

CS 530 INTERNET WEB AND CLOUD SYSTEMS

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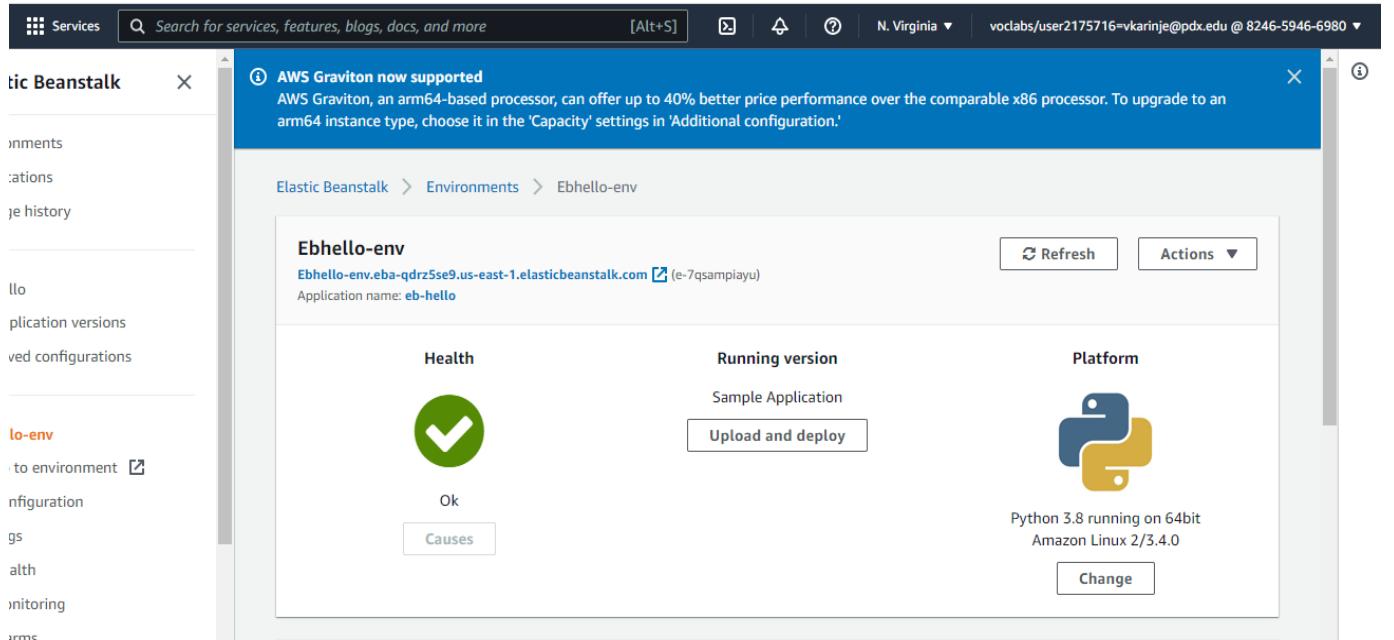
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06.1a: EB Guestbook

Running the application

- Take a screenshot showing it has been brought up successfully



Handling failures seamlessly

Visit the EC2 console and see that two instances have been brought up in separate availability zones for your application.

The screenshot shows the AWS EC2 Instances page. The left sidebar lists various EC2-related options like Dashboard, Global View, Requests, and Instances. The main pane displays a table of instances with the following data:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
EbhHello-env	i-056c036e139bbe927	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b
EbhHello-env	i-06d61bfaf69918d83	Running	t2.micro	2/2 checks passed	No alarms	us-east-1c

Select one of the instances running your environment and terminate it.

The screenshot shows the AWS EC2 Instances page after terminating an instance. A green banner at the top indicates "Successfully terminated i-06d61bfaf69918d83". The main pane now shows only one instance in the table:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
EbhHello-env	i-056c036e139bbe927	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b
<input checked="" type="checkbox"/> EbhHello-env	i-06d61bfaf69918d83	Terminated	t2.micro	2/2 checks passed	No alarms	us-east-1c

Below the table, a detailed view for the terminated instance is shown:

Instance: i-06d61bfaf69918d83 (EbhHello-env)

Details | Security | Networking | Storage | Status checks | Monitoring | Tags

Instance summary

Instance ID i-06d61bfaf69918d83 (EbhHello-env)	Public IPv4 address 3.218.143.179 open address	Private IPv4 addresses 172.31.4.181
IPv6 address -	Instance state Shutting-down	Public IPv4 DNS ec2-3-218-143-179.compute-1.amazonaws.com open address

- Take a screenshot of the replacement VM being started.

Instances (3) Info

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
EbhHello-env	i-05651d1f631b593e8	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a
EbhHello-env	i-056c036e139bbe927	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b
EbhHello-env	i-06d61bfaf69918d83	Terminated	t2.micro	-	No alarms	us-east-1c

Select an instance

Clean up

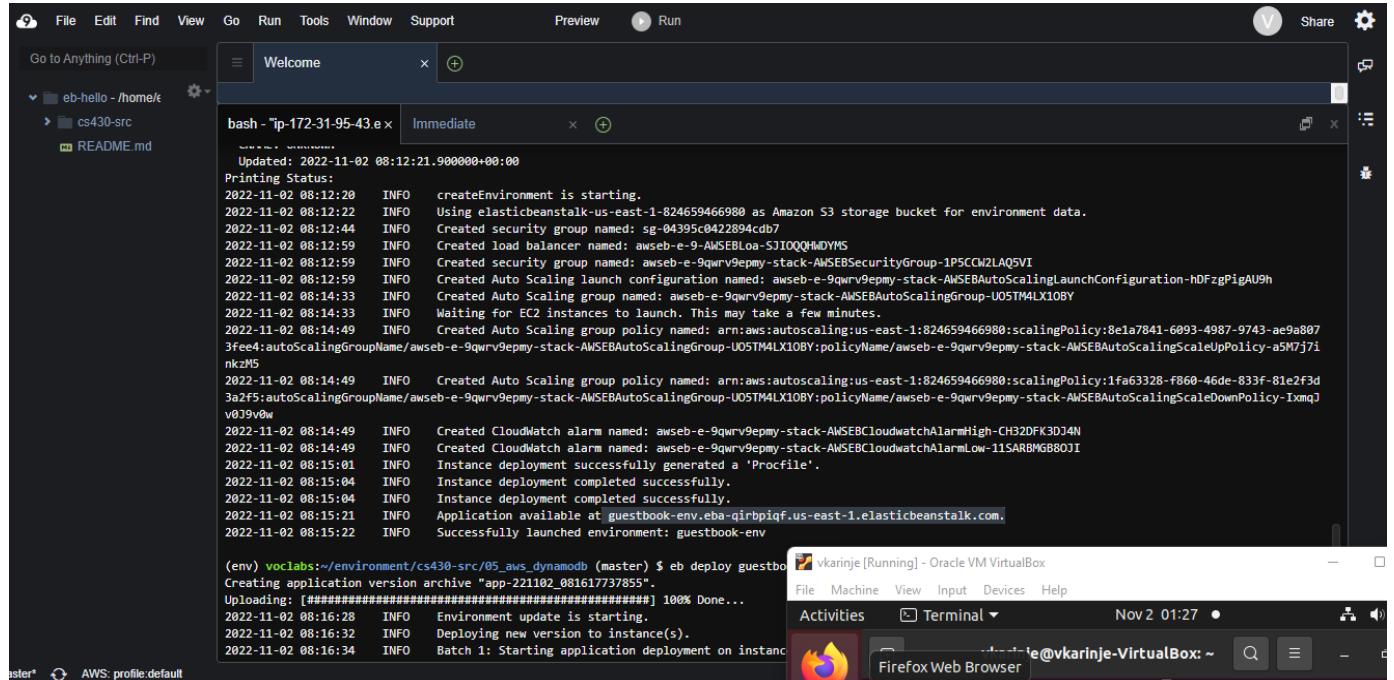
AWS Graviton now supported
AWS Graviton, an arm64-based processor, can offer up to 40% better price performance over the comparable x86 processor. To upgrade to an arm64 instance type, choose it in the 'Capacity' settings in 'Additional configuration.'

Elastic Beanstalk > Environments

All environments

Environment name	Health	Application name	Date created	Last modified	URL	Running versions
EbhHello-env (terminated)	-	eb-hello	2022-11-01 16:00:10 UTC-0700	2022-11-01 16:40:02 UTC-0700	EbhHello-env.eba-qdrz5se9.us-east-1.elasticbeanstalk.com	Sample Application

Deploying the Guestbook



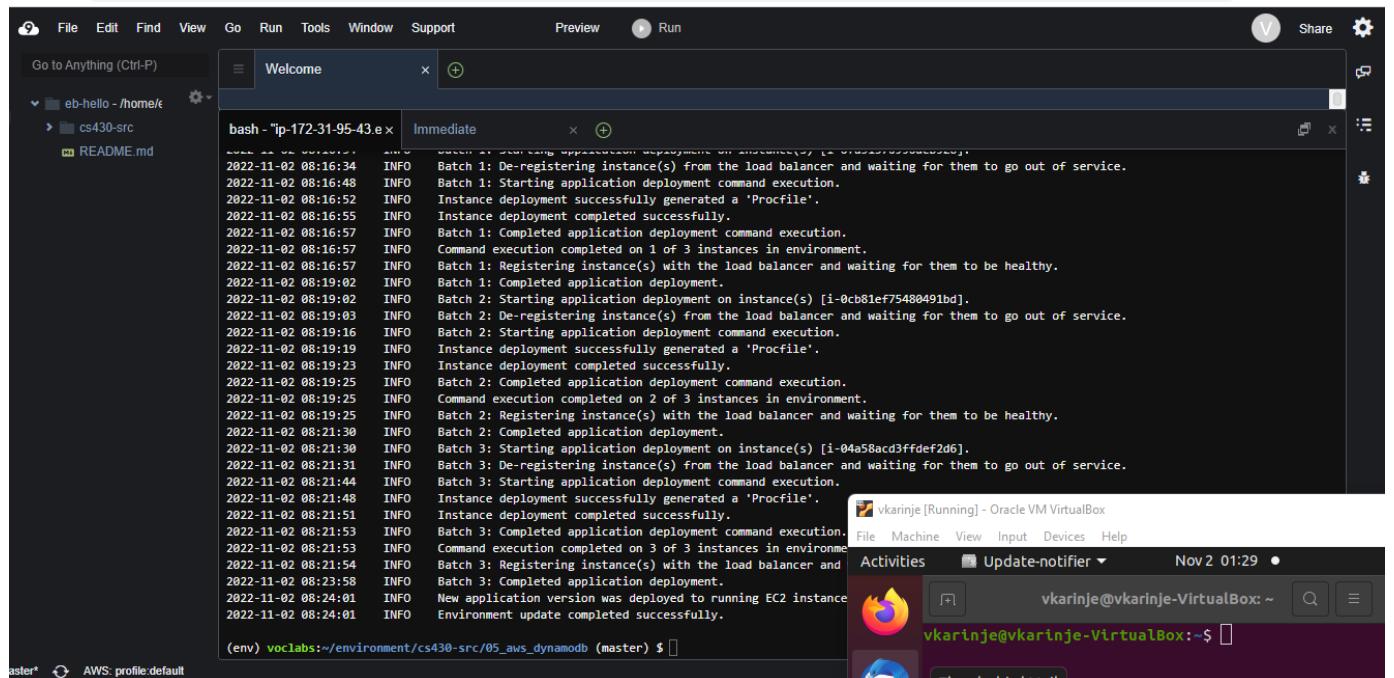
```

Go to Anything (Ctrl-P)
eb-hello - /home/e
cs430-src
README.md

bash - "ip-172-31-95-43.e" x Immediate x +
Updated: 2022-11-02 08:12:21.900000+00:00
Printing Status:
2022-11-02 08:12:20 INFO  createEnvironment is starting.
2022-11-02 08:12:22 INFO  Using elasticbeanstalk-us-east-1-824659466980 as Amazon S3 storage bucket for environment data.
2022-11-02 08:12:44 INFO  Created security group named: sg-04395c0422894cdb7
2022-11-02 08:12:59 INFO  Created load balancer named: awseb-e-9-AWSEBLoa-SJIOQQHMDYMS
2022-11-02 08:12:59 INFO  Created security group named: awseb-e-9qwr9epmy-stack-AWSEBSecurityGroup-1PSCCM2LAQ5VI
2022-11-02 08:12:59 INFO  Created Auto Scaling launch configuration named: awseb-e-9qwr9epmy-stack-AWSEBAutoScalingLaunchConfiguration-hDFzgPigAU9h
2022-11-02 08:14:33 INFO  Created Auto Scaling group named: awseb-e-9qwr9epmy-stack-AWSEBAutoScalingGroup-U0STM4LX10BY
2022-11-02 08:14:33 INFO  Waiting for EC2 instances to launch. This may take a few minutes.
2022-11-02 08:14:49 INFO  Created Auto Scaling group policy named: arn:aws:autoscaling:us-east-1:824659466980:scalingPolicy:8e1a7841-6093-4987-9743-ae9a8073fee4:autoScalingGroupName/awseb-e-9qwr9epmy-stack-AWSEBAutoScalingGroup-U0STM4LX10BY:policyName/awseb-e-9qwr9epmy-stack-AWSEBAutoScalingScaleUpPolicy-a5K7j71nkzH5
2022-11-02 08:14:49 INFO  Created Auto Scaling group policy named: arn:aws:autoscaling:us-east-1:824659466980:scalingPolicy:1fa63328-f860-46de-83f-81e2f3d3a2f5:autoScalingGroupName/awseb-e-9qwr9epmy-stack-AWSEBAutoScalingGroup-U0STM4LX10BY:policyName/awseb-e-9qwr9epmy-stack-AWSEBAutoScalingScaleDownPolicy-1xmqjv039v0W
2022-11-02 08:14:49 INFO  Created CloudWatch alarm named: awseb-e-9qwr9epmy-stack-AWSEBCloudwatchAlarmHigh-HCH32DFK3D34N
2022-11-02 08:14:49 INFO  Created CloudWatch alarm named: awseb-e-9qwr9epmy-stack-AWSEBCloudwatchAlarmLow-11SARBNGB8OJI
2022-11-02 08:15:01 INFO  Instance deployment successfully generated a 'Procfile'.
2022-11-02 08:15:04 INFO  Instance deployment completed successfully.
2022-11-02 08:15:04 INFO  Instance deployment completed successfully.
2022-11-02 08:15:21 INFO  Application available at guestbook-env.eba-qirbpjqf.us-east-1.elasticbeanstalk.com.
2022-11-02 08:15:22 INFO  Successfully launched environment: guestbook-env

(env) vclabs:~/environment/cs430-src/05_aws_dynamodb (master) $ eb deploy guestbook
Creating application version archive "app-221102_081617737855".
Uploading: [########################################] 100% Done...
2022-11-02 08:16:28 INFO  Environment update is starting.
2022-11-02 08:16:32 INFO  Deploying new version to instance(s).
2022-11-02 08:16:34 INFO  Batch 1: Starting application deployment on instance(s)

File Machine View Input Devices Help
Activities Terminal Nov 2 01:27
vkarinje@vkarinje-VirtualBox:~$ Firefox Web Browser
```



```

Go to Anything (Ctrl-P)
eb-hello - /home/e
cs430-src
README.md

bash - "ip-172-31-95-43.e" x Immediate x +
2022-11-02 08:16:34 INFO  Batch 1: Starting application deployment on instance(s) [i-0cb81ef75480491bd].
2022-11-02 08:16:48 INFO  Batch 1: De-registering instance(s) from the load balancer and waiting for them to go out of service.
2022-11-02 08:16:52 INFO  Batch 1: Starting application deployment command execution.
2022-11-02 08:16:55 INFO  Instance deployment successfully generated a 'Procfile'.
2022-11-02 08:16:57 INFO  Instance deployment completed successfully.
2022-11-02 08:16:57 INFO  Batch 1: Completed application deployment command execution.
2022-11-02 08:16:57 INFO  Command execution completed on 1 of 3 instances in environment.
2022-11-02 08:16:57 INFO  Batch 1: Registering instance(s) with the load balancer and waiting for them to be healthy.
2022-11-02 08:19:02 INFO  Batch 1: Completed application deployment.
2022-11-02 08:19:02 INFO  Batch 2: Starting application deployment on instance(s) [i-0cb81ef75480491bd].
2022-11-02 08:19:03 INFO  Batch 2: De-registering instance(s) from the load balancer and waiting for them to go out of service.
2022-11-02 08:19:16 INFO  Batch 2: Starting application deployment command execution.
2022-11-02 08:19:19 INFO  Instance deployment successfully generated a 'Procfile'.
2022-11-02 08:19:23 INFO  Instance deployment completed successfully.
2022-11-02 08:19:25 INFO  Batch 2: Completed application deployment command execution.
2022-11-02 08:19:25 INFO  Command execution completed on 2 of 3 instances in environment.
2022-11-02 08:19:25 INFO  Batch 2: Registering instance(s) with the load balancer and waiting for them to be healthy.
2022-11-02 08:21:38 INFO  Batch 2: Completed application deployment.
2022-11-02 08:21:38 INFO  Batch 3: Starting application deployment on instance(s) [i-04a58acd3ffdef2d6].
2022-11-02 08:21:31 INFO  Batch 3: De-registering instance(s) from the load balancer and waiting for them to go out of service.
2022-11-02 08:21:44 INFO  Batch 3: Starting application deployment command execution.
2022-11-02 08:21:48 INFO  Instance deployment successfully generated a 'Procfile'.
2022-11-02 08:21:51 INFO  Instance deployment completed successfully.
2022-11-02 08:21:53 INFO  Batch 3: Completed application deployment command execution.
2022-11-02 08:21:53 INFO  Command execution completed on 3 of 3 instances in environment.
2022-11-02 08:21:54 INFO  Batch 3: Registering instance(s) with the load balancer and
2022-11-02 08:23:58 INFO  Batch 3: Completed application deployment.
2022-11-02 08:24:01 INFO  New application version was deployed to running EC2 instance.
2022-11-02 08:24:01 INFO  Environment update completed successfully.

(env) vclabs:~/environment/cs430-src/05_aws_dynamodb (master) $ 
```

Not secure | guestbook-env.eba-qirbpiqf.us-east-1.elasticbeanstalk.com

Guestbook

[Sign here](#)

Entries

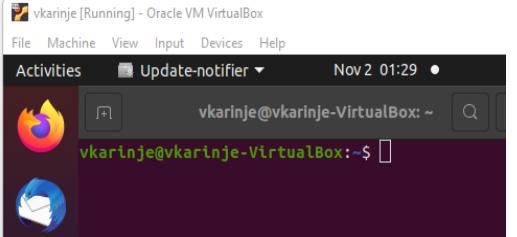
Varsha Karinje <vkarinje@pdx.edu>
signed on 2022-10-30 06:08:47.837999
Hello DynamoDB

Varsha Karinje <vkarinje@pdx.edu>
signed on 2022-10-30 13:33:21.969328
Hello Docker DynamoDB

Varsha Karinje <vkarinje@pdx.edu>
signed on 2022-10-30 14:06:25.364282
Hello Cloud9!

Varsha Karinje <vkarinje@pdx.edu>
signed on 2022-10-31 02:35:01.889722
Hello EC2

Varsha Karinje <vkarinje@pdx.edu>
signed on 2022-11-02 08:25:36.879805
Hello Elastic BeanStalk!



Services Search [Alt+S]

EC2 Experience us what you think X

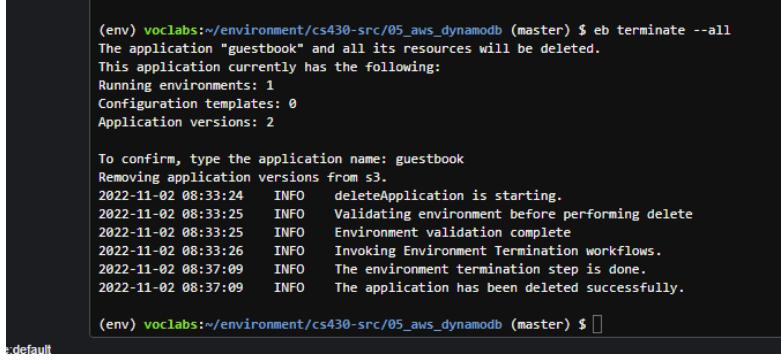
ashboard lobar View s i cies

Instances (9) Info

Find instance by attribute or tag (case-sensitive)

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	
<input type="checkbox"/>	guestbook-env	i-04a58acd3ffdef2d6	Running	t2.micro	2/2 checks passed	No alarms	+	us-east-1a
<input type="checkbox"/>	guestbook-env	i-0fa31570990deb926	Running	t2.micro	2/2 checks passed	No alarms	+	us-east-1b
<input type="checkbox"/>	guestbook-env	i-0cb81ef75480491bd	Running	t2.micro	2/2 checks passed	No alarms	+	us-east-1c
<input type="checkbox"/>	aws-cloud9-eb...	i-0b975523cbb16e6f6	Running	t2.micro	2/2 checks passed	No alarms	+	us-east-1d

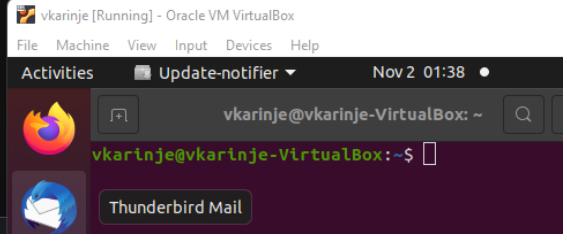
Clean up



```
(env) vclabs:~/environment/cs430-src/05_aws_dynamodb (master) $ eb terminate --all
The application "guestbook" and all its resources will be deleted.
This application currently has the following:
Running environments: 1
Configuration templates: 0
Application versions: 2

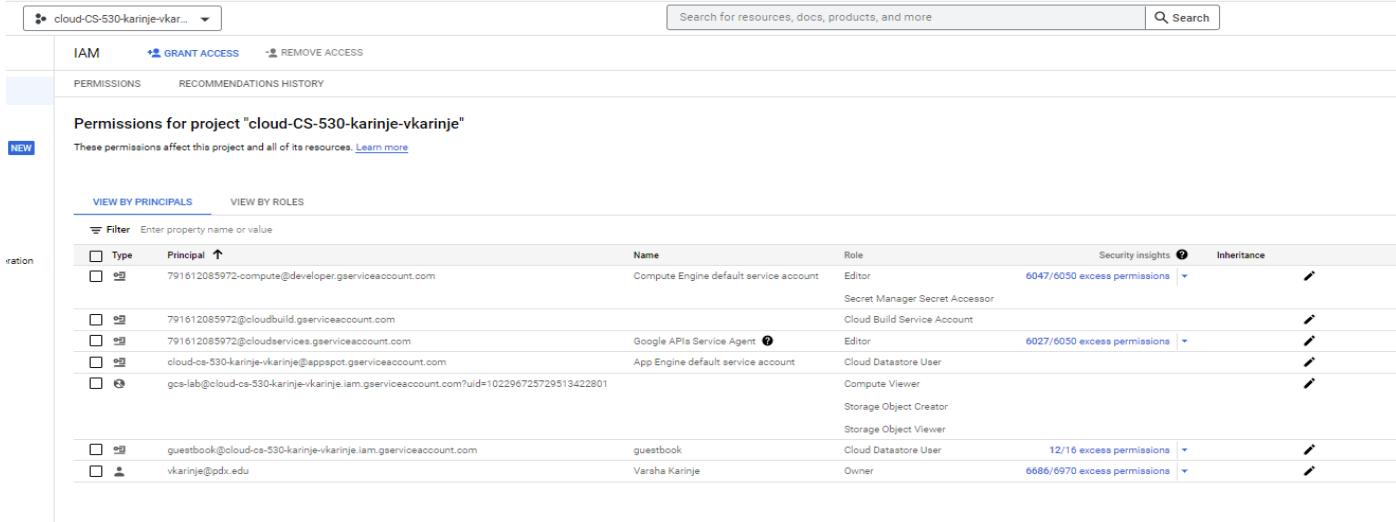
To confirm, type the application name: guestbook
Removing application versions from s3.
2022-11-02 08:33:24 INFO deleteApplication is starting.
2022-11-02 08:33:25 INFO Validating environment before performing delete
2022-11-02 08:33:25 INFO Environment validation complete
2022-11-02 08:33:26 INFO Invoking Environment Termination workflows.
2022-11-02 08:37:09 INFO The environment termination step is done.
2022-11-02 08:37:09 INFO The application has been deleted successfully.

(env) vclabs:~/environment/cs430-src/05_aws_dynamodb (master) $ 
```



06.1g: App Engine Guestbook

Reducing privileges



Type	Principal	Name	Role	Security Insights	Inheritance
Compute Engine default service account	791612085972-compute@developer.gserviceaccount.com	Compute Engine default service account	Editor	6047/6050 excess permissions	
Cloud Build Service Account	791612085972@cloudbuild.gserviceaccount.com				
Google APIs Service Agent	791612085972@cloudservices.gserviceaccount.com	Google APIs Service Agent	Editor	6027/6050 excess permissions	
App Engine default service account	cloud-ce-530-karinje-vkarinje@appspot.gserviceaccount.com	App Engine default service account	Cloud Datastore User		
Compute Viewer	gcs-lab@cloud-ce-530-karinje-vkarinje.iam.gserviceaccount.com?uid=102296725729513422801				
Storage Object Creator					
Storage Object Viewer					
Cloud Datastore User	guestbook@google.com	guestbook	Cloud Datastore User	12/16 excess permissions	
Owner	vkarinje@pdx.edu	Varsha Karinje	Owner	6686/6970 excess permissions	

Deploying the Guestbook

```
vkarinje@cloudshell:~/cs430-svc/05_gcp_datastore (cloud-cs-530-karinje-vkarinje)$ gcloud app deploy
Services to deploy:
descriptor: [/home/vkarinje/cs430-svc/05_gcp_datastore/app.yaml]
source: [/home/vkarinje/cs430-svc/05_gcp_datastore]
target project: [cloud-cs-530-karinje-vkarinje]
target service: [default]
target version: [20221107t091922]
target url: [https://cloud-cs-530-karinje-vkarinje.appspot.com]
target service account: [App Engine default service account]

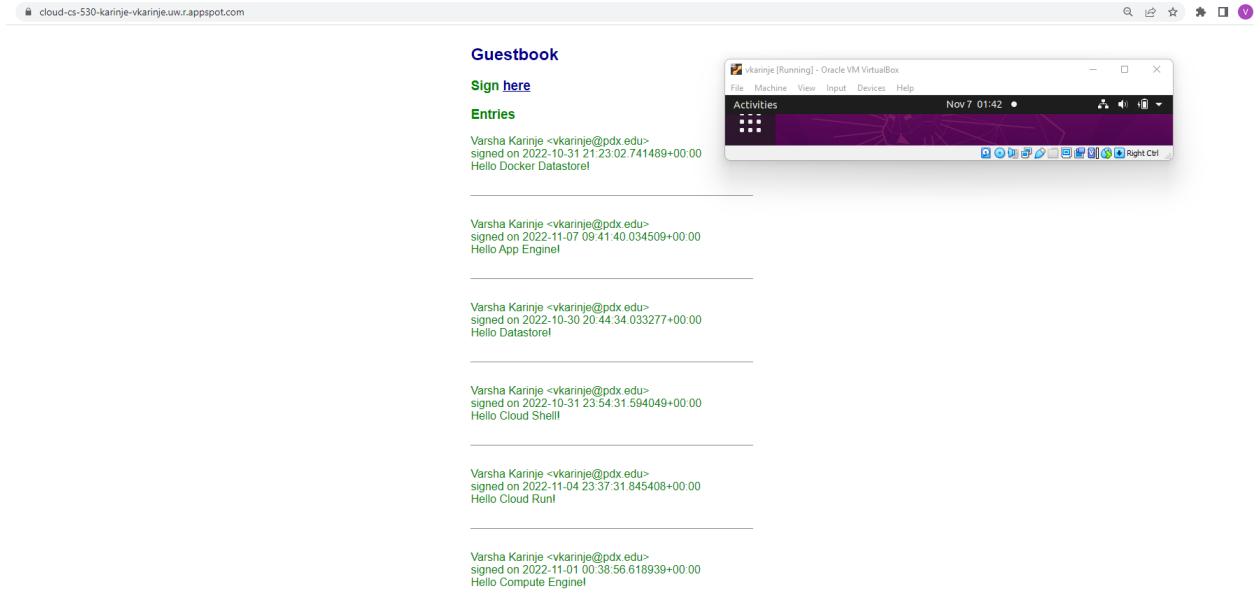
Do you want to continue (Y/n)? Y

Beginning deployment of service [default]...
Uploading 0 files to Google Cloud Storage
100%
File upload done.
Updating service [default]...done.
Setting traffic split for service [default]...done.
Stopping version [cloud-cs-530-karinje-vkarinje/default/2022107t091703].
Sent request to stop version [cloud-cs-530-karinje-vkarinje/default/20221107t091703]. This operation may take some time to complete. If you would like to verify that it succeeded, run:
$ gcloud app versions describe -s default 20221107t091703
until it shows that the version has stopped.
Deployed service [default] to [https://cloud-cs-530-karinje-vkarinje.appspot.com]

You can stream logs from the command line by running:
$ gcloud app logs tail -s default

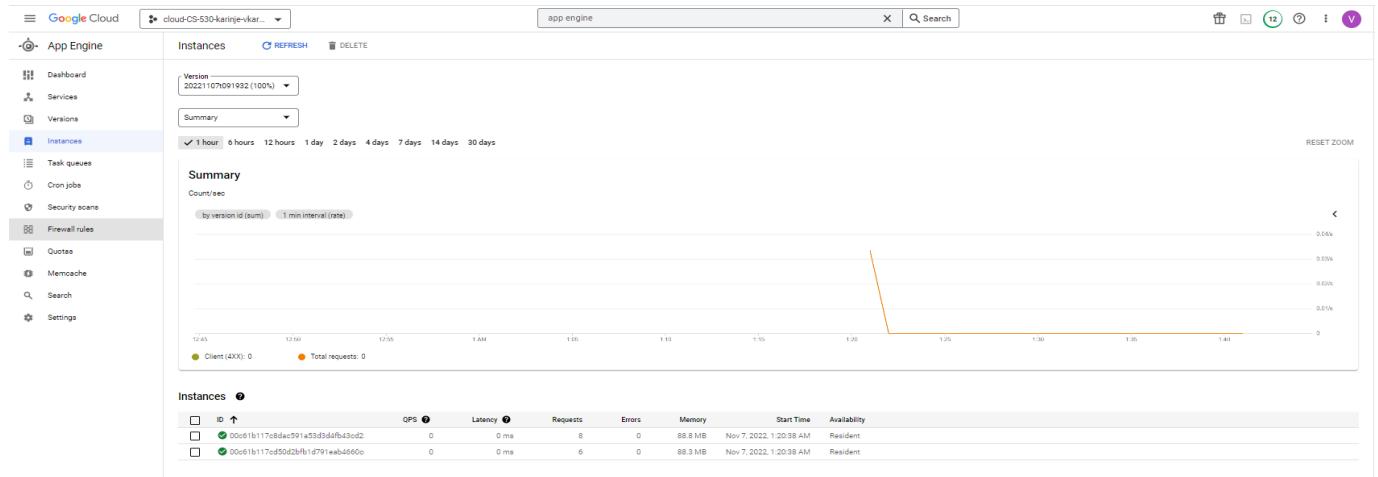
To view your application in the web browser run:
```

- Take a screenshot of the output that includes the URL in the address bar for your lab notebook.

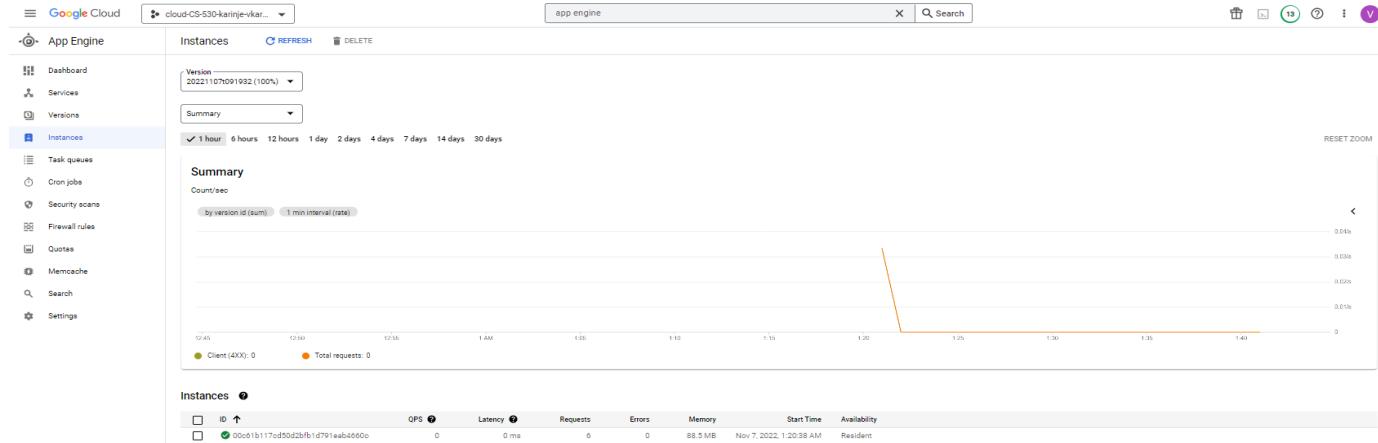


Handling failures seamlessly

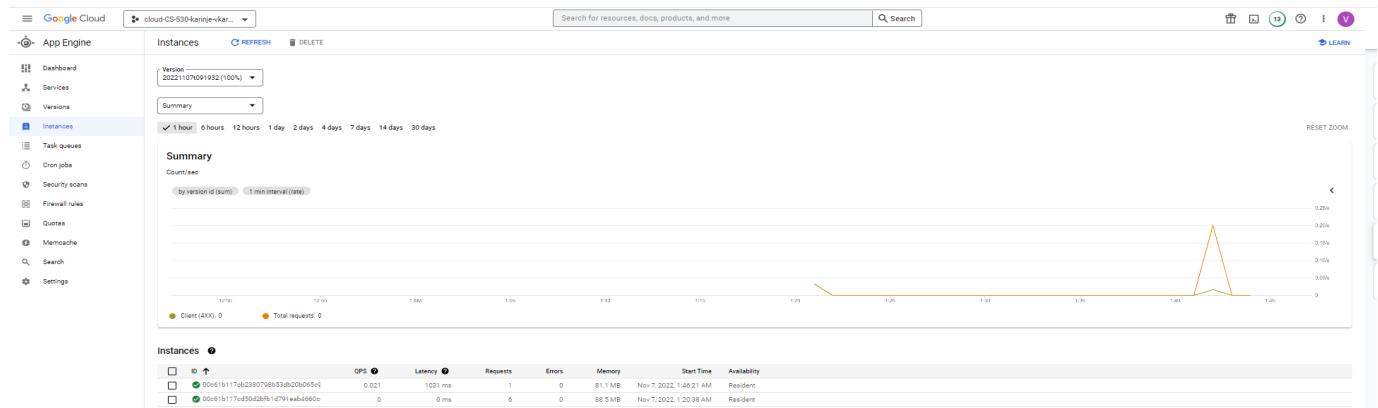
- Take a screenshot of them.



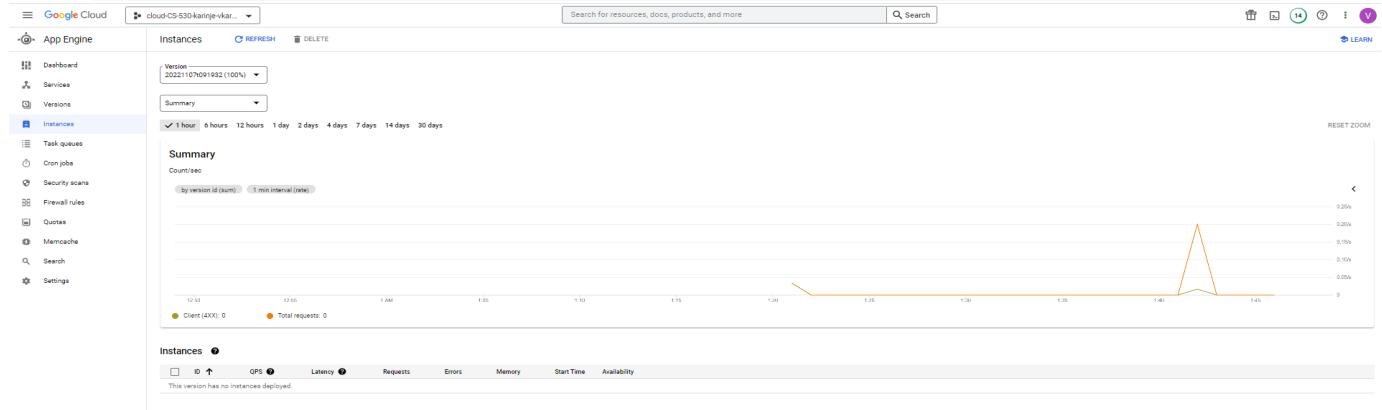
Click on one of the instances and delete it.



Refresh the page and see how quickly it has been replaced by another replica in order to maintain the number of replicas specified in app.yaml!

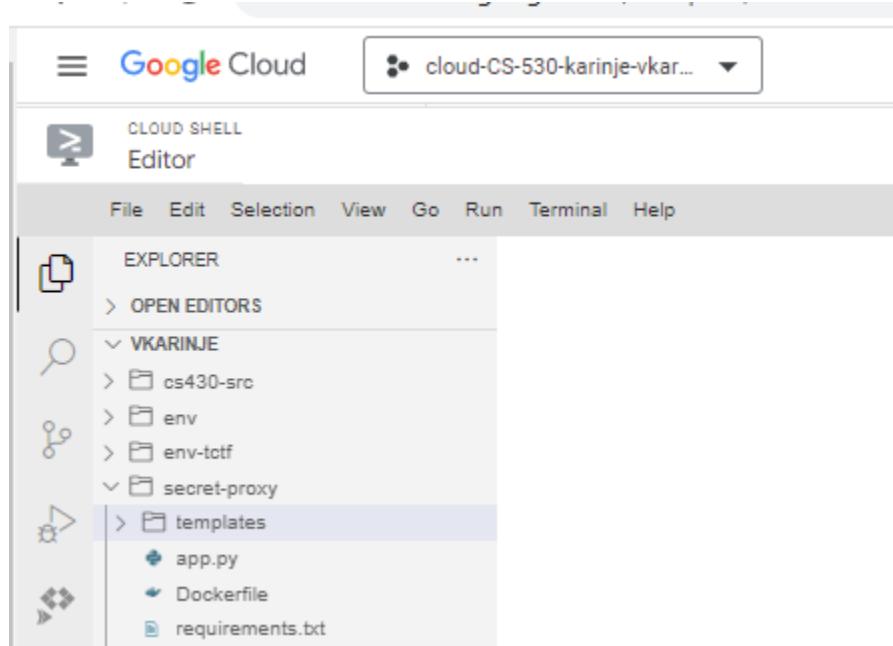


Clean up

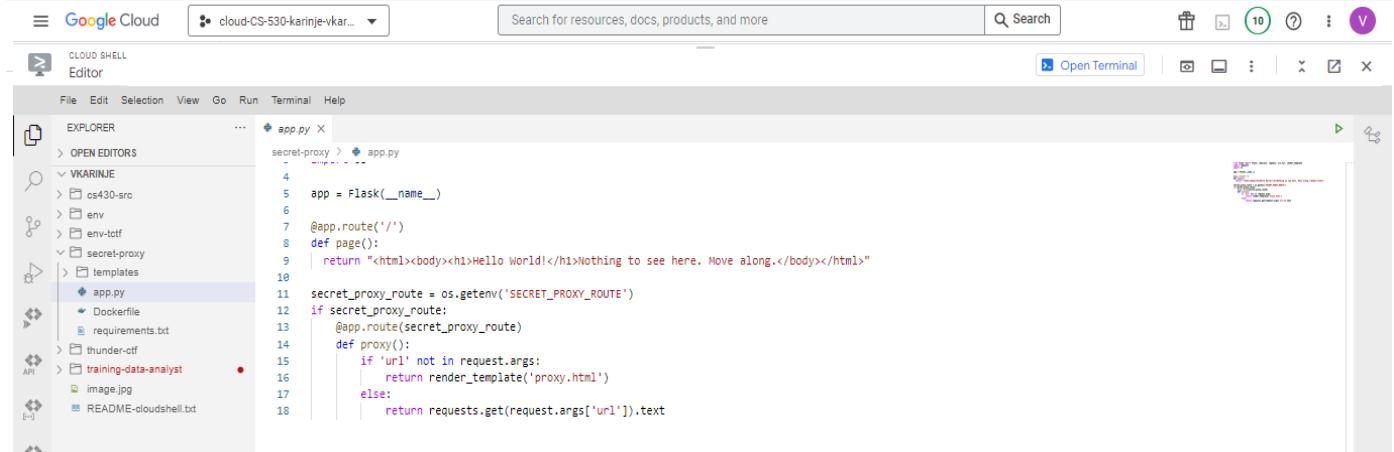


06.2gCloud Run, Secret Manager (Web proxy)

Application



App.py



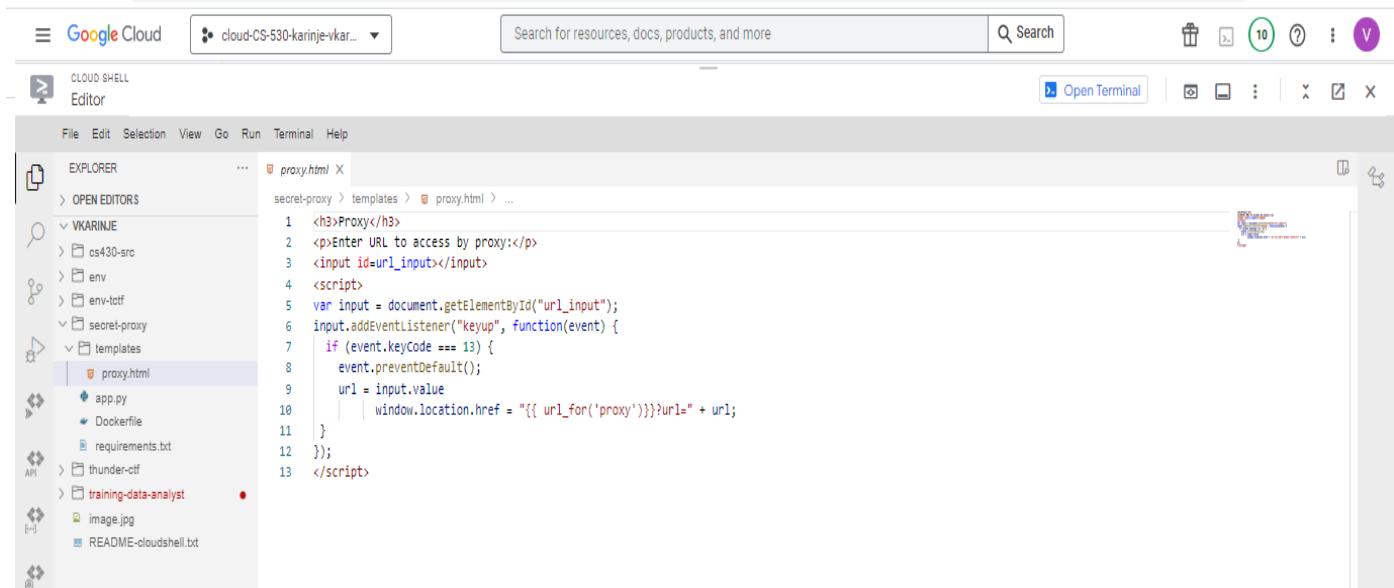
The screenshot shows the Google Cloud Shell interface with the 'CLOUD SHELL' tab selected. The 'EXPLORER' view on the left shows a project structure with files like app.py, Dockerfile, requirements.txt, and templates/proxy.html. The 'app.py' file is open in the editor, displaying Python code for a Flask application. The code includes a route for '/' returning a simple HTML page, a secret proxy route, and a proxy function that returns a rendered template or a request from a URL.

```

4
5     app = Flask(__name__)
6
7     @app.route('/')
8     def page():
9         return "<html><body><h1>Hello World!</h1>Nothing to see here. Move along.</body></html>"
10
11    secret_proxy_route = os.getenv('SECRET_PROXY_ROUTE')
12    if secret_proxy_route:
13        @app.route(secret_proxy_route)
14        def proxy():
15            if 'url' not in request.args:
16                return render_template('proxy.html')
17            else:
18                return requests.get(request.args['url']).text

```

templates/proxy.html



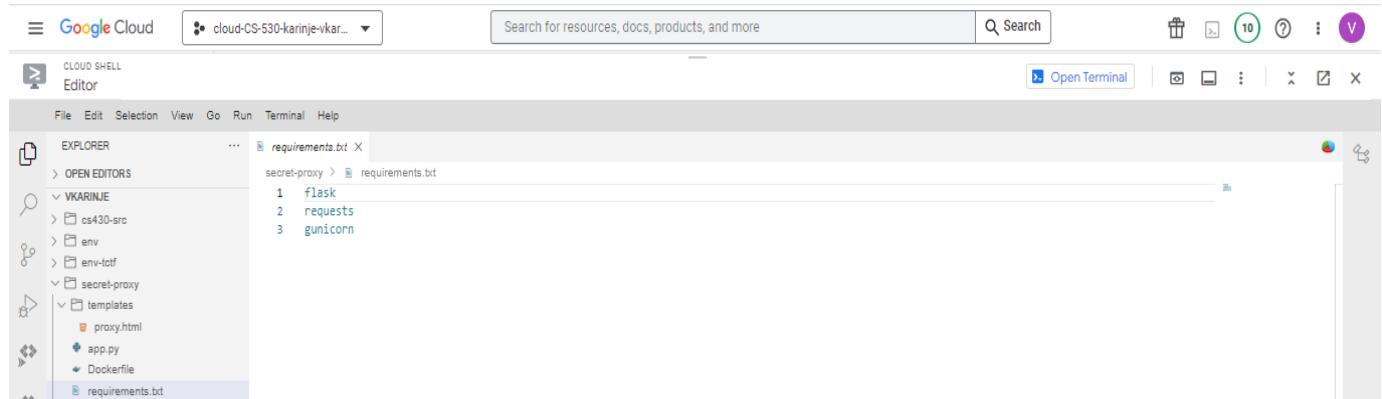
The screenshot shows the Google Cloud Shell interface with the 'CLOUD SHELL' tab selected. The 'EXPLORER' view on the left shows the same project structure. The 'proxy.html' file is open in the editor, displaying a simple HTML form with a script that listens for keyup events on an input field to change the window location.

```

1 <h3>Proxy</h3>
2 <p>Enter URL to access by proxy:</p>
3 <input id=url_input></input>
4 <script>
5 var input = document.getElementById("url_input");
6 input.addEventListener("keyup", function(event) {
7   if (event.keyCode === 13) {
8     event.preventDefault();
9     url = input.value
10    | | window.location.href = "{{ url_for('proxy') }}?url=" + url;
11  }
12 });
13 </script>

```

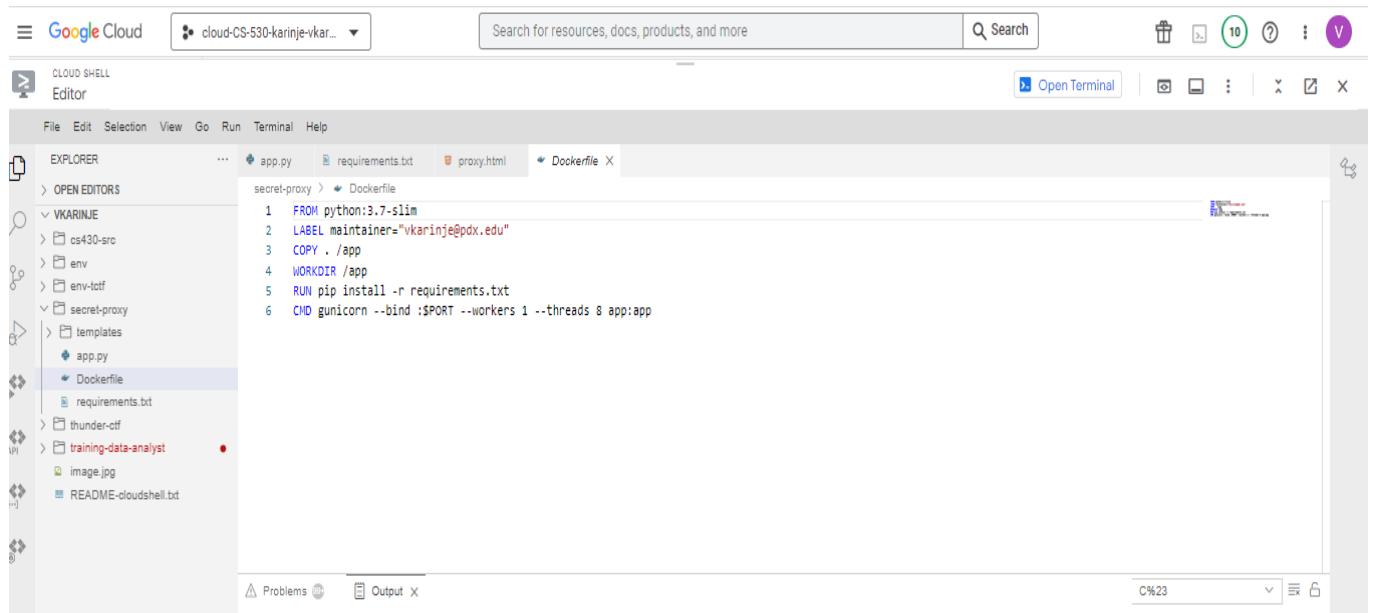
Requirements.txt



The screenshot shows the Google Cloud Shell interface. The left sidebar displays a file tree under 'VKARINJE'. In the main editor area, the file 'requirements.txt' is open, showing the following content:

```
flask
requests
gunicorn
```

Dockerfile



The screenshot shows the Google Cloud Shell interface. The left sidebar displays a file tree under 'VKARINJE'. In the main editor area, the file 'Dockerfile' is open, showing the following content:

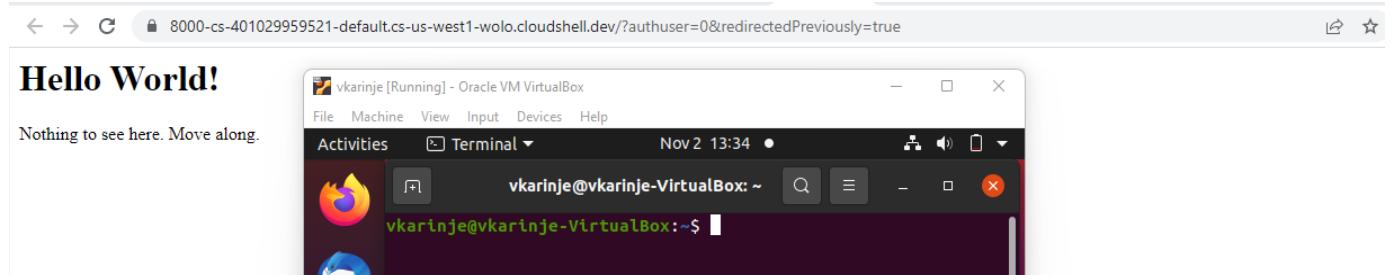
```
FROM python:3.7-slim
LABEL maintainer="vkarinje@pdx.edu"
COPY . /app
WORKDIR /app
RUN pip install -r requirements.txt
CMD gunicorn --bind :$PORT --workers 1 --threads 8 app:app
```

Build and test in Cloud Shell

```
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ docker build -t secret-proxy-image .
Sending build context to Docker daemon 6.144kB
Step 1/6 : FROM python:3.7-slim
3.7-slim: Pulling from library/python
e9995326b091: Pull complete
f3d7f077cdde: Pull complete
ffc9c06e5974: Pull complete
8df28e49d8f: Pull complete
f46edf997d16: Pull complete
Digest: sha256:47bad4fb65c0194bddff388ce44b19a21f6e40869bb96806514ffbb0ef9dd32
Status: Downloaded newer image for python:3.7-slim
--> 68f77be1394d
Step 2/6 : LABEL maintainer="vkarinje@pdx.edu"
--> Running in 9e8f2163ccb0
Removing intermediate container 9e8f2163ccb0
--> fb95a35548d0
Step 3/6 : COPY . /app
--> 5f63dcf6ead96
Step 4/6 : WORKDIR /app
--> Running in 377410daba2e
Removing intermediate container 377410daba2e
--> cf893909cce2f
Step 5/6 : RUN pip install -r requirements.txt
--> Running in 5f251429d1fb
Collecting flask
  Downloading Flask-2.2.2-py3-none-any.whl (101 kB)
  101.5/101.5 KB 5.2 MB/s eta 0:00:00
Collecting requests
  Downloading requests-2.28.1-py3-none-any.whl (62 kB)
  62.8/62.8 KB 10.2 MB/s eta 0:00:00
Collecting gunicorn
  Downloading gunicorn-20.1.0-py3-none-any.whl (79 kB)
  79.5/79.5 KB 12.6 MB/s eta 0:00:00
Collecting importlib-metadata>=3.6.0
  Downloading importlib_metadata-5.0.0-py3-none-any.whl (21 kB)
Collecting click>=8.0

```

```
Successfully built 882aee9c5c73
Successfully tagged secret-proxy-image:latest
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ docker run --env PORT=8000 -p 8000:8000 --name=proxy --rm -it secret-proxy-image
[2022-11-02 20:25:40 +0000] [7] [INFO] Starting gunicorn 20.1.0
[2022-11-02 20:25:40 +0000] [7] [INFO] Listening at: http://0.0.0.0:8000 (7)
[2022-11-02 20:25:40 +0000] [7] [INFO] Using worker: gthread
[2022-11-02 20:25:40 +0000] [10] [INFO] Booting worker with pid: 10
```



Build and test in Cloud Shell

```
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: vkarinje
Password:
WARNING! Your password will be stored unencrypted in /home/vkarinje/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

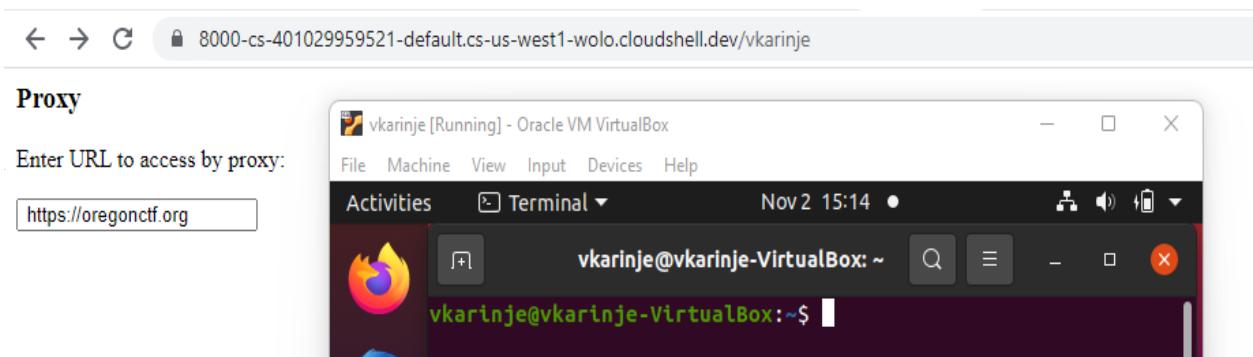
Login_Succeeded
```

```
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ docker build -t secret-proxy-image ./
Sending build context to Docker daemon 6.144kB
Step 1/6 : FROM python:3.7-slim
3.7-slim: Pulling from library/python
e9995326b091: Pull complete
f3d7f077cdde: Pull complete
ffc9c06e5974: Pull complete
8dfa28e49d8f: Pull complete
fa6edf997d16: Pull complete
Digest: sha256:47bad4fb65c0194bddff288ce44b19a21f6e40869bb96806514ffbb0ef9dd32
Status: Downloaded newer image for python:3.7-slim
--> 68f77bc1394d
Step 2/6 : LABEL maintainer="vkarinje@pdx.edu"
--> Running in 5d8278a66e3c
Removing intermediate container 5d8278a66e3c
--> 472360d82a27
Step 3/6 : COPY . /app
```

```
Successfully built 85865cda0f5f
Successfully tagged secret-proxy-image:latest
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ docker run -e SECRET_PROXY_ROUTE=/vkarinje --env PORT=8000 -p 8000:8000 --name=proxy --rm -it secret-proxy-image
[2022-11-02 22:06:30 +0000] [7] [INFO] Starting gunicorn 20.1.0
[2022-11-02 22:06:30 +0000] [7] [INFO] Listening at: http://0.0.0.0:8000 (7)
[2022-11-02 22:06:30 +0000] [7] [INFO] Using worker: gthread
[2022-11-02 22:06:30 +0000] [10] [INFO] Booting worker with pid: 10
```

Setup secret proxy

- Take a screenshot of the proxy and its results including the URL containing your OdinID



Capture-the-Flag security games and codelabs

Ones we've developed:

- Computer Systems Programming (CS 201) [CTF](#)
- Malware Reverse Engineering (CS 492) [CTF](#)
- angi Symbolic Execution (CS 492) [CTF](#)
- Cloud Security (CS 430/495) [Thunder CTF](#)
- Fuzzing (CS 492) [codelab](#)
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- Etherernaut (Ethereum) [CTF](#)
- CryptoPals (Cryptanalysis) [CTF](#)

Portland State's CTF Slack channel [here](#)

Resources

Some recommended resources include:

Answer the following question for your lab notebook.

- What is the security advantage of passing in the secret proxy route as an environment variable?

Ans: This will help users to hide their information from hackers.

Stop the container instance and then delete the container image from Cloud Shell.

```
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ docker stop proxy
Error response from daemon: No such container: proxy
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ docker rmi secret-proxy-image
Untagged: secret-proxy-image:latest
Deleted: sha256:85865cd0f5fb7da351f8abeec7a910d762f8e7ee710033a6c810cc1ec54d6f2
Deleted: sha256:0779001073f1d6b3aec3a99f5594535ff46969e4b6cf36570fc6f6b809775cb9
Deleted: sha256:bff4274e565cd298a3e9b34955c74bd4dfa3ba743b3626bd40f747b1e3ea426
Deleted: sha256:a9b4806821df45b0fc723841fc4f02e59aa815e314969fe75e7d36588298c902
Deleted: sha256:d4c623db6f6e2a8aec9503c7e7f06206eb184a9899a4c46f7a30f162d1223d8
Deleted: sha256:e0c36d4279d47ffee617b3971413f0060740ca3700c8e10ad2ea581e7ce166ba
Deleted: sha256:472360d82a378557c6355c7b090f11590cb5afc47aedd04e2b303e4f8ec1b3b
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ docker rmi secret-proxy-image
Error: No such image: secret-proxy-image
vkarinje@cloudshell:~/secret-proxy (cloud-CS-530-karinje-vkarinje)$ |
```

Cloud Build and Container Registry

```
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ gcloud builds submit --tag gcr.io/${GOOGLE_CLOUD_PROJECT}/secret-proxy
Creating temporary tarball archive of 4 file(s) totalling 1.1 KiB before compression.
Uploading tarball of [...] to [gs://cloud-cs-530-karinje-vkarinje_cloudbuild/source/1667464269.008865-226601ab3de54493b50141ad535c20c5.tgz]
Created [https://cloudbuild.googleapis.com/v1/projects/cloud-cs-530-karinje-vkarinje/locations/global/builds/5404cd5f-7fff-4377-8342-a746777af25b].
Logs are available at [ https://console.cloud.google.com/cloud-build/builds/5404cd5f-7fff-4377-8342-a746777af25b?project=791612085972 ].
----- REMOTE BUILD OUTPUT -----
starting build "5404cd5f-7fff-4377-8342-a746777af25b"

FETCHSOURCE
Fetching storage object: gs://cloud-cs-530-karinje-vkarinje_cloudbuild/source/1667464269.008865-226601ab3de54493b50141ad535c20c5.tgz#1667464269310905
Copying gs://cloud-cs-530-karinje-vkarinje_cloudbuild/source/1667464269.008865-226601ab3de54493b50141ad535c20c5.tgz#1667464269310905...
[ 1 files] 1.0 KiB/ 1.0 KiB
Operation completed over 1 objects/1.0 KiB.
BUILD
Already have image (with digest): gcr.io/cloud-builders/docker
Sending build context to Docker daemon 6.144kB
Step 1/6 : FROM python:3.7-slim
3.7-slim: Pulling from library/python
e9995326b091: Already exists
f3d7f077cdde: Pulling fs layer
ffc9c06e5974: Pulling fs layer
8dfa28e49d8f: Pulling fs layer
fa6edf997d16: Pulling fs layer
fa6edf997d16: Waiting
8dfa28e49d8f: Verifying Checksum
8dfa28e49d8f: Download complete
f3d7f077cdde: Download complete
fa6edf997d16: Verifying Checksum
fa6edf997d16: Download complete
ffc9c06e5974: Verifying Checksum
ffc9c06e5974: Download complete
f3d7f077cdde: Pull complete
ffc9c06e5974: Pull complete
8dfa28e49d8f: Pull complete
fa6edf997d16: Pull complete
```

```
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ gcloud container images list
NAME: gcr.io/cloud-cs-530-karinje-vkarinje/secret-proxy
Only listing images in gcr.io/cloud-cs-530-karinje-vkarinje. Use --repository to list images in other repositories.
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ |
```

- Take a screenshot of the image in the registry that shows the size of the container for your lab notebook.

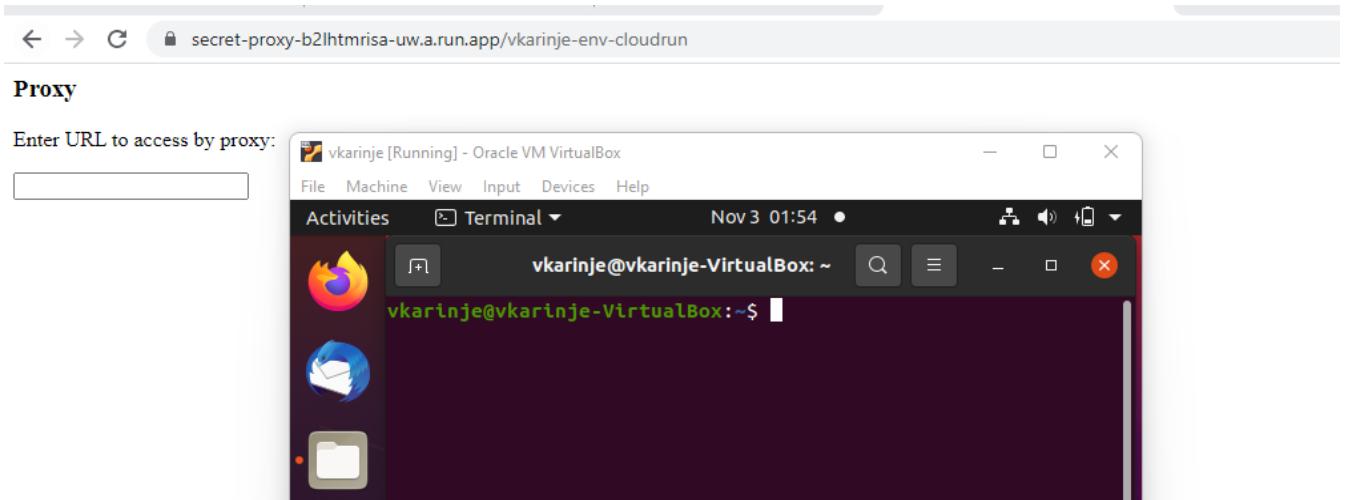
The screenshot shows the Google Cloud Container Registry interface. The left sidebar has 'Container Registry' selected under 'Images'. The main area shows a list of images for the 'secret-proxy' repository. One image is listed: '177dcae6f59a' (latest tag), which has a Virtual Size of 50.1 MB and was uploaded 3 minutes ago. The interface includes standard navigation and search tools.

Name	Tags	Virtual Size	Created	Uploaded
177dcae6f59a	latest	50.1 MB	3 minutes ago	3 minutes ago

Deploy to Cloud Run

```
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ gcloud container images list
NAME: gcr.io/cloud-cs-530-karinje/vkarinje/secret-proxy
Only listing images in gcr.io/cloud-cs-530-karinje/vkarinje. Use --repository to list images in other repositories.
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ gcloud run deploy secret-proxy \
--image gcr.io/${GOOGLE_CLOUD_PROJECT}/secret-proxy \
--platform=managed --region=us-west1 --allow-unauthenticated \
--update-env-vars SECRET_PROXY_ROUTE=/vkarinje-env-cloudrun
API [run.googleapis.com] not enabled on project [791612085972]. Would you like to enable and retry (this will take a few minutes)? (y/N)? y
Enabling service [run.googleapis.com] on project [791612085972]...
Operation "operations/acf.p2-791612085972-d38d29cf-d6aa-422a-b0e1-4d5c854c6673" finished successfully.
Deploying container to Cloud Run service [secret-proxy] in project [cloud-cs-530-karinje-vkarinje] region [us-west1]
OK Deploying new service... Done.
OK Creating Revision... Revision deployment finished. Checking container health.
OK Routing traffic...
OK Setting IAM Policy...
Done.
Service [secret-proxy] revision [secret-proxy-00001-gut] has been deployed and is serving 100 percent of traffic.
Service URL: https://secret-proxy-b2lhtmrisa-uw.a.run.app
vkarinje@cloudshell:~/secret-proxy (cloud-cs-530-karinje-vkarinje)$ ||
```

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



Capture-the-Flag security games and codelabs

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Resources

Finally, remove the environment variable on Cloud Run by re-deploying with the following flag.

```
vkarinje@cloudshell:~/secret-proxy (cloud-ea-530-karinje-vkarinje)$ gcloud run deploy secret-proxy --image gcr.io/${GOOGLE_CLOUD_PROJECT}/secret-proxy --platform=managed --region=us-west1 --allow-unauthenticated
d --remove-env-vars=SECRET_PROXY_ROUTE
Deploying container to Cloud Run service [secret-proxy] in project [cloud-ea-530-karinje-vkarinje] region [us-west1]
OK Deploying...
OK Creating Revision...
OK Routing traffic...
OK Setting IAM Policy...
Done.
Service [secret-proxy] revision [secret-proxy-00002-mav] has been deployed and is serving 100 percent of traffic.
Service URL: https://secret-proxy-b2lhtmrsa-uw.a.run.app
vkarinje@cloudshell:~/secret-proxy (cloud-ea-530-karinje-vkarinje)$ ||
```

- Take a screenshot of the error page that includes the proxy URL for your lab notebook.

Not Found

The requested URL was not found on the server. If you entered the URL manually please check your spelling and try again.

Secret manager

The screenshot shows the 'Secret details' page for a secret named 'proxy-secret'. The secret is described as 'Secret: "proxy-secret"'. It has one version listed, which is enabled and Google-managed, created on 11/3/22 at 2:09 AM.

The screenshot shows the 'Permissions for project "cloud-CS-530-karinje-vkarinje"' page. It lists a single principal, 'Compute Engine default service account', with the role 'Editor'. There is a note indicating '6047/6050 excess permissions'.

Deploy to Cloud Run with Secret Manager

The screenshot shows a terminal session in Cloud Shell. The user is deploying a Cloud Run service named 'secret-proxy' using the command:

```
gcloud run deploy secret-proxy --image gcr.io/${GOOGLE_CLOUD_PROJECT}/secret-proxy --platform=managed --region=us-west1 --allow-unauthenticated --update-secrets SECRET_PROXY ROUTE=proxy-secret:latest
```

The deployment process is shown as follows:

- Deploying container to Cloud Run service [secret-proxy] in project [cloud-CS-530-karinje-vkarinje] region [us-west1]
- OK Deploying... Done.
- OK Creating Revision...
- OK Routing traffic...
- OK Setting IAM Policy...
- Done.

The service has been deployed and is serving 100 percent of traffic. The URL is <https://secret-proxy-b2lhtmrisa-uw.a.run.app>.

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

secret-proxy-b2lhtmrsa-uw.a.run.app/vkarinje-env-secretmanager

Proxy

Enter URL to access by proxy:

vkarinje [Running] - Oracle VM VirtualBox

Activities Nov 3 15:30

secret-proxy-b2lhtmrsa-uw.a.run.app/vkarinje-env-secretmanager?url=https://google.com

Search Images Maps Play YouTube News Gmail Drive More > Web History | Settings | Sign in

Google

Advanced search

Google Search I'm Feeling Lucky

Advertising Programs Business Solutions About Google
© 2022 - Privacy - Terms

vkarinje [Running] - Oracle VM VirtualBox

Activities Nov 3 15:30

secret-proxy-b2lhtmrsa-uw.a.run.app/vkarinje-env-secretmanager?url=http://169.254.169.254/computeMetadata/v1

v1/

vkarinje [Running] - Oracle VM VirtualBox

Activities Terminal Nov 3 15:32

secret-proxy-b2lhtmrsa-uw.a.run.app/vkarinje-env-secretmanager?url=http://169.254.169.254/computeMetadata/v1

Missing required header: Metadata-Flavor

vkarinje [Running] - Oracle VM VirtualBox

Activities Terminal Nov 3 15:34

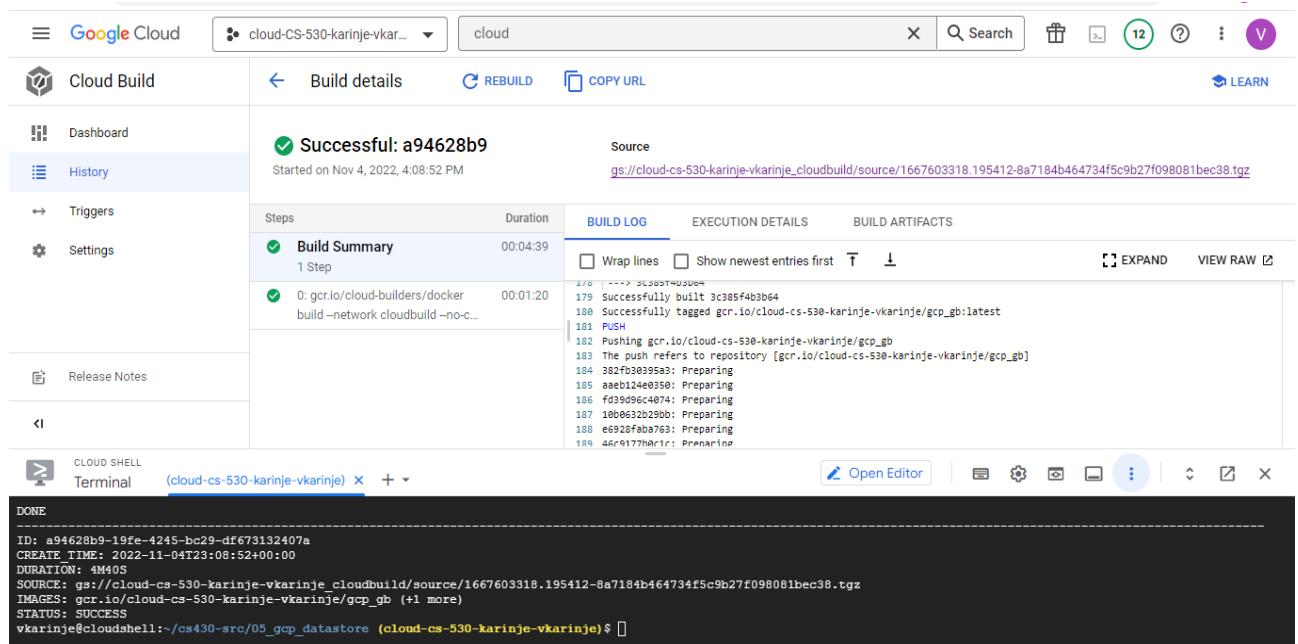
- Identify the vulnerability in your lab notebook that Google has prevented.

Ans: Google prevented the SSRF vulnerability that allows the attacker to fetch the metadata from through the URL that will be passed and retrieve sensitive information like user credentials etc.

06.3g: Cloud Run Guestbook

Prepare a container image

- Take a screenshot that includes the output of the command and the time it took to execute.



The screenshot shows the Google Cloud Build interface. On the left, there's a sidebar with 'Cloud Build' selected, followed by 'Dashboard' and 'History'. Below that are 'Triggers' and 'Settings'. At the bottom of the sidebar are 'Release Notes' and a 'Cloud Shell' section with a terminal tab open. The main area shows a 'Build details' card for a successful build (ID: a94628b9). It includes a 'Build Summary' table with one step, a 'Source' link, and a detailed 'BUILD LOG' section. The log shows the build process, including pulling Docker images, building the application, and pushing the image to GCR. The terminal at the bottom shows the build command and its output, including the build ID, creation time, duration, source, images, status, and success message.

```

ID: a94628b9-19fe-4245-bc29-df673132407a
CREATE TIME: 2022-11-04T23:08:52+00:00
DURATION: 4M40S
SOURCE: gs://cloud-cs-530-karinje-vkarinje_cloudbuild/source/1667603318.195412-8a7184b464734f5c9b27f098081bec38.tgz
IMAGES: gcr.io/cloud-cs-530-karinje-vkarinje/gcp_gb (+1 more)
STATUS: SUCCESS
vkarinje@cloudshell:~/cs430-src/05_gcp_datastore (cloud-cs-530-karinje-vkarinje)$

```

- Take a screenshot showing the container image and its virtual size

Container Registry

Images

gcp_gb

Name	Tags	Virtual Size	Created	Uploaded
c58f6e6fb99	latest	1.1 GB	7 minutes ago	4 minutes ago

Cloud Storage

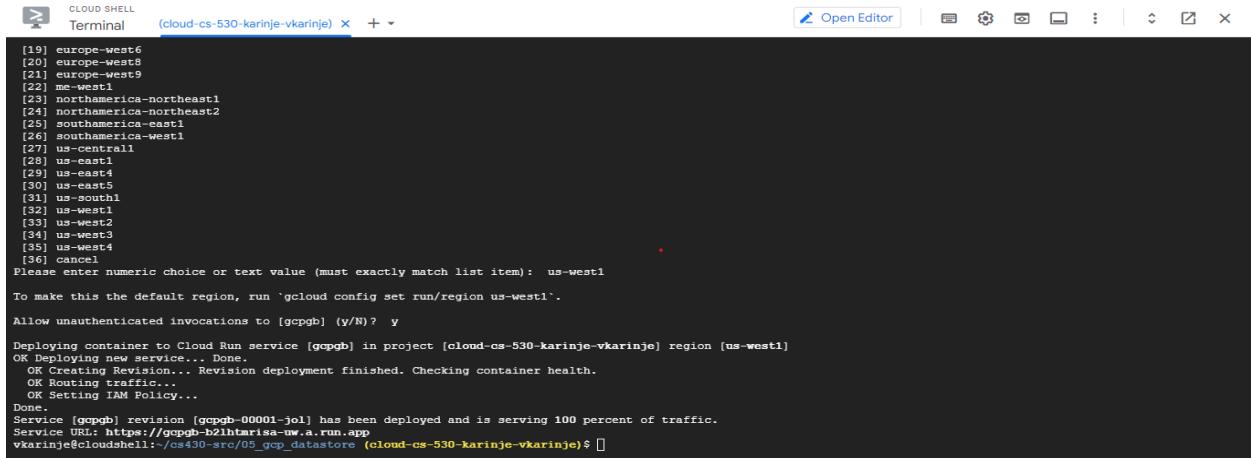
Buckets

artifacts.cloud-CS-530-karinje-vkarinje.appspot.com

Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption
containers/	-	Folder	-	-	-	Subject to object ACLs	-	-

Deploy container with minimal privileges

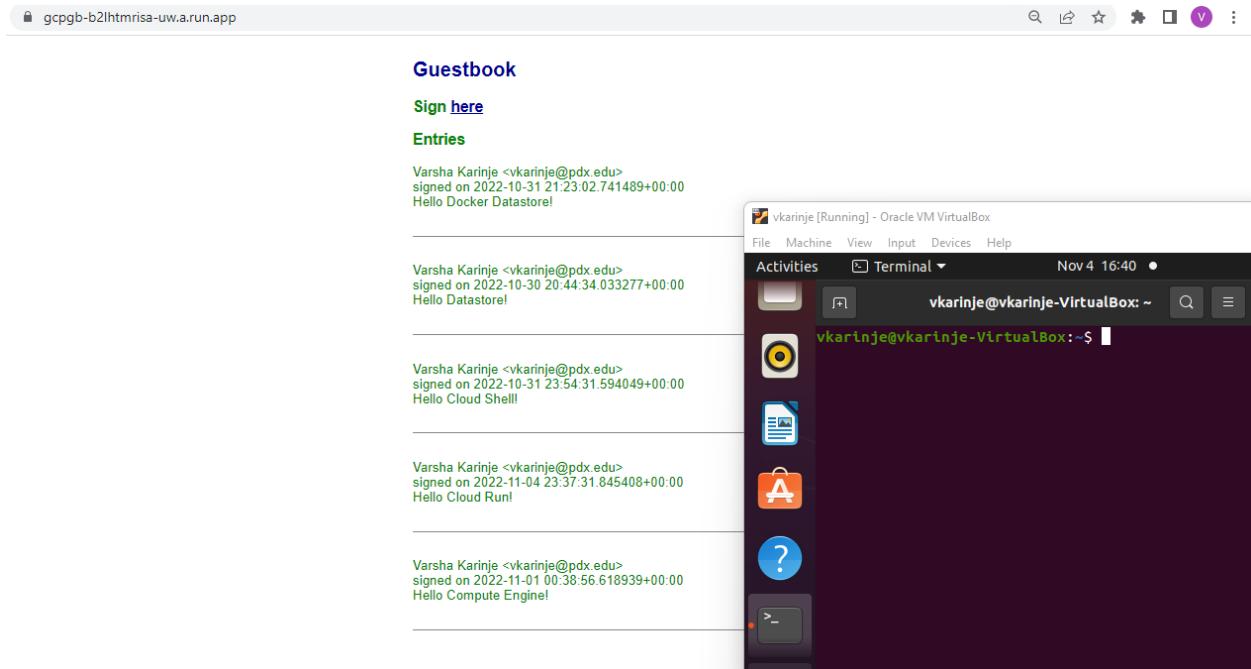
```
vkarinje@cloudshell:~/cs430-src/05_gcp_datastore (cloud-CS-530-karinje-vkarinje)$ gcloud run deploy gcpgb \
--image gcr.io/${GOOGLE_CLOUD_PROJECT}/gcp_gb \
--service-account guestbook@${GOOGLE_CLOUD_PROJECT}.iam.gserviceaccount.com
Please specify a region:
[1] asia-east1
[2] asia-east2
[3] asia-northeast1
[4] asia-northeast2
```



```
[19] europe-west6
[20] europe-west8
[21] europe-west9
[22] me-west1
[23] northamerica-northeast1
[24] northamerica-northeast2
[25] southamerica-east1
[26] southamerica-west1
[27] us-central1
[28] us-east1
[29] us-east4
[30] us-east5
[31] us-south1
[32] us-west1
[33] us-west2
[34] us-west3
[35] us-west4
[36] cancel
Please enter numeric choice or text value (must exactly match list item): us-west1
To make this the default region, run `gcloud config set run/region us-west1`.
Allow unauthenticated invocations to [gcpqb] (y/N)? y
Deploying container to Cloud Run service [gcpqb] in project [cloud-cs-530-karinje-vkarinje] region [us-west1]
OK Deploying new service... Done.
OK Creating Revision... Revision deployment finished. Checking container health.
OK Routing traffic...
OK Setting IAM Policy...
Done.
Service [gcpqb] revision [gcpqb-00001-jol] has been deployed and is serving 100 percent of traffic.
Service URL: https://gcpqb-b2lhtmrisa-uw-a.run.app
vkarinje@cloudshell:~/cs430-src/05_gcp_datastore (cloud-cs-530-karinje-vkarinje)$
```

View the Guestbook

- Take a screenshot that includes the URL Cloud Run has created for your site.



View the "Details" section to the right and answer the following questions:

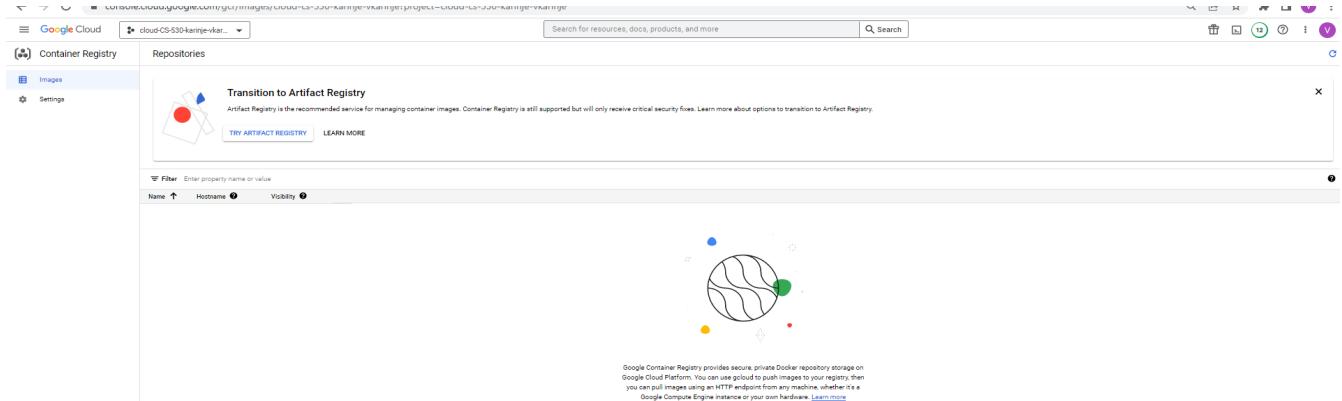
- What port do container instances listen on?

Ans: The container instances listen on port 8080

- What are the maximum number of instances Cloud Run will autoscale up to for your service?

Ans: The maximum number of instances Cloud Run will autoscale up to for our service is 100.

Clean Up



06.4g: Cloud Functions (Image blurring)

Image blurring

CLOUD SHELL

Terminal (cloud-cs-530-karinje-vkarinje) x + v

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to cloud-cs-530-karinje-vkarinje.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
vkarinje@cloudshell:~ (cloud-cs-530-karinje-vkarinje)$ git clone https://github.com/GoogleCloudPlatform/python-docs-samples.git
Cloning into 'python-docs-samples'...
remote: Enumerating objects: 69149, done.
remote: Counting objects: 100% (1894/1894), done.
remote: Compressing objects: 100% (485/485), done.
remote: Total 69149 (delta 1261), reused 1717 (delta 1198), pack-reused 67255
Receiving objects: 100% (69149/69149), 171.11 MiB | 27.49 MiB/s, done.
Resolving deltas: 100% (39807/39807), done.
vkarinje@cloudshell:~ (cloud-cs-530-karinje-vkarinje)$ cd python-docs-samples/functions/imagemagick
vkarinje@cloudshell:~/python-docs-samples/functions/imagemagick (cloud-cs-530-karinje-vkarinje)$ gsutil mb gs://vkarinje_bucket_input
Creating gs://vkarinje_bucket_input/...
vkarinje@cloudshell:~/python-docs-samples/functions/imagemagick (cloud-cs-530-karinje-vkarinje)$ gsutil mb gs://vkarinje_bucket_output
Creating gs://vkarinje_bucket_output/...
vkarinje@cloudshell:~/python-docs-samples/functions/imagemagick (cloud-cs-530-karinje-vkarinje)$ ||
```

Services setup

Google Cloud cloud-cs-530-karinje-vkar...

APIs & Services API/Service Details DISABLE API

Enabled APIs & services

- Library
- Credentials
- OAuth consent screen
- Domain verification
- Page usage agreements

Cloud Vision API
Integrates Google Vision features, including image labeling, face, logo, and landmark detection, optical character recognition (OCR), and detection of explicit content, into applications.
By Google Enterprise API

Service name	Type	Status
vision.googleapis.com	Public API	Enabled

Cloud Functions API
Manages lightweight user-provided functions executed in response to events.
By Google Enterprise API

Service name	Type	Status
cloudfunctions.googleapis.com	Public API	Enabled

METRICS QUOTAS CREDENTIALS COST

Select Graphs: 1 Graphs

Filters: Versions: v1, v2, v2alpha, and v2beta Credentials: App Engine default service Methods: 44 options selected

Traffic by response code

The screenshot shows the Google Cloud Platform interface. At the top, there's a navigation bar with the Google Cloud logo and a dropdown menu showing 'cloud-CS-530-karinje-vkar...'. Below the navigation bar, there's a back arrow icon. The main content area has a blue hexagonal icon with a white 'Z' inside, followed by the text 'Cloud Build API' and 'Google Enterprise API'. A subtitle reads 'Continuously build, test, and deploy.' Below this are three buttons: 'MANAGE' (blue), 'TRY THIS API' (white with blue text), and 'API Enabled' (green checkmark). There are also sections for 'Cloud Run API Reference' and 'Cloud Run API Examples'.

Answer the following questions for your lab notebook:

- **After downloading the file from the bucket, where is it stored?**

Ans: A temporary location is created by the `mkstemp()` method in the bucket where the downloaded file from the bucket is stored. The downloaded file is stored inside `temp_local_filename`.

- **What class in the ImageMagick package is used to do the blurring of the file?**

Ans: The `__blur_image` package in the ImageMagick package is used to do the blurring of the file.

- **What lines of code perform the blurring of the image and its storage back into the filesystem?**

Ans: The following lines of code perform the blurring of the image and its storage back into the filesystem.

```

# Blur the image using ImageMagick.
with Image(filename=temp_local_filename) as image:
    image.resize(*image.size, blur=16, filter="hamming")
    image.save(filename=temp_local_filename)

print(f"Image {file_name} was blurred.")

# Upload result to a second bucket, to avoid re-triggering the function.
# You could instead re-upload it to the same bucket + tell your function
# to ignore files marked as blurred (e.g. those with a "blurred" prefix)
blur_bucket_name = os.getenv("BLURRED_BUCKET_NAME")
blur_bucket = storage_client.bucket(blur_bucket_name)
new_blob = blur_bucket.blob(file_name)
new_blob.upload_from_filename(temp_local_filename)
print(f"Blurred image uploaded to: gs://{blur_bucket_name}/{file_name}")

```

Set up service account

The screenshot shows the Google Cloud IAM Permissions page for the project "cloud-CS-530-karinje-vkarinje". It lists several service accounts under the "VIEW BY PRINCIPALS" tab. The roles assigned include:

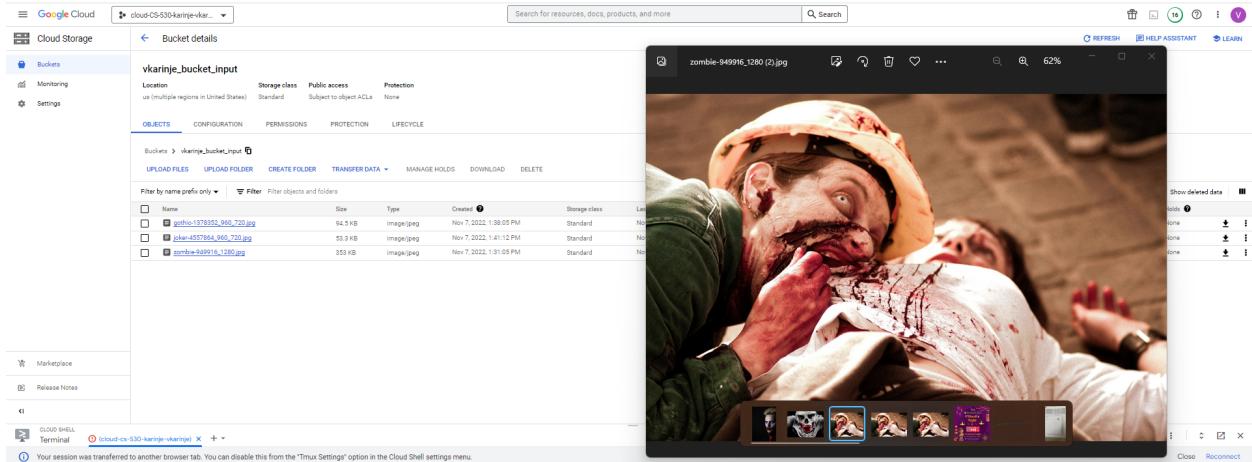
Type	Principal	Name	Role	Security insights	Inheritance
Compute Engine default service account	791612085972-compute@developer.gserviceaccount.com	Compute Engine default service account	Editor	6047/6050 excess permissions	
Cloud Build Service Account	791612085972@cloudbuild.gserviceaccount.com	Cloud Build Service Account	Secret Manager Secret Accessor		
Google APIs Service Agent	791612085972@cloudservices.gserviceaccount.com	Google APIs Service Agent	Editor	6027/6050 excess permissions	
Cloud Datastore User	cloudcs-530-karinje-vkarinje@appspot.gserviceaccount.com	App Engine default service account	Storage Object Admin		
Storage Object Admin	gcs-lab@cloud.cs-530-karinje-vkarinje.iam.gserviceaccount.com	Compute Viewer	Storage Object Admin		

Test function

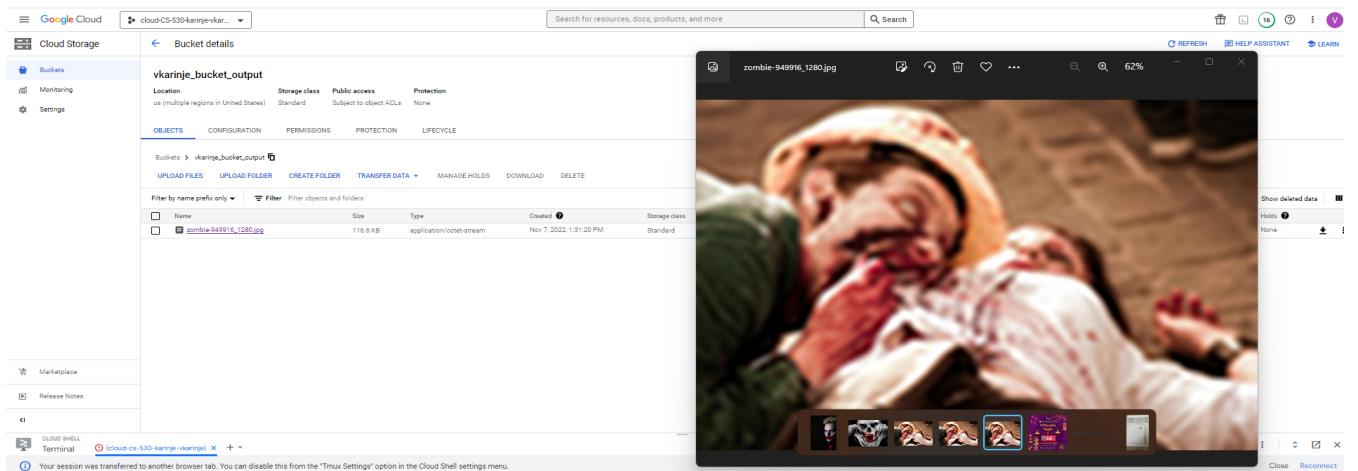
Once uploaded, the function should automatically execute via the bucket trigger and blur the image. Then, find and download two more gory images from the Internet. Upload them to the input bucket.

The screenshot shows the Google Cloud Storage Bucket details page for the bucket "vkarinje_bucket_input". The bucket has three objects listed:

Name	Size	Type	Created	Storage class	Last modified	Public access	Version history	Encryption	Retention expiration date	Holds
gothic-1378352_060_700.jpg	94.5 KB	image/jpeg	Nov 7, 2022, 1:38:05 PM	Standard	Nov 7, 2022, 1:38:05 PM	Not public	—	Google-managed key	—	None
poker-4577864_060_720.jpg	50.3 KB	image/jpeg	Nov 7, 2022, 1:41:12 PM	Standard	Nov 7, 2022, 1:41:12 PM	Not public	—	Google-managed key	—	None
combine-849916_1280.jpg	353 KB	image/jpeg	Nov 7, 2022, 1:31:05 PM	Standard	Nov 7, 2022, 1:31:05 PM	Not public	—	Google-managed key	—	None



- Verify that at least one image has been blurred by taking a screenshot of it in the output bucket and including it in your lab notebook



- Include a screenshot of the output logs that show that the above image was blurred.

```
operation completed over 1 objects/53.2 KB.
vkarinje@cloudshell:~/python-docs-samples/functions/imagemagick (cloud-cs-530-karinje-vkarinje)$ gcloud functions logs read
LEVEL: D
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:13.323
LOG: Function execution took 372 ms, finished with status: 'ok'

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:13.322
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:13.322
LOG: The image joker-4557864_960_720.jpg was detected as OK.

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:12.997
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:12.997
LOG: Analyzing joker-4557864_960_720.jpg.

LEVEL: D
NAME: blur_offensive_images
EXECUTION_ID: i7nsr93ex8mk
TIME_UTC: 2022-11-07 21:41:12.952
LOG: Function execution started

LEVEL: D
NAME: blur_offensive_images
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.596
LOG: Function execution took 424 ms, finished with status: 'ok'

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.594
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.594
LOG: The image gothic-1378352_960_720.jpg was detected as OK.
```

```
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.217
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.217
LOG: Analyzing gothic-1378352_960_720.jpg.

LEVEL: D
NAME: blur_offensive_images
EXECUTION_ID: i7nsg7r2gvu6
TIME_UTC: 2022-11-07 21:38:06.172
LOG: Function execution started

LEVEL: D
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:20.169
LOG: Function execution took 12950 ms, finished with status: 'ok'

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:20.167
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:20.167
LOG: Blurred image uploaded to: gs://vkarinje_bucket_output/zombie-949916_1280.jpg

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:19.981
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:19.981
LOG: Image zombie-949916_1280.jpg was blurred.

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:08.172
LOG:

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:08.172
LOG: Image zombie-949916_1280.jpg was downloaded to /tmp/tmpwl4s01bj.
```

```

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:08.172
LOG: Image zombie-949916_1280.jpg was downloaded to /tmp/tmpwl4s0lzb.

LEVEL: I
NAME: blur_offensive_images
EXECUTION_ID: i7ns5a93db7f
TIME_UTC: 2022-11-07 21:31:08.021
LOG:
vkarinje@cloudshell:~/python-docs-samples/functions/imagemagick (cloud-cs-530-karinje-vkarinje)$ 

```

Clean up

The screenshot shows the Google Cloud Storage Buckets page. The navigation bar at the top includes the Google Cloud logo, a dropdown menu, a search bar, and various icons. Below the navigation is a header with 'Cloud Storage' and tabs for 'Buckets', 'CREATE', and 'REFRESH'. To the right of the header are 'HELP ASSISTANT' and 'LEARN' buttons. The main content area displays a table of buckets:

	Name	Created	Location type	Location	Default storage class	Last modified	Public access	Access control	Protection	Lifecycle rules	Tags	Encryption
<input type="checkbox"/>	artifacts.cloudcs530-karinje-vkarinje.appspot.com	Nov 8, 2022, 1:31:33 AM	Multi-region	us	Standard	Nov 8, 2022, 1:31:33 AM	Subject to object ACLs	Fine-grained	None	None	-	Google-managed key
<input type="checkbox"/>	cloudcs530-karinje-vkarinje.appspot.com	Oct 30, 2022, 8:03:59 PM	Region	us-west1	Standard	Oct 30, 2022, 8:03:59 PM	Subject to object ACLs	Fine-grained	None	None	-	Google-managed key
<input type="checkbox"/>	cloudcs530-karinje-vkarinje.cloudbuild	Nov 2, 2022, 3:44:32 PM	Multi-region	us	Standard	Nov 2, 2022, 3:44:32 PM	Subject to object ACLs	Fine-grained	None	None	-	Google-managed key
<input type="checkbox"/>	gf-sourcee-791612085972-us-central1	Nov 7, 2022, 1:28:27 PM	Region	us-central1	Standard	Nov 7, 2022, 1:28:27 PM	Not public	Uniform	None	None	-	Google-managed key
<input type="checkbox"/>	staging.cloudcs530-karinje-vkarinje.appspot.com	Oct 30, 2022, 8:03:59 PM	Region	us-west1	Standard	Oct 30, 2022, 8:03:59 PM	Subject to object ACLs	Fine-grained	None	True	-	Google-managed key
<input type="checkbox"/>	us.artifacts.cloudcs530-karinje-vkarinje.appspot.com	Nov 7, 2022, 1:18:31 AM	Multi-region	us	Standard	Nov 7, 2022, 1:18:31 AM	Subject to object ACLs	Fine-grained	None	None	-	Google-managed key

