detect.py  README.rst  requirements.txt  set_endpoint_test.py  vision_batch_annotate_files_gcs.py  vision_batch_annotate_files_test.py
emmanart@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanart)$ python detect.py logos Portland-State-University-Logo.png
Logos:
Portland State University
emmanart@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-arthur-emmanart)$

```

- What method is invoked in the Vision client to perform the detection?

`.logo_detection` method

- Show the output for your lab notebook

```
Cloud Shell Editor

Gemin CLI is available in Cloud Shell terminal! Type gemini to try it. Learn more

emmanrt@cloudshell:~/python-docs-samples (cloud-arthur-emmanrt) $ cd speech
emmanrt@cloudshell:~/python-docs-samples/speech (cloud-arthur-emmanrt) $ cd snippets
emmanrt@cloudshell:~/python-docs-samples/speech/snippets (cloud-arthur-emmanrt) $ pip install google-cloud-speech
Defaulting to user installation because normal site-packages is not writeable
Collecting google-cloud-speech
  Downloading google_cloud_speech-2.34.0-py3-none-any.whl.metadata (9.8 KB)
Requirement already satisfied: google-api-core[grpc]>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.16.0)
Requirement already satisfied: google-auth>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.25.1)
Requirement already satisfied: proto-plus>=1.22.3, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (1.26.1)
Requirement already satisfied: protobuf>=4.21.0, <4.21.2, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (4.21.1)
Requirement already satisfied: googleapis-common-protos>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.24.0)
Requirement already satisfied: requests>=2.28.1, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.32.4)
Requirement already satisfied: grpcio-status>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.24.0)
Requirement already satisfied: cachetools<6.0, >=2.0.0, in /usr/local/lib/python3.12/dist-packages (from google-auth>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (5.5.2)
Requirement already satisfied: pyasn1-modules>=0.2.1, in /usr/local/lib/python3.12/dist-packages (from google-auth>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (0.4.2)
Requirement already satisfied: rsa<5.0, >=3.1.4, in /usr/local/lib/python3.12/dist-packages (from google-auth>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (4.9.1)
Requirement already satisfied: pyasn1<4.0, >=0.6.1, in /usr/local/lib/python3.12/dist-packages (from pyasn1-modules>=0.2.1, in /usr/local/lib/python3.12/dist-packages (from google-auth>=2.0.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (0.6.1)
Requirement already satisfied: charset-normalizer<4, >=2 in /usr/local/lib/python3.12/dist-packages (from requests>=2.28.1, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (3.2.1)
Requirement already satisfied: idna<4, >=2.5 in /usr/local/lib/python3.12/dist-packages (from requests>=2.28.1, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (3.10)
Requirement already satisfied: urllib3<3, >=1.21.1 in /usr/local/lib/python3.12/dist-packages (from requests>=2.28.1, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.2.3)
Requirement already satisfied: certifi<2024.7.4, >=2024.7.4 in /usr/local/lib/python3.12/dist-packages (from requests>=2.28.1, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2024.7.4)
Requirement already satisfied: google-cloud-speech>=2.34.0, <3.0.0, in /usr/local/lib/python3.12/dist-packages (from google-cloud-speech) (2.34.0)
Downloading google_cloud_speech-2.34.0-py3-none-any.whl (336 KB)
Installing collected packages: google-cloud-speech
Successfully installed google-cloud-speech-2.34.0
emmanrt@cloudshell:~/python-docs-samples/speech/snippets (cloud-arthur-emmanrt) $ python transcribe.py resources/audio.raw
Transcript: how old is the Brooklyn Bridge
emmanrt@cloudshell:~/python-docs-samples/speech/snippets (cloud-arthur-emmanrt) $
```

- What is the name of the function?

Since the path to the audio file did not start with `gcs` the name of the function must be `transcribe_file`

- What method is invoked in the Speech client to perform the detection?

## The recognize method

- What is the name of the attribute in the response object that contains the results we seek?

The results attribute

- Show the output for your lab notebook

```
Cloud Shell Editor

Gemini CLI is available in Cloud Shell terminal! Type gemini to try it. Learn more

Requirement already satisfied: google-api-core[grpc]<2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1 in /usr/local/lib/python3.12/dist-packages (from google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-translate) (2.0.5)
Requirement already satisfied: google-auth<2.24.0,!=2.25.0,<3.0.0,>=2.14.1 in /usr/local/lib/python3.12/dist-packages (from google-cloud-translate) (2.40.3)
Requirement already satisfied: google-cloud-core<3.0.0,>=1.4.4 in /usr/local/lib/python3.12/dist-packages (from google-cloud-translate) (2.4.3)
Requirement already satisfied: proto-plus<2.0.0,>=1.22.3 in /usr/local/lib/python3.12/dist-packages (from google-cloud-translate) (1.26.1)
Requirement already satisfied: protobuf<4.21.0,!=4.21.1,!=4.21.2,!=4.21.3,!=4.21.4,!=4.21.5,<7.0.0,>=3.20.2 in /usr/local/lib/python3.12/dist-packages (from google-cloud-translate) (5.29.5)
Requirement already satisfied: grpc-google-iam-v1<1.0.0,>=0.14.0 in /usr/local/lib/python3.12/dist-packages (from google-cloud-translate) (0.14.2)
Requirement already satisfied: googleapis-common-protos<2.0.0,>=1.56.2 in /usr/local/lib/python3.12/dist-packages (from google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-translate) (1.70.0)
Requirement already satisfied: requests<3.0.0,>=2.18.0 in /usr/local/lib/python3.12/dist-packages (from google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-translate) (2.32.4)
Requirement already satisfied: grpcio<2.0.0,>=1.33.2 in /usr/local/lib/python3.12/dist-packages (from google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-translate) (1.73.1)
Requirement already satisfied: grpcio-status<2.0.0,>=1.33.2 in /usr/local/lib/python3.12/dist-packages (from google-api-core[grpc]) (2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-translate) (1.71.2)
Requirement already satisfied: cachetools<6.0,>=2.0.0 in /usr/local/lib/python3.12/dist-packages (from google-auth[rsa]) (2.0.0)
Requirement already satisfied: pyasn1-modules<0.2.1 in /usr/local/lib/python3.12/dist-packages (from google-auth[rsa]) (0.4.2)
Requirement already satisfied: rsa<5,>=3.1.4 in /usr/local/lib/python3.12/dist-packages (from google-auth[rsa]) (4.9.1)
Requirement already satisfied: pyasn1<0.7.0,>=0.6.1 in /usr/local/lib/python3.12/dist-packages (from pyasn1-modules) (0.6.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0) (3.4.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0) (3.10)
Requirement already satisfied: urllib3<3,>=2.1.1 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0) (2.2.3)
Requirement already satisfied: certifi<2017.4.17 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0) (2025.7.9)
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ from google.cloud import translate_v2 as translate
-bash: from: command not found
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python snippets.py translate-text en '你有没有带外套'
Detected source language: zh-TW
Input text: 你有没有带外套
Translated text: Did you bring a jacket?
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$
```

- What is the name of the function?

It's the translate\_text function

- What method is invoked in the Translate client to perform the detection?

translate method of the translate.client object

- What is the name of the attribute in the response object that contains the results we seek?

- Show the output for your lab notebook



```
3.4.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0->google-api-core!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-api-core[grpc]!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-language) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0->google-api-core!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-api-core[grpc]!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-language) (2.5.0)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.12/dist-packages (from requests<3.0.0,>=2.18.0->google-api-core!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-api-core[grpc]!=2.0.*,!=2.1.*,!=2.10.*,!=2.2.*,!=2.3.*,!=2.4.*,!=2.5.*,!=2.6.*,!=2.7.*,!=2.8.*,!=2.9.*,<3.0.0,>=1.34.1->google-cloud-language) (2025.7.9)
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python language.py 'homework is awful!'
"homework is awful!" has sentiment=-0.800000011920929
Entities are:
name: homework
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python language.py 'homework is ok'
"homework is ok" has sentiment=0.30000001192092896
Entities are:
name: homework
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python language.py 'homework is awesome!'
"homework is awesome!" has sentiment=0.4000000059604645
Entities are:
name: homework
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python language.py 'homework is awesome!'
"homework is awesome!" has sentiment=0.8999999761581421
Entities are:
name: homework
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$ python language.py 'The protestors in Oregon put on gas masks and wore yellow t-shirts'
"The protestors in Oregon put on gas masks and wore yellow t-shirts" has sentiment=-0.6000000238418579
Entities are:
name: protestors
name: gas masks
name: Oregon
name: t-shirts
emmanart@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-arthur-emmanart)$
```

Odin ID: emmanart

- What is the name of the function that performs the transcription?

transcribe\_gcs

- What is the name of the function that performs the translation?

translate\_text

- What is the name of the function that performs the entity analysis on the translation?

entities\_text

- What is the name of the function that performs the entity analysis on the image?

Detect\_labels\_uri

- If the program deems them unrelated, then based on the results from the APIs, what must be changed in the program to address this?

Not much needs to be changed for the ball stadium situation

- If the program deems them unrelated, then based on the results from the APIs, what must be changed in the program to address this?

For the bicycle situation it seems bike is not matched with Bicycle so we need

- If the program deems them unrelated, then based on the results from the APIs, what must be changed in the program to address this?

For the ostrich situation we need to alter the code to account for the fact that a major substring of a string in entities could match a major substring of a string in the labels.

- What are the 3 labels with the highest confidence that the Video Intelligence API associates with the video and what are the confidences for each?

Sports: Confidence: 0.9218811392784119

Basketball: Confidence: 0.9137870669364929

Player: Confidence: 0.8446521162986755

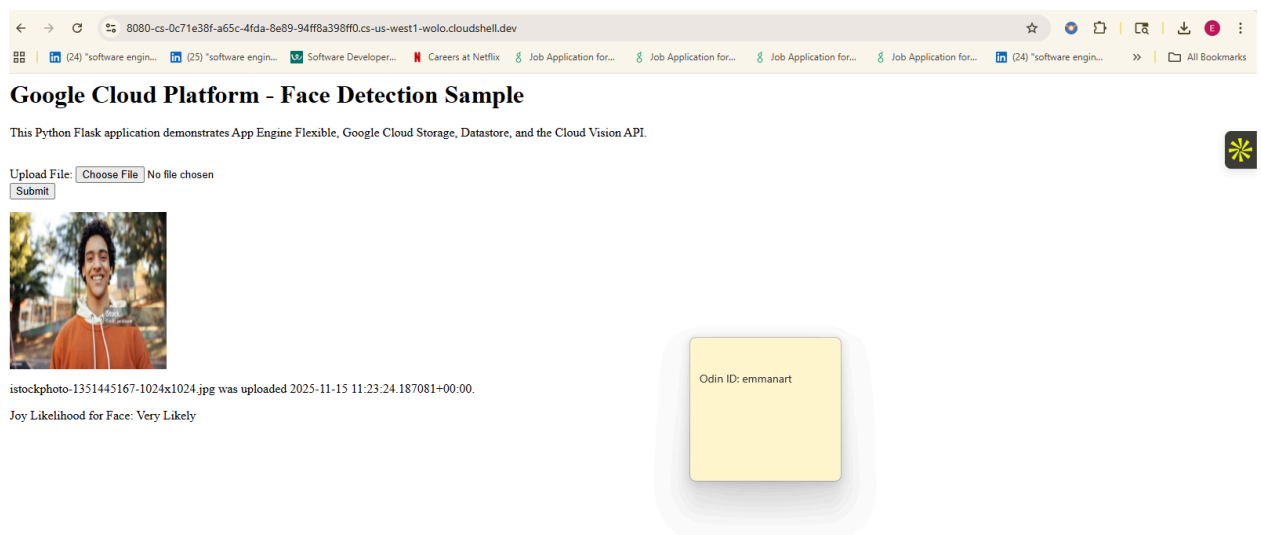
- What is the name of the client class in the package that is used?

VideoIntelligenceServiceClient

- What method is used in that class to perform the annotation?

annotate\_video

- Take a screenshot for your lab notebook that includes the URL.



- What line of code creates the query for previous detections?

```
query = datastore_client.query(kind="Faces")
```

- What line of code sends the query to Cloud Datastore?

```
image_entities = list(query.fetch())
```

Then, view the `upload_photo` route.

- Show the line that retrieves the name of the storage bucket to use.

```
bucket = storage_client.get_bucket(CLOUD_STORAGE_BUCKET)
```

- What form field is used to specify the uploaded photo?

Upload photo

- Show the line that copies the photo's contents to the storage bucket.

```
blob = bucket.blob(photo.filename)
```

```
blob.upload_from_string(photo.read(),  
content_type=photo.content_type)
```

- What method in Vision's annotation client is used to perform the analysis?

face\_detection as seen in this line: `faces = vision_client.face_detection(image=image).face_annotations`

- What fields are stored in Cloud Datastore for each image?

`blob_name`, `image_public_url`, `timestamp`, `joy` as seen in the code below:

```
entity = datastore.Entity(key)  
  
entity["blob_name"] = blob.name
```

```
entity["image_public_url"] = blob.public_url
```

```
entity["timestamp"] = current_datetime
```

```
entity["joy"] = face_joy
```

- What happens at the end of the `upload_photo` route?

It redirects to the home page

