

07.1a: Terraform AWS Guestbook.....	2
4. Launching configuration.....	2
6. Adding ssh access.....	3
7. Adding the Guestbook application.....	4
8. View the Guestbook.....	5
07.1g: Terraform GCP Guestbook.....	6
4. Launching configuration.....	6
6. Adding ssh access.....	7
8. View the Guestbook.....	8
07.2g: Kubernetes Guestbook.....	9
4. Create Kubernetes cluster.....	9
5. Prepare a container image.....	9
7. Deploy the configuration.....	10
12. Deploy and view application.....	14
07.3g: APIs (Slack, Knowledge Graph).....	15
2. Code.....	15
3. Code.....	15
8. Test the command.....	16
07.4g: ML APIs.....	16
3. Vision.....	17
4. Speech.....	18
5. Translate.....	18
6. Natural Language.....	19
8. Code.....	20
16. Application.....	22

07.1a: Terraform AWS Guestbook

4. Launching configuration

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

```
+ subnet_id           = (known after apply)
+ tags_all            = (known after apply)
+ tenancy              = (known after apply)
+ user_data            = (known after apply)
+ user_data_base64    = (known after apply)
+ user_data_replace_on_change = false
+ vpc_security_group_ids = (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... [10s elapsed]
aws_instance.guestbook: Still creating... [20s elapsed]
aws_instance.guestbook: Still creating... [30s elapsed]
aws_instance.guestbook: Creation complete after 32s [id=i-0d06cd4d699e71945]
```

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

Outputs:

```
ec2instance = "44.220.144.106"
```

+ ... X

pdin id :raghuram

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

Instances (1) Info							
<div>Find instance by attribute or tag (case-sensitive)</div> <div>Instance state = running X Clear filters</div>							
Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...
i-0d06cd4d699e71945	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1c	ec2-44-220-144-106.co...	44.220.144.106

+ ... X

pdin id :raghuram

6. Adding ssh access

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

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:        https://ubuntu.com/advantage

System information as of Mon May 20 19:57:06 UTC 2024

System load:  0.21          Processes:           105
Usage of /:   18.6% of 7.69GB Users logged in:       0
Memory usage: 21%          IPv4 address for eth0: 172.31.22.59
Swap usage:   0%

1 update can be applied immediately.
To see these additional updates run: apt list --upgradable

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@ip-172-31-22-59:~$
```

+ ... X

pdin id :raghuram

7. Adding the Guestbook application

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

```
Plan: 3 to add, 0 to change, 0 to destroy.

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

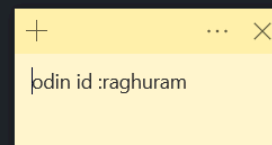
Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes

aws_key_pair.kp: Creating...
aws_security_group.sg-guestbook: Creating...
aws_key_pair.kp: Creation complete after 0s [id=guestbook-key]
aws_security_group.sg-guestbook: Creation complete after 2s [id=sg-030e061e14158d70f]
aws_instance.guestbook: Creating...
aws_instance.guestbook: Still creating... [10s elapsed]
aws_instance.guestbook: Still creating... [20s elapsed]
aws_instance.guestbook: Still creating... [30s elapsed]
aws_instance.guestbook: Creation complete after 32s [id=i-05bb2c2c5c419c7ab]

Apply complete! Resources: 3 added, 0 changed, 0 destroyed.

Outputs:
ec2instance = "34.227.194.122"
```



8. View the Guestbook

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

Guestbook

Sign [here](#)

Entries

Raghuram <raghuram@pdx.edu>
signed on 2024-05-21
Hello Terraform on AWS!

07.1g: Terraform GCP Guestbook

4. Launching configuration

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

cloud-nataraja-raghuram Search (/) for resources, docs, products, and more Search 19 ?

VM instances CREATE INSTANCE IMPORT VM REFRESH

Filter Enter property name or value

Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Network	Connect
<input type="checkbox"/>	course-vm	us-west1-b			10.138.0.10 (nic0)		default	SSH ▾ ⋮
<input type="checkbox"/>	tf-lab-vm	us-west1-b			10.138.0.21 (nic0)		default	SSH ▾ ⋮

Related actions

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

```

google_compute_address.static: Creating...
google_compute_address.static: Still creating... [10s elapsed]
google_compute_address.static: Creation complete after 11s [id=projects/cloud-nataraja-raghuram/regions/us-west1/addresses/ipv4-address]
google_compute_instance.default: Modifying... [id=projects/cloud-nataraja-raghuram/zones/us-west1-b/instances/tf-lab-vm]
google_compute_instance.default: Still modifying... [id=projects/cloud-nataraja-raghuram/zones/us-west1-b/instances/tf-lab-vm, 10s elapsed]
google_compute_instance.default: Modifications complete after 12s [id=projects/cloud-nataraja-raghuram/zones/us-west1-b/instances/tf-lab-vm]

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

Outputs:

ip = "35.203.135.178"
raghuram@cloudshell:~/tf (cloud-nataraja-raghuram) $

```

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

cloud-nataraja-raghuram
Search (/) for resources, docs, products, and more
Search
19
?
R

VM instances
CREATE INSTANCE
IMPORT VM
REFRESH
LEARN

Filter Enter property name or value

<input type="checkbox"/> Status	Name ↑	Zone	Recommendations	In use by	Internal IP ↑	External IP	Network	Connect
<input type="checkbox"/>	course-vm	us-west1-b			10.138.0.10 (nic0)		default	SSH ▾
<input checked="" type="checkbox"/>	tf-lab-vm	us-west1-b			10.138.0.21 (nic0)	35.203.135.178 (nic0)	default	SSH ▾

Related actions
HIDE

6. Adding ssh access

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

```
System information as of Tue May 21 03:09:58 UTC 2024

System load: 0.0          Processes:           103
Usage of /: 19.0% of 9.51GB Users logged in:       0
Memory usage: 5%          IPv4 address for ens4: 10.138.0.21
Swap usage: 0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

raghुरam@tf-lab-vm:~$
```

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

Addition: Google Compute Engine has a new instance called `google_compute_instance.default`.

Adjustments are being made to the current (`google_compute_instance.default`) by modifying attributes such as `metadata_startup_script`, `tags`, and other configurations.

Destruction: A destruction alert has been sent for (`google_compute_instance.default`).

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

The `metadata_startup_script` field forces a replacement

8. View the Guestbook

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

Guestbook

Sign [here](#)

Entries

Raghuram <raghuram@pdx.edu>
signed on 2024-05-21
Hello Terraform on GCP!

07.2g: Kubernetes Guestbook

4. Create Kubernetes cluster

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

gke-guestbook-default-pool-7b383a81

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

gke-guestbook-default-pool-7b383a81-grp

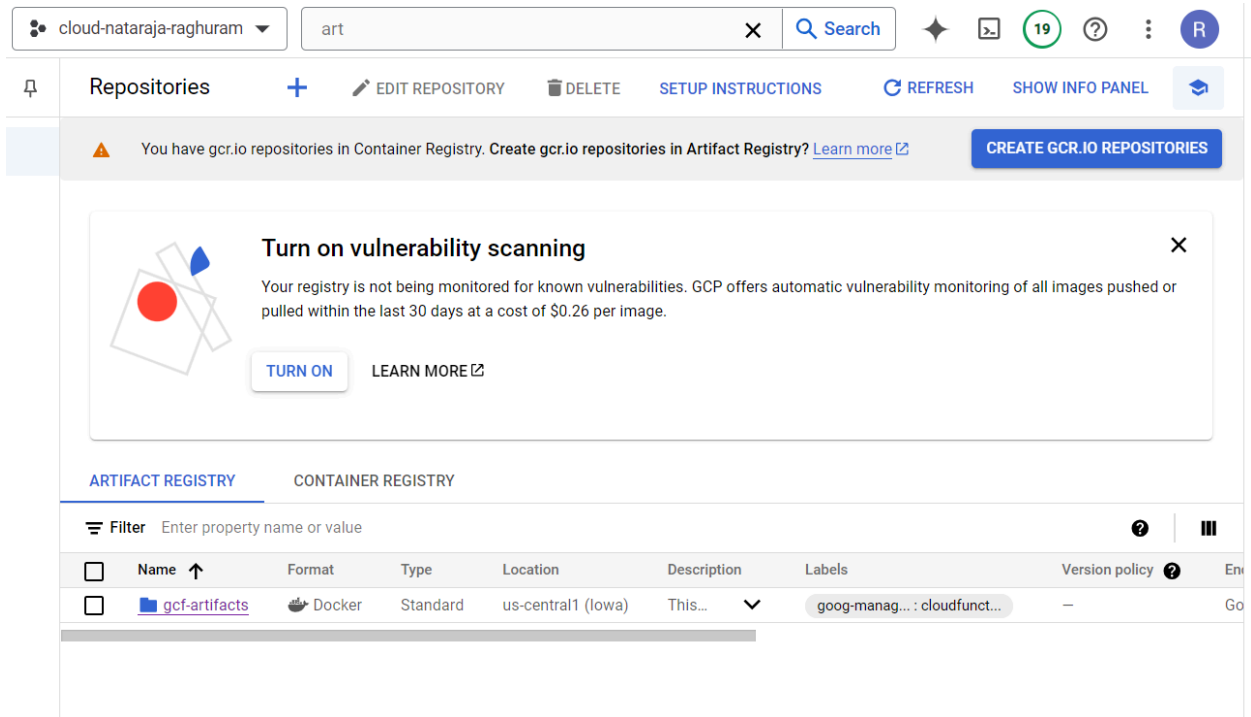
- What are the names of the two nodes?

gke-guestbook-default-pool-7b383a81-clvf

Gke-guestbook-default-pool-7b383a81-v0s1

5. Prepare a container image

- Take a screenshot of the container image created



7. Deploy the configuration


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

```
raghuram@cloudshell:~/cs430-src/05_gcp_datastore (cloud-nataraja-raghuram)$ kubectl get pods
NAME                                READY   STATUS             RESTARTS   AGE
guestbook-replicas-h2xsk            0/1     ContainerCreating   0           26s
guestbook-replicas-v2njv            0/1     ContainerCreating   0           26s
guestbook-replicas-xxfcg            0/1     ContainerCreating   0           26s
raghuram@cloudshell:~/cs430-src/05_gcp_datastore (cloud-nataraja-raghuram)$
```

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

```
raghuram@cloudshell:~/cs430-src/05_gcp_datastore (cloud-nataraja-raghuram)$ kubectl get services
NAME                TYPE          CLUSTER-IP    EXTERNAL-IP    PORT(S)          AGE
guestbook-lb        LoadBalancer  10.4.220.34    35.233.196.84  80:31212/TCP     110s
kubernetes           ClusterIP     10.4.208.1     <none>         443/TCP          70m
raghuram@cloudshell:~/cs430-src/05_gcp_datastore (cloud-nataraja-raghuram)$
```

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

 Not secure
 35.233.196.84

Sign [here](#)

Entries

Raghuram <raghuram@pdx.edu>
 signed on 2024-05-07 04:04:49.085611+00:00
 Hello Cloud Shell!

Raghuram <raghuram@pdx.edu>
 signed on 2024-05-07 03:09:44.206532+00:00
 Hello Datastore

Raghuram <raghuram@pdx.edu>
 signed on 2024-05-13 21:58:34.463629+00:00
 Hello Cloud Run!

Raghuram <raghuram@pdx.edu>
 signed on 2024-05-21 05:32:12.532942+00:00
 Hello Kubernetes!

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

cloud-nataraja-raghuram

Kubernetes Engine

Search

19

Replication Co...

REFRESH

EDIT

DELETE

ACTIONS

KUBECTL

LEARN

Logs

Container logs, Audit logs

Pods

3 current / 3 desired

Label selector

app = guestbook

tier = frontend

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-v2njv	Running	0	May 20, 2024, 10:27:35 PM
guestbook-replicas-h2xsk	Running	0	May 20, 2024, 10:27:35 PM
guestbook-replicas-xxfcg	Running	0	May 20, 2024, 10:27:35 PM

Exposing services

Name	Type	Endpoints
guestbook-lb	Load balancer	35.233.196.84:80

- Take a screenshot of the load balancer and its details

Google Cloud | cloud-nataraja-raghuram | network services

Network services

Load balancer details

ae865bda7d13942da96d0a8bfa0b4737

Target-pool Network Load Balancer

Frontend

Protocol	IP version	IP:Port	Network Tier
TCP	IPv4	35.233.196.84:80	Premium

Backend

Name	Region	Health check
ae865bda7d13942da96d0a8bfa0b4737	us-west1	k8s-2663ccee7bdaf34-node

ADVANCED CONFIGURATIONS

Instance	Zone	35.233.196.84
gke-guestbook-default-pool-7b383a81-clvf	us-west1-a	✓
gke-guestbook-default-pool-7b383a81-v0s1	us-west1-a	✓

- 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-nataraja-raghuram | VPC network

VPC network

IP addresses

RESERVE EXTERNAL STATIC IP ADDRESS RESERVE INTERNAL STATIC IP ADDRESS

SHOW INFO PANEL

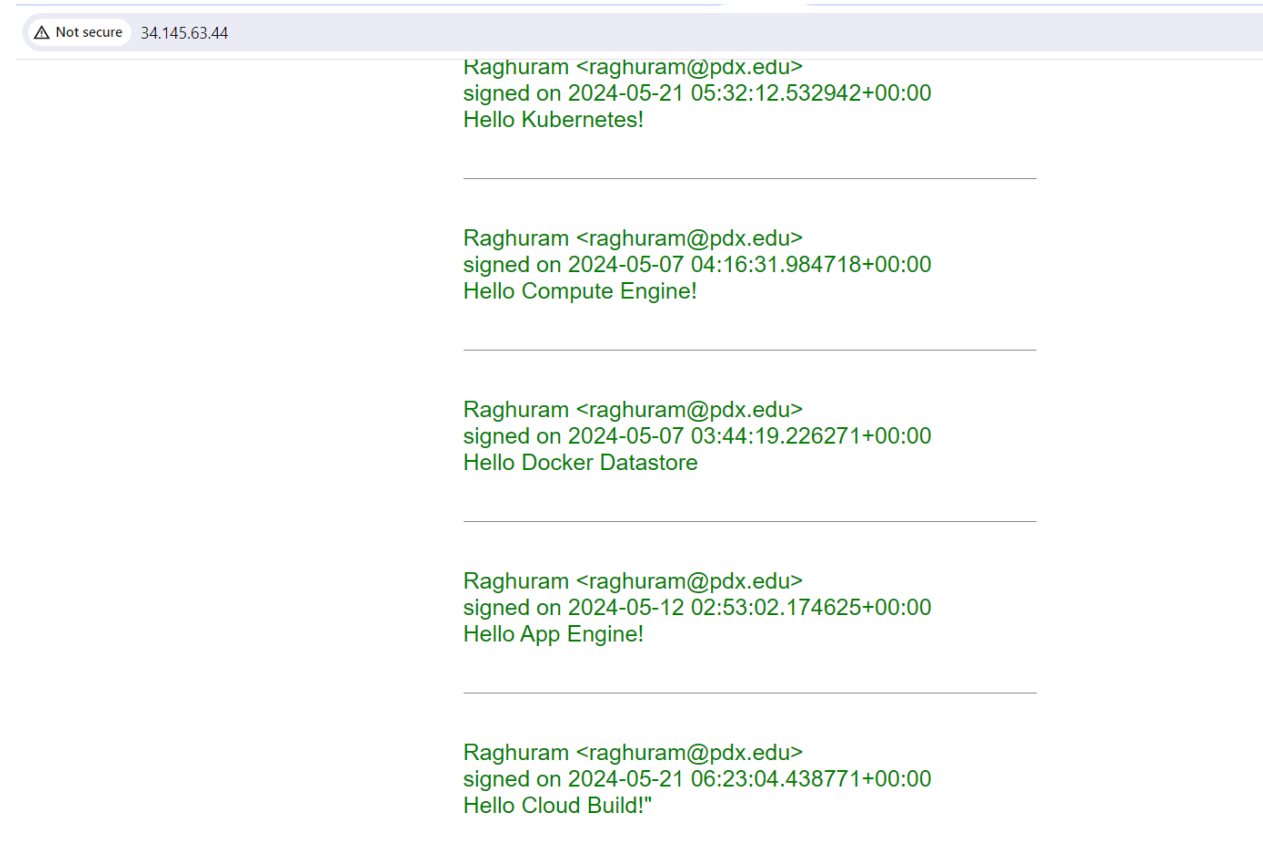
ALL INTERNAL IP ADDRESSES EXTERNAL IP ADDRESSES IPV4 ADDRESSES IPV6 ADDRESSES

Filter Enter property name or value

Name	IP address	Access type	Region	Type	Version	In use by	Sub
—	10.138.0.10	Internal	us-west1	Ephemeral	IPv4	VM instance course-vm (Zone us-west1-b)	def
—	10.138.0.39	Internal	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-7b383a81-v0s1 (Zone us-west1-a)	def
—	10.138.0.40	Internal	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-7b383a81-clvf (Zone us-west1-a)	def
—	35.197.106.1	External	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-7b383a81-v0s1 (Zone us-west1-a)	def
—	35.203.135.178	External	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-7b383a81-clvf (Zone us-west1-a)	def
—	35.233.196.84	External	us-west1	Ephemeral	IPv4	Forwarding rule ae865bda7d13942da96d0a8bfa0b4737	

12. Deploy and view application

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



07.3g: APIs (Slack, Knowledge Graph)

2. Code

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

NO

3. Code

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

```
# [START functions_slack_request]
def make_search_request(query):
    req = kgsearch.entities().search(query=query, limit=1)
    res = req.execute()
    return format_slack_message(query, res)
```

+ ... X

pdin id :raghuram

- 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?

```
# [START functions_slack_request]
def make_search_request(query):
    req = kgsearch.entities().search(query=query, limit=1)
    res = req.execute()
    return format_slack_message(query, res)
```

+ ... X

pdin id :raghuram

‘execute()’ is the method

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

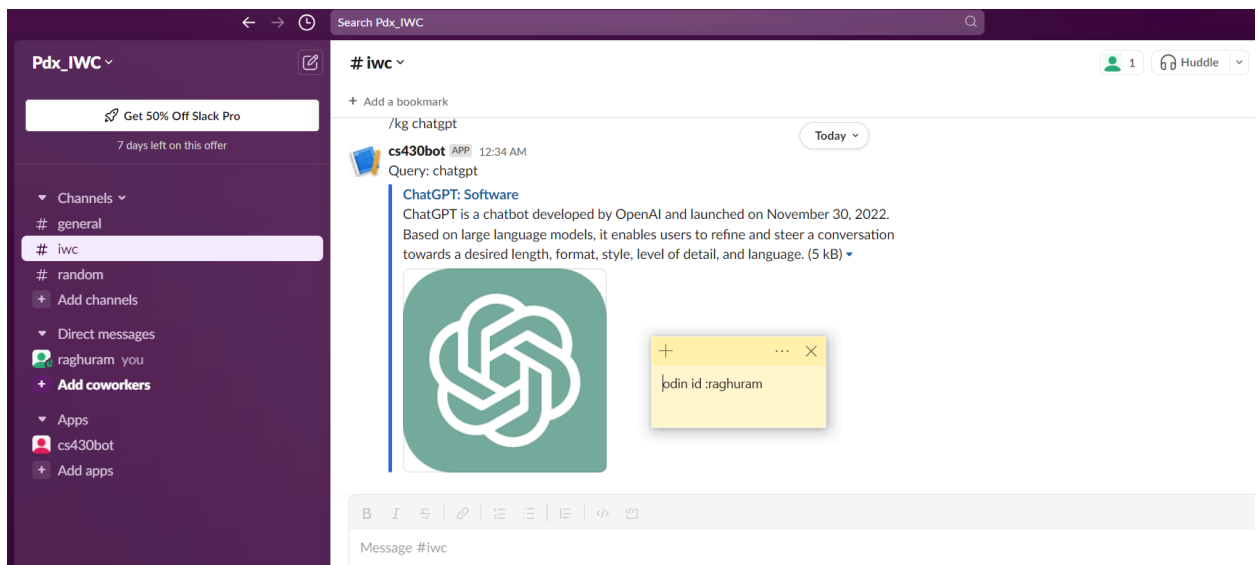
formatted message is a dictionary.

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

"response_type", "text", "attachments"

8. Test the command

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



07.4g: ML APIs

3. Vision

- Show the output for your lab notebook

```
(env) raghuram@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-nataraja-raghuram) $ python detect.py labels-uri gs://cloud-samples-data/ml-api-codelab/birds.jpg
Labels:
Bird
Ratite
Cloud
Sky
Beak
Plant
Green
Neck
Ostrich
Casuariiformes
```

- What is the name of the function?

detect_labels_uri

- What type of Vision client is instantiated in it?

vision.ImageAnnotatorClient is instantiated in this function.

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

label_detection

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

Response.label_annotations

- Take a screenshot of the output for the above commands

```
(env) raghuram@cloudshell:~/python-docs-samples/vision/snippets/detect (cloud-nataraja-raghuram) $ python detect.py logos image.png
Logos:
Portland State University
```

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

logo_detection

4. Speech

- Show the output for your lab notebook

```
(env) raghuram@cloudshell:~/python-docs-samples/speech/snippets (cloud-nataraja-raghuram)$ python transcribe.py resources/audio.raw
Transcript: how old is the Brooklyn Bridge
(env) raghuram@cloudshell:~/python-docs-samples/speech/snippets (cloud-nataraja-raghuram)$
```

- What is the name of the function?

transcribe_file

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

recognize

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

Transcript

5. Translate

- Show the output for your lab notebook

```
(env) raghuram@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-nataraja-raghuram)$ python snippets.py translate-text en '你有沒有帶外套'
Text: 你有沒有帶外套
Translation: did you bring a coat
Detected source language: zh-TW
(env) raghuram@cloudshell:~/python-docs-samples/translate/samples/snippets (cloud-nataraja-raghuram)$
```

- What is the name of the function?

translate_text

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

translate_client.translate

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

result["translatedText"]

6. Natural Language

- Show the output for your lab notebook

```
(env) raghuram@cloudshell:~ (cloud-nataraja-raghuram) $ python language.py 'homework is awful!'
"homework is awful!" has sentiment=-0.800000011920929

Entities are:
name: homework
(env) raghuram@cloudshell:~ (cloud-nataraja-raghuram) $ python language.py 'homework is ok'
"homework is ok" has sentiment=0.30000001192092896

Entities are:
name: homework
(env) raghuram@cloudshell:~ (cloud-nataraja-raghuram) $ python language.py 'homework is awesome?'
"homework is awesome?" has sentiment=0.4000000059604645

Entities are:
name: homework
(env) raghuram@cloudshell:~ (cloud-nataraja-raghuram) $ python language.py 'homework is awesome!'
"homework is awesome!" has sentiment=0.8999999761581421

Entities are:
name: homework
(env) raghuram@cloudshell:~ (cloud-nataraja-raghuram) $ 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
```

8. Code

- 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?

to fix the program's problem of classifying the image and audio as unrelated even though they contain related content, take into consideration the following changes:

Synonym Recognition:

Include a feature or make use of a library or service that identifies synonyms or related terms.

Adjust Matching Logic:

Make changes to the `compare_audio_to_image` function's comparison logic.

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

Image labels and entities must match

Consider labels as synonyms or closely related terms of entities instead of matching strings directly.

Make sure that related terms and synonyms are recognized correctly in several languages.

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

It is necessary to improve the comparison logic in order to resolve the present problem where the program is unable to identify the connection between audio and image content (for example, "ostriches" in audio and "Ostrich" in image 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, basketball, player

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

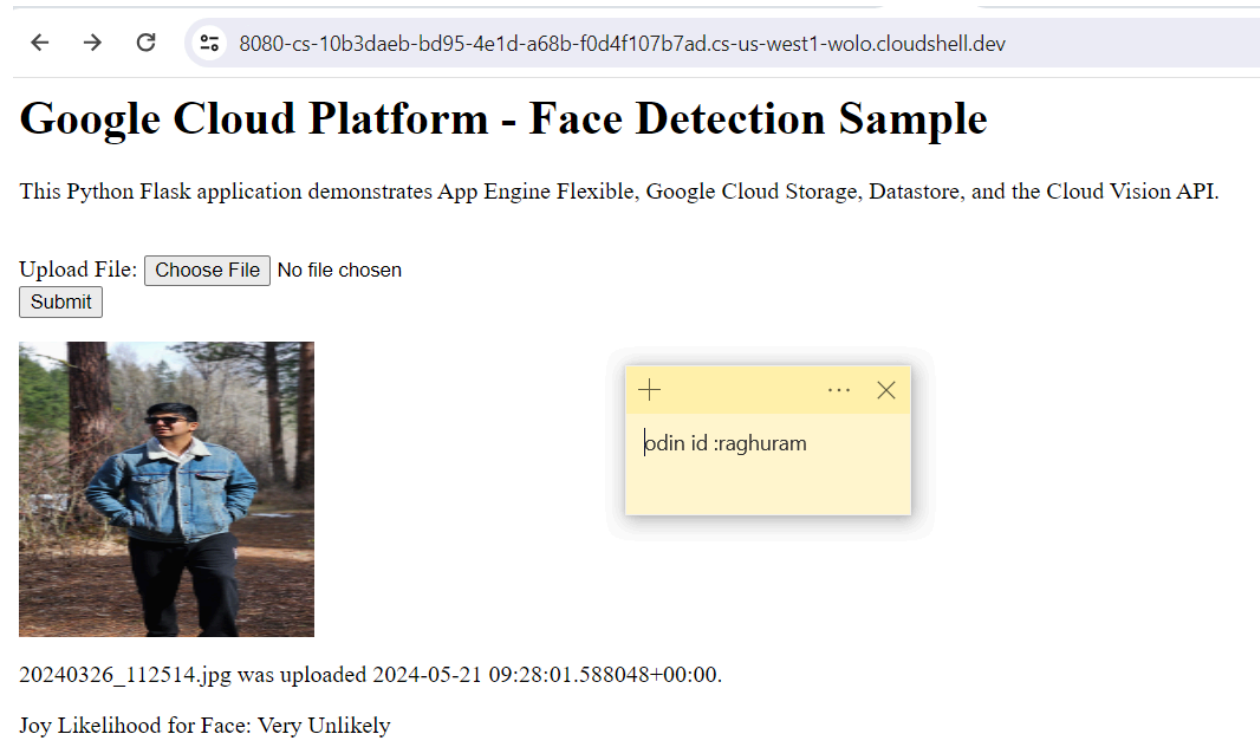
VideoIntelligenceServiceClient

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

Annotate_video

16. Application

- 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())
```

- 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?

```
photo = request.files["file"]
```

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

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

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

```
faces = vision_client.face_detection(image=image).face_annotations
```

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

```
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?

```
return redirect("/")
```