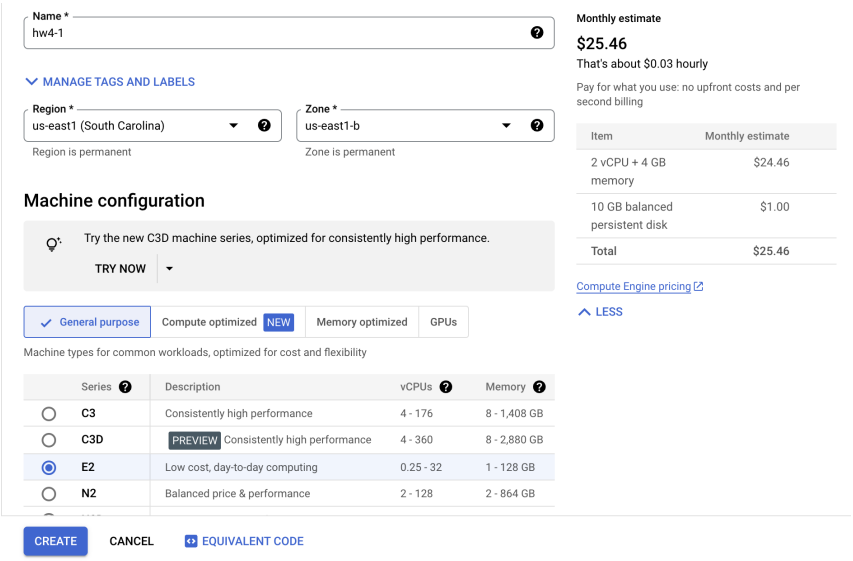
BU - DS561 - HW4 - DAVID EUIJOON KIM - U66545284 - VM Webserver

https://github.com/dk-davidekim/Google-Cloud-Computing.git

1. Create 1st VM Instance (Console)



2. Allow 8080 Firewall

gcloud compute firewall-rules create allow-web-8080 \
--allow=tcp:8080 \
--target-tags=web-server \
--description="Allow port 8080 access to web servers"

gcloud compute instances add-tags hw4 --zone=us-east1-b --tags=web-server

```
davidekim@crc-dot1x-nat-10-239-144-196 hw4 % gcloud compute firewall-rules create allow-web-8080 \
--allow=tcp:8080 \
--target-tags=web-server \
--description="Allow port 8080 access to web servers"
gcloud compute instances add-tags hw4 --zone=us-east1-b --tags=web-server

Creating firewall...⠹Created [https://www.googleapis.com/compute/v1/projects/ds-561/global/firewalls/allow-web-8080].
Creating firewall...done.
NAME          NETWORK  DIRECTION  PRIORITY  ALLOW     DENY  DISABLED
allow-web-8080  default  INGRESS    1000      tcp:8080        False
Updated [https://www.googleapis.com/compute/v1/projects/ds-561/zones/us-east1-b/instances/hw4].
```

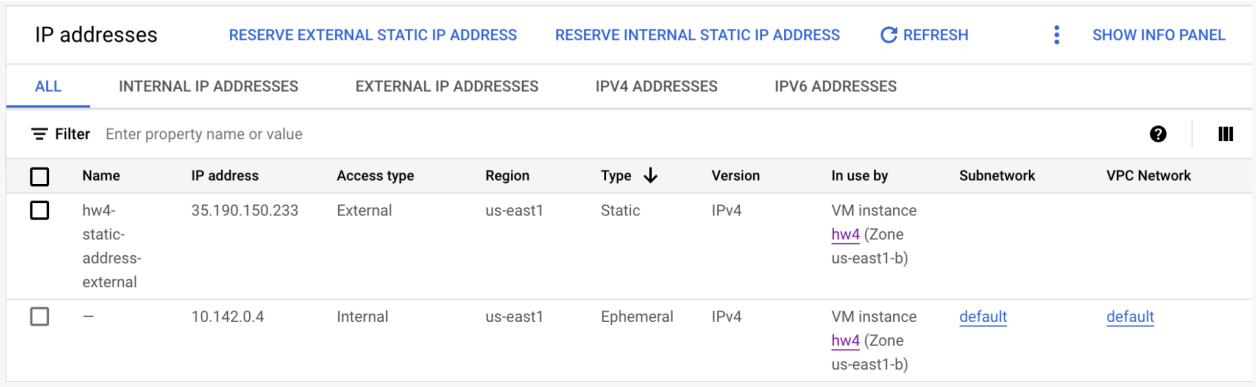
3. Set up Service Account for VM

gcloud compute instances set-service-account hw4 \
--service-account=bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
--scopes=https://www.googleapis.com/auth/cloud-platform \
--zone=us-east1-b

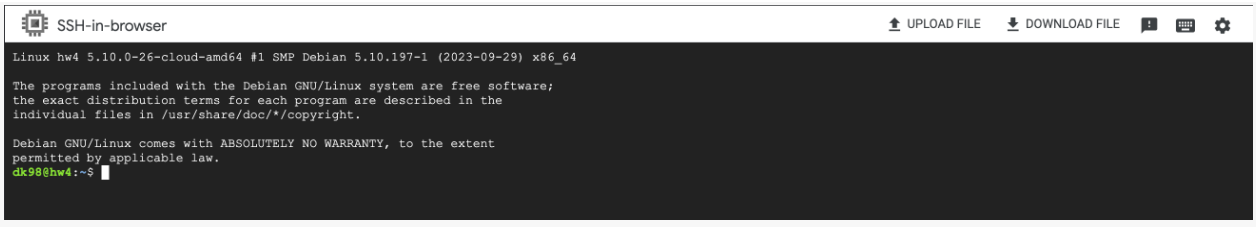
```
base ~ (1.701s)
gcloud compute instances set-service-account hw4 \
--service-account=bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
--scopes=https://www.googleapis.com/auth/cloud-platform \
--zone=us-east1-b
Updated [https://www.googleapis.com/compute/v1/projects/ds-561/zones/us-east1-b/instances/hw4].
```

4. Reserve Static Address

- Reserve Static Address:



5. Access SSH



6. Install Dependencies

```
sudo apt-get update
sudo apt-get install python3 python3-pip
pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging
```

```
dk98@hw4:/home/davidekim$ pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging
Requirement already satisfied: Flask in /home/dk98/.local/lib/python3.9/site-packages (3.0.0)
Requirement already satisfied: google-cloud-storage in /home/dk98/.local/lib/python3.9/site-packages (2.12.0)
Requirement already satisfied: google-cloud-pubsub in /usr/local/lib/python3.9/dist-packages (2.18.4)
Collecting google-cloud-logging
```

```
dk98@hw4:~$ sudo apt-get update
sudo apt-get install python3 python3-pip
pip3 install Flask google-cloud-storage
Get:1 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable InRelease [5146 B]
Get:2 https://packages.cloud.google.com/apt cloud-sdk-bullseye InRelease [6406 B]
Hit:3 https://deb.debian.org/debian bullseye InRelease
Get:4 https://deb.debian.org/debian-security bullseye-security InRelease [48.4 kB]
Get:5 https://deb.debian.org/debian bullseye-updates InRelease [44.1 kB]
Get:6 https://deb.debian.org/debian bullseye-backports InRelease [49.0 kB]
Get:7 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable/main amd64 Packages [1930 B]
Get:8 https://packages.cloud.google.com/apt cloud-sdk-bullseye/main amd64 Packages [376 kB]
Get:9 https://deb.debian.org/debian-security bullseye-security/main Sources [156 kB]
Get:10 https://deb.debian.org/debian-security bullseye-security/main amd64 Packages [254 kB]
Get:11 https://deb.debian.org/debian-security bullseye-security/main Translation-en [164 kB]
Get:12 https://deb.debian.org/debian bullseye-backports/main Sources.diff/Index [63.3 kB]
Get:13 https://deb.debian.org/debian bullseye-backports/main amd64 Packages.diff/Index [63.3 kB]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Fetched 1234 kB in 1s (1163 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
python3 is already the newest version (3.9.2-3).
```

7. app_one.py

app_two.py U app_one.py U

BU > DS561 > ds561-davidekim-U66545284 > hw4 > app_one.py > app_one

```python
from flask import Flask, request
from google.cloud import storage, logging, pubsub_v1

app = Flask(__name__)

BANNED_COUNTRIES = ["North Korea", "Iran", "Cuba", "Myanmar",
                    "Iraq", "Libya", "Sudan", "Zimbabwe", "Syria"]

@app.route('/', defaults={'path': ''}, methods=['GET','POST','PUT', 'DELETE', 'HEAD', 'CONNECT', 'OPTIONS', 'TRACE', 'PATCH'])
@app.route('/<path:filename>', methods=['GET','POST','PUT', 'DELETE', 'HEAD', 'CONNECT', 'OPTIONS', 'TRACE', 'PATCH'])
def app_one(filename):
    logging_client = logging.Client(project='ds-561')
    logger = logging_client.logger('hw3')
    pub = pubsub_v1.PublisherClient()
    path = pub.topic_path('ds-561', 'hw3')

    if request.method == 'GET':
        country = request.headers.get("X-country", "")

        if country in BANNED_COUNTRIES:
            try:
                data = str({'400 Forbidden from country': country})
                future = pub.publish(path, data.encode("utf-8"))
                message_id = future.result()
                logger.log_text(f"Message published with ID: {message_id}")
            except Exception as e:
                logger.log_text(f"PubSub Notification Failed {str(e)}")
            logger.log_text(f"Error Code 400: Forbidden: {str(country)}")
            return "Permission Denied", 400

        else:
            try:
                filename = filename.replace('bu-ds561-dk98-bucket/', '')
                storage_client = storage.Client()
                bucket = storage_client.bucket('bu-ds561-dk98-bucket')
                blob = bucket.blob(filename)
                file_content = blob.download_as_text()
                logger.log_text(f"200: {filename}")
                return file_content, 200
            except Exception as e:
                logger.log_text(f"Error Code 404: {filename}: {str(e)}")
                return 'File not found', 404
    else:
        logger.log_text(f"Error Code 501: {request.method}")
        return 'Not implemented', 501

if __name__ == "__main__":
    app.run(host='0.0.0.0', port=8080)
```

8. Send the Python File to VM

```
gcloud compute scp
/Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/app_one.py
hw4:~/app_one.py --zone us-east1-b
```

```
WARNING: The private SSH key file for gcloud does not exist.
WARNING: The public SSH key file for gcloud does not exist.
WARNING: You do not have an SSH key for gcloud.
WARNING: SSH keygen will be executed to generate a key.
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /Users/davidekim/.ssh/google_compute_engine
Your public key has been saved in /Users/davidekim/.ssh/google_compute_engine.pub
The key fingerprint is:
SHA256:2tA5SjSll2xTR6wAWwRGGnbqCPgmlmyasJVWeC50CM0 davidekim@crc-dot1x-nat-10-239-144-196.bu.edu
The key's randomart image is:
+---[RSA 3072]----+
|.o  o.*++ .oo    |
|..E+ * *.o ..    |
|o + * = *. .     |
|.+.O . = o.      |
|o=O o o S        |
|=B . . = .       |
|+     o .        |
|                 |
|                 |
+----[SHA256]-----+
Updating project ssh metadata...⠿Updated [https://www.googleapis.com/compute/v1/projects/ds-561].
Updating project ssh metadata...done.
Waiting for SSH key to propagate.
Warning: Permanently added 'compute.2195805271631523210' (ED25519) to the list of known hosts.
```

```
davidekim@crc-dot1x-nat-10-239-144-196 hw4 % gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U665452
84/hw4/app_one.py hw4:~/app_one.py --zone us-east1-b
Enter passphrase for key '/Users/davidekim/.ssh/google_compute_engine':
app_one.py                                                    100% 1728    50.6KB/s   00:00
```

9. Check and Test File in VM SSH

```
dk98@hw4:/home$ ls
davidekim  dk98
dk98@hw4:/home$ cd davidekim
dk98@hw4:/home/davidekim$ ls
app_one.py
```

```
dk98@hw4:/home/davidekim$ python3 app_one.py
 * Serving Flask app 'app_one'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on all addresses (0.0.0.0)
 * Running on http://127.0.0.1:8080
 * Running on http://10.142.0.4:8080
Press CTRL+C to quit
128.197.29.228 - - [15/Oct/2023 23:03:30] "GET /bu-ds561-dk98-bucket/hw2_output/539.html HTTP/1.1" 200 -
128.197.29.228 - - [15/Oct/2023 23:04:30] "GET /bu-ds561-dk98-bucket/hw2_output/539.html HTTP/1.1" 200 -
128.197.29.228 - - [15/Oct/2023 23:04:38] "GET /hw2_output/1234.html HTTP/1.1" 200 -
```

10. Web Server in VM

```
sudo nano /etc/systemd/system/hw4webserver.service
```

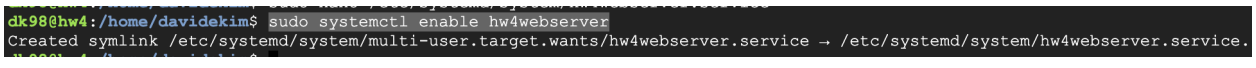

```
[Unit]
Description=HW4 Web Server

[Service]
ExecStart=/usr/bin/python3 app_one.py
Restart=always
User=dk98
WorkingDirectory=/home/davidekim

[Install]
WantedBy=multi-user.target
```

11. Enable and Run Web Server

```
sudo systemctl enable hw4webserver
```




```
sudo systemctl start hw4webserver
sudo systemctl status hw4webserver
```

```
dk98@hw4:/home/davidekim$ sudo systemctl status hw4webserver
● hw4webserver.service - HW4 Web Server
     Loaded: loaded (/etc/systemd/system/hw4webserver.service; enabled; vendor preset: enabled)
     Active: active (running) since Sun 2023-10-15 23:06:01 UTC; 6s ago
   Main PID: 1811 (python3)
      Tasks: 1 (limit: 4691)
     Memory: 43.5M
        CPU: 533ms
     CGroup: /system.slice/hw4webserver.service
             └─1811 /usr/bin/python3 app_one.py

Oct 15 23:06:01 hw4 systemd[1]: Started HW4 Web Server.
Oct 15 23:06:02 hw4 python3[1811]:  * Serving Flask app 'app_one'
Oct 15 23:06:02 hw4 python3[1811]:  * Debug mode: off
Oct 15 23:06:02 hw4 python3[1811]: WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
Oct 15 23:06:02 hw4 python3[1811]:  * Running on all addresses (0.0.0.0)
Oct 15 23:06:02 hw4 python3[1811]:  * Running on http://127.0.0.1:8080
Oct 15 23:06:02 hw4 python3[1811]:  * Running on http://10.142.0.4:8080
Oct 15 23:06:02 hw4 python3[1811]: Press CTRL+C to quit
```

12. Ensure the VM Automatically Starts the Web Server

Automation

Startup script

```
sudo systemctl enable hw4webserver
sudo systemctl start hw4webserver
```

You can choose to specify a startup script that will run when your instance boots up or restarts. Startup scripts can be used to install software and updates, and to ensure that services are running within the virtual machine. Learn more

13. Test the Webserver in Browser

http://35.190.150.233:8080/hw2_output/1234.html

Not Secure | 35.190.150.233:8080/hw2_output/1234.html

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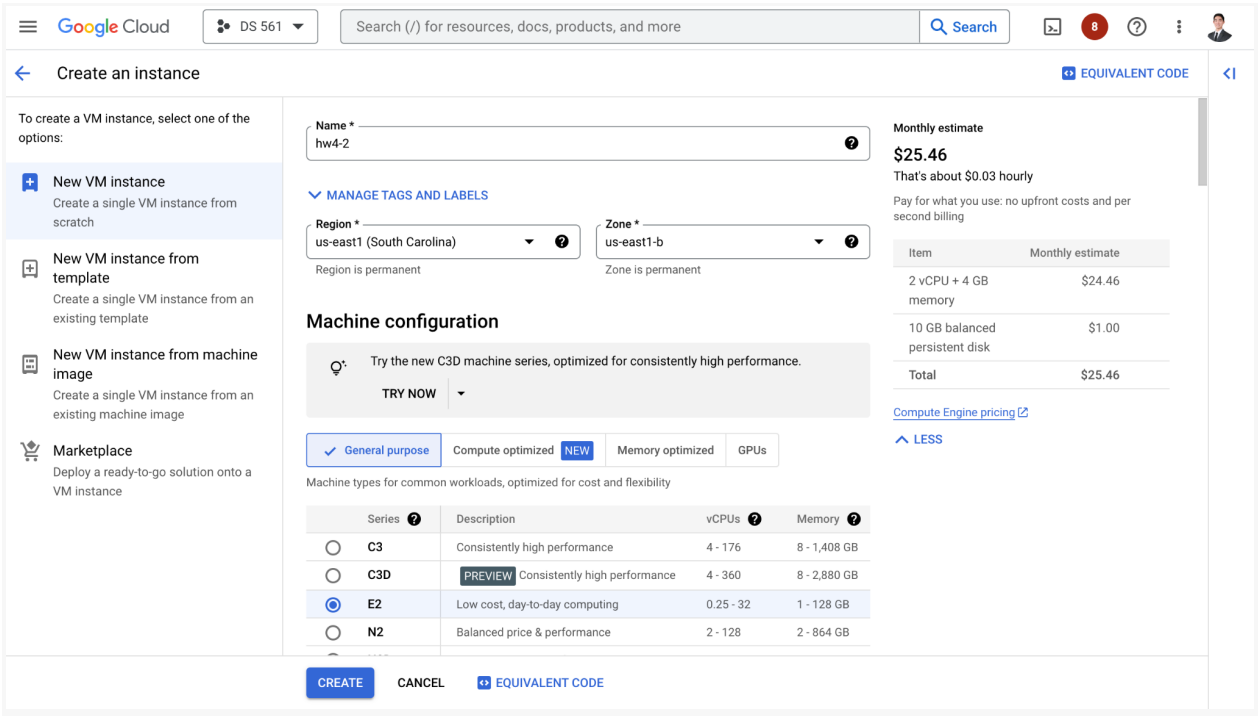
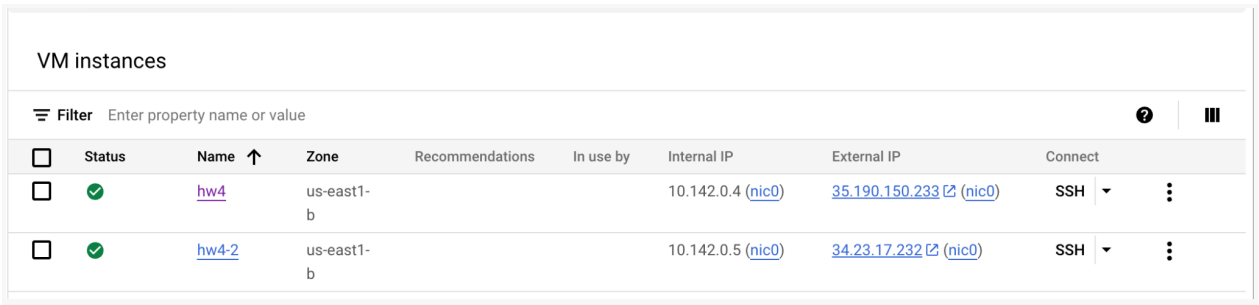
14. Create 2nd VM Instance (Console)

`2nd VM Instance`





15. Send the http-client.py File to VM 2

```
gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/http-client.py hw4-2:~/http-client.py --zone us-east1-b
```

```
davidekim@crc-dot1x-nat-10-239-144-196 hw4 % gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/http-client.py hw4-2:~/http-client.py --zone us-east1-b
Warning: Permanently added 'compute.6243238247854627315' (ED25519) to the list of known hosts.
Enter passphrase for key '/Users/davidekim/.ssh/google_compute_engine':
http-client.py                                100% 8949    74.6KB/s   00:00
```

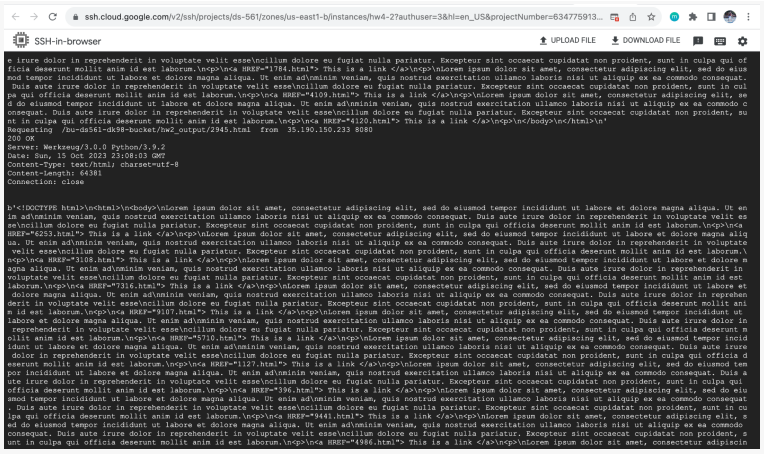
16. Run http-client.py in VM 2

```
python3 http-client.py -d 35.190.150.233 -b /bu-ds561-dk98-bucket -w hw2_output -n 1 -i 11000 -p 8080 -v -f
```

```
dk98@hw4-2:/home/davidekim$ python3 http-client.py -d 35.190.150.233 -b /bu-ds561-dk98-bucket -w hw2_output -n 1 -i 11000 -p 8080 -v -f
Requesting  /bu-ds561-dk98-bucket/hw2_output/4618.html  from  35.190.150.233 8080
200 OK
Server: Werkzeug/3.0.0 Python/3.9.2
Date: Sun, 15 Oct 2023 23:06:46 GMT
Content-Type: text/html; charset=utf-8
Content-Length: 541
Connection: close

b'<!DOCTYPE html>\n<html>\n<body>\nLorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut en
im ad\nminim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit es
se\ncillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.\n<p>\n<a
HREF="6029.html"> This is a link </a>\n<p>\n</body>\n</html>\n'
```

`python3 http-client.py -d 35.190.150.233 -b /bu-ds561-dk98-bucket -w hw2_output -n 100 -i 11000 -p 8080 -v -f`



17. Curl 200

`curl http://35.190.150.233:8080/hw2_output/1234.html`

18. Curl 404

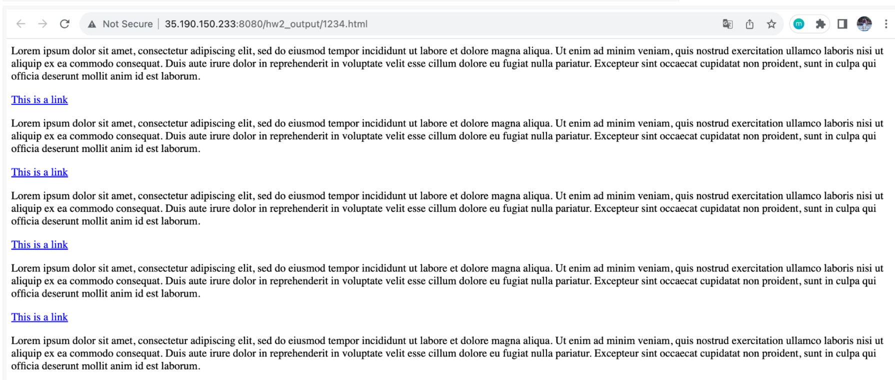
`curl http://35.190.150.233:8080/hw2_output/12345.html`

19. Curl 501

`curl -X POST http://35.190.150.233:8080/hw2_output/12345.html`

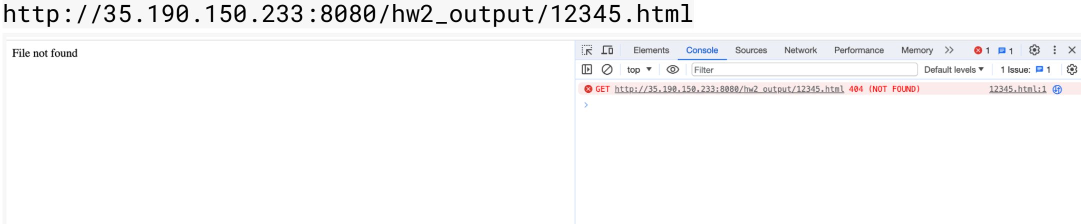
20. Browser 200

`http://35.190.150.233:8080/hw2_output/1234.html`



21. Browser 404

`http://35.190.150.233:8080/hw2_output/12345.html`



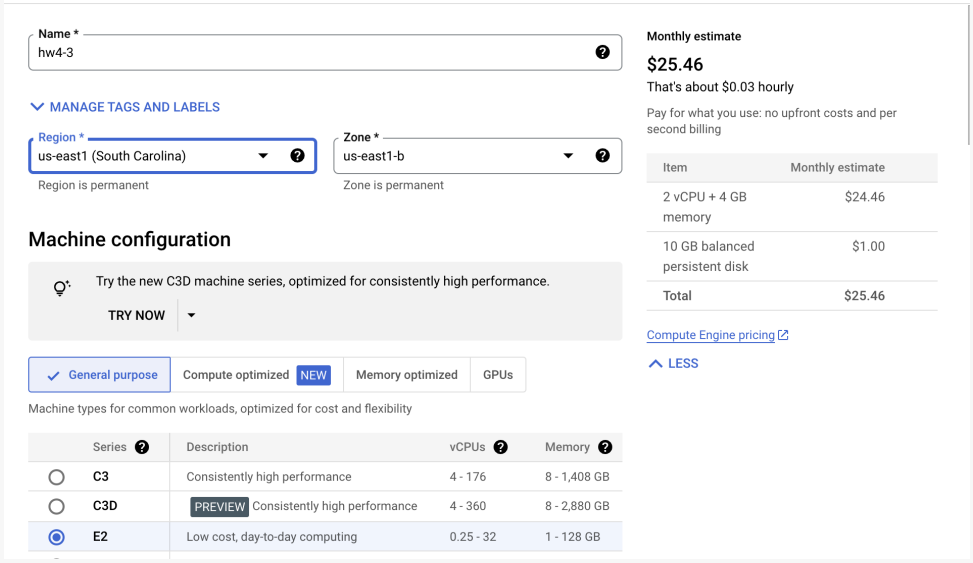
22. Browser 501

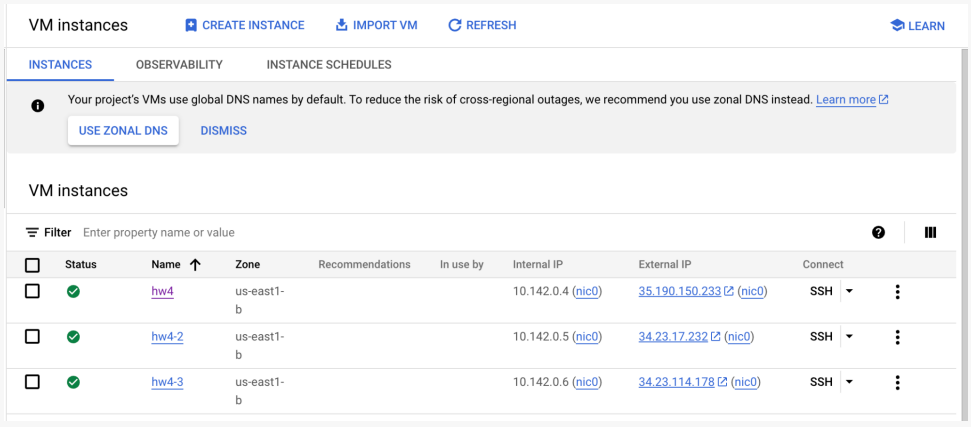
```
fetch('http://35.190.150.233:8080/hw2_output/1234.html', { method: 'POST' })
```

```
> fetch('http://35.190.150.233:8080/hw2_output/1234.html', { method: 'POST' })
< ▶ Promise {<pending>}
✕ ▶ POST http://35.190.150.233:8080/hw2_output/1234.html 501 (NOT IMPLEMENTED)   VM116:1
```

23. Create 3rd VM Instance (Console)

`3rd VM Instance`





24. Set up Service Account for VM3 for PubSub

*gcloud compute instances set-service-account hw4-3 *
*--service-account=*bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
*--scopes=https://www.googleapis.com/auth/cloud-platform *
--zone=us-east1-b

```
base ~ (1.64s)
gcloud compute instances set-service-account hw4-3 \
--service-account=bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
--scopes=https://www.googleapis.com/auth/cloud-platform \
--zone=us-east1-b

Updated [https://www.googleapis.com/compute/v1/projects/ds-561/zones/us-east1-b/instances/hw4-3].
```

25. Send app_two.py to VM3

app_two.py U

BU > DS561 > ds561-davidekim-U66545284 > hw4 > app_two.py > ...

```python
from google.cloud import pubsub_v1

def call_back(message):                                    # Callback if message received
    print(f"Received message: {message.data.decode('utf-8')}")  # Print the message
    message.ack()

sub = pubsub_v1.SubscriberClient()                         # SubscriberClient
path = sub.subscription_path('ds-561', 'app_one_two')      # Subscription Path

future = sub.subscribe(path, callback=call_back)           # Subscribe to the path and callback
print("Listening for messages on: {}".format(path))        # Indicating that it's listening

with sub:                                                  # Keep the app running
    try:
        future.result()
    except KeyboardInterrupt:
        future.cancel()
```

`gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/app_two.py hw4-3:~/app_two.py --zone us-east1-b`

```
davidekim@crc-dot1x-nat-10-239-144-196 hw4 % gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66
545284/hw4/ds-561-c49fc1ab1464.json hw4-3:~/ds-561-c49fc1ab1464.json --zone us-east1-b
Enter passphrase for key '/Users/davidekim/.ssh/google_compute_engine':
ds-561-c49fc1ab1464.json                                                    100% 2348    36.0KB/s   00:00
```

26. Install Dependencies

`sudo apt-get update`
`sudo apt-get install python3 python3-pip`

```
pip3 install google-cloud-pubsub
```

```
dk98@hw4-3:/home/davidekim$ sudo apt-get update
sudo apt-get install python3 python3-pip
pip3 install google-cloud-pubsub
Get:1 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable InRelease [5146 B]
Hit:2 https://deb.debian.org/debian bullseye InRelease
Get:3 https://deb.debian.org/debian-security bullseye-security InRelease [48.4 kB]
Get:4 https://packages.cloud.google.com/apt cloud-sdk-bullseye InRelease [6406 B]
Get:5 https://deb.debian.org/debian bullseye-updates InRelease [44.1 kB]
Get:6 https://deb.debian.org/debian bullseye-backports InRelease [49.0 kB]
Get:7 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable/main amd64 Packages [1930 B]
Get:8 https://packages.cloud.google.com/apt cloud-sdk-bullseye/main amd64 Packages [376 kB]
Get:9 https://deb.debian.org/debian-security bullseye-security/main Sources [156 kB]
Get:10 https://deb.debian.org/debian-security bullseye-security/main amd64 Packages [254 kB]
Get:11 https://deb.debian.org/debian-security bullseye-security/main Translation-en [164 kB]
Get:12 https://deb.debian.org/debian bullseye-backports/main Sources.diff/Index [63.3 kB]
Get:13 https://deb.debian.org/debian bullseye-backports/main amd64 Packages.diff/Index [63.3 kB]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Fetched 1234 kB in 1s (1058 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree... Done
```

27. Run app_two.py

```
dk98@hw4-3:/home/davidekim$ python3 app_two.py
Listening for messages on: projects/ds-561/subscriptions/app_one_two
```

28. Run http-client.py in VM2

```
python3 http-client.py -d 35.190.150.233 -b /bu-ds561-dk98-bucket -w hw2_output -n 100 -i 11000 -p 8080 -v -f
```

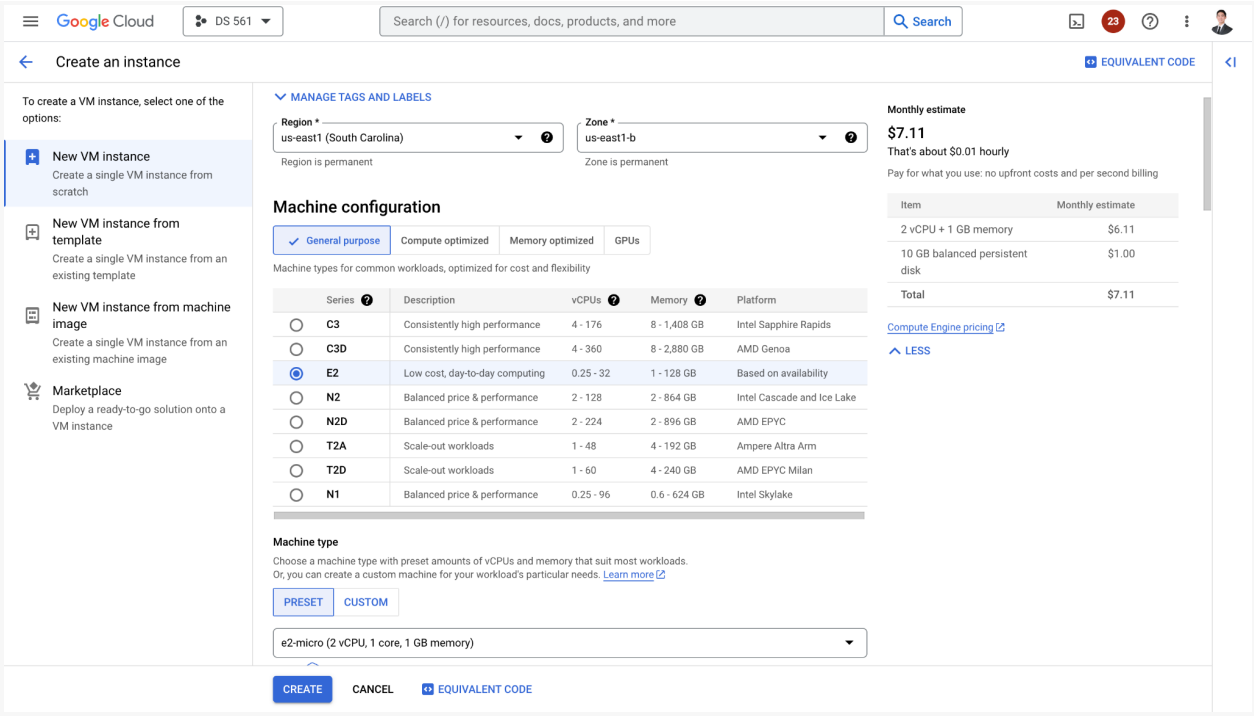
```
dk98@hw4-2:/home/davidekim$ python3 http-client.py -d 35.190.150.233 -b /bu-ds561-dk98-bucket -w hw2_output -n 100 -i 11000 -p 8080 -v -f
```

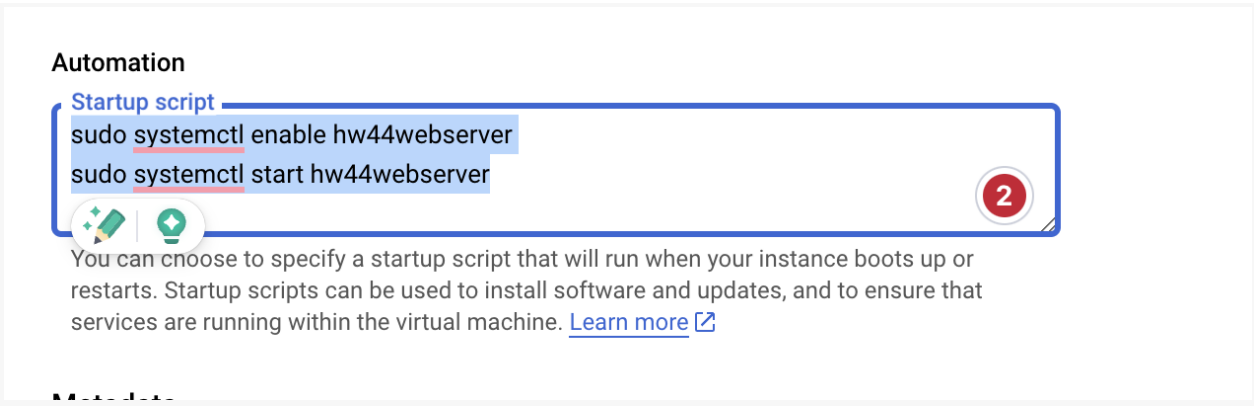
29. Outputs

```
dk98@hw4-3:/home/davidekim$ python3 app_two.py
Listening for messages on: projects/ds-561/subscriptions/app_one_two
Received message: {'400 Forbidden from country': 'North Korea'}
Received message: {'400 Forbidden from country': 'Libya'}
Received message: {'400 Forbidden from country': 'Sudan'}
Received message: {'400 Forbidden from country': 'Myanmar'}
Received message: {'400 Forbidden from country': 'Iran'}
```

30. Create 4th VM Instance (E2-Micro) and Repeat Everything Done in 1st VM Instance

`4th VM Instance for Q9 - E2 Micro - Repeat Everything Done in 1st VM Instance`





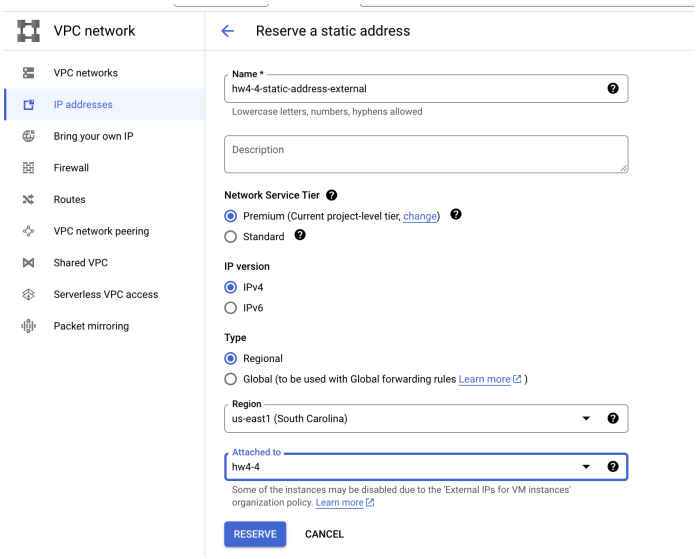

```
# No need to do this if you did it before
gcloud compute firewall-rules create allow-web-8080 \
--allow=tcp:8080 \
```

--target-tags=web-server \
--description="Allow port 8080 access to web servers"

This is required
gcloud compute instances add-tags hw4-4 --zone=us-east1-b --tags=web-server

Service account
gcloud compute instances set-service-account hw4-4 \
--service-account=bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
--scopes=https://www.googleapis.com/auth/cloud-platform \
--zone=us-east1-b

```
base ~/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4 git:(main) ±1 (2.306s)
gcloud compute instances set-service-account hw4-4 \
--service-account=bu-ds561-dk98-sa@ds-561.iam.gserviceaccount.com \
--scopes=https://www.googleapis.com/auth/cloud-platform \
--zone=us-east1-b
Updated [https://www.googleapis.com/compute/v1/projects/ds-561/zones/us-east1-b/instances/hw4-4].
```



Name	IP address	Access type	Region	Type	Version	In use by	Subnetwork	VPC Network	Network Tier
hw4-4-static-address-external	35.237.163.169	External	us-east1	Static	IPv4	VM instance hw4-4 (Zone us-east1-b)			Premium

```
sudo apt-get update
sudo apt-get install python3 python3-pip
pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging
```

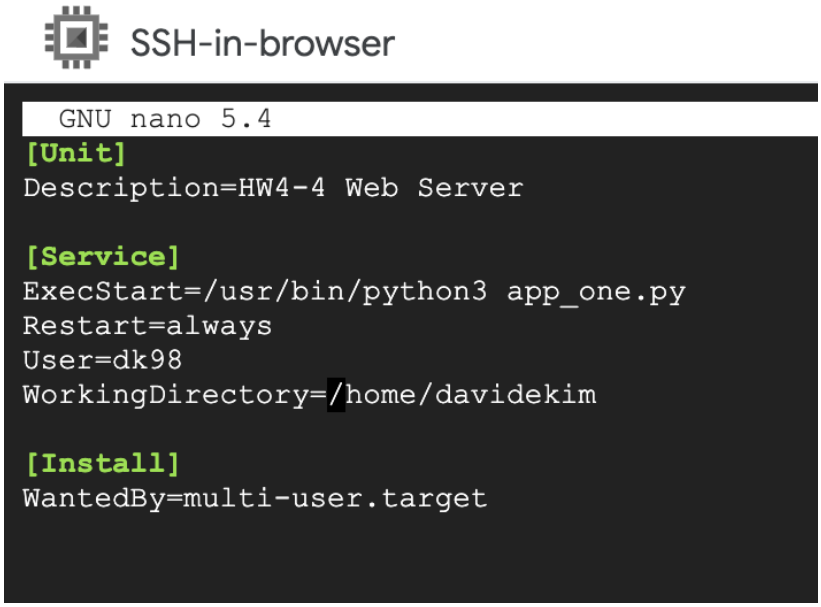
```
dk98@hw4-4:~$ sudo apt-get update
sudo apt-get install python3 python3-pip
pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging
Hit:1 https://deb.debian.org/debian bullseye InRelease
Get:2 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable InRelease [5146 B]
Get:3 https://packages.cloud.google.com/apt cloud-sdk-bullseye InRelease [6406 B]
Get:4 https://deb.debian.org/debian-security bullseye-security InRelease [48.4 kB]
Get:5 https://deb.debian.org/debian bullseye-updates InRelease [44.1 kB]
Get:6 https://deb.debian.org/debian bullseye-backports InRelease [49.0 kB]
Get:7 https://packages.cloud.google.com/apt google-compute-engine-bullseye-stable/main amd64 Packages [1930 B]
Get:8 https://packages.cloud.google.com/apt cloud-sdk-bullseye/main amd64 Packages [380 kB]
Get:9 https://deb.debian.org/debian-security bullseye-security/main Sources [159 kB]
Get:10 https://deb.debian.org/debian-security bullseye-security/main amd64 Packages [256 kB]
Get:11 https://deb.debian.org/debian-security bullseye-security/main Translation-en [164 kB]
Get:12 https://deb.debian.org/debian bullseye-backports/main Sources.diff/Index [63.3 kB]
Get:13 https://deb.debian.org/debian bullseye-backports/main amd64 Packages.diff/Index [63.3 kB]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:14 https://deb.debian.org/debian bullseye-backports/main Sources T-2023-10-12-2014.16-F-2023-10-12-0803.19.pdiff [1508 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Get:15 https://deb.debian.org/debian bullseye-backports/main amd64 Packages T-2023-10-12-1403.27-F-2023-10-12-1403.27.pdiff [750 B]
Fetched 1243 kB in 1s (1146 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

`gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/app_one.py hw4-4:~/app_one.py --zone us-east1-b`

```
base ~/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4 git:(main) ±1 (20.955s)
gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/ds561-davidekim-U66545284/hw4/app_one.py hw4-4:~/app_one.py --zone us-east1
-b
Warning: Permanently added 'compute.7319369984931747957' (ED25519) to the list of known hosts.
Enter passphrase for key '/Users/davidekim/.ssh/google_compute_engine':
app_one.py                                                    100% 2068     5.6KB/s   00:00
```

`sudo apt-get update`
`sudo apt-get install python3 python3-pip`
`pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging`

```
sudo nano /etc/systemd/system/hw4webserver.service
```




```
[Unit]
Description=HW4 Web Server

[Service]
ExecStart=/usr/bin/python3 app_one.py
Restart=always
User=dk98
WorkingDirectory=/home/davidekim

[Install]
WantedBy=multi-user.target

sudo systemctl enable hw44webserver

sudo systemctl start hw44webserver
sudo systemctl status hw44webserver
```

31. Stress Test VM4

```
seq 10000 | xargs -I{} -P10000 python3 http-client.py -d 35.237.163.169 -b
/bu-ds561-dk98-bucket -w hw2_output -n 100 -i 11000 -p 8080 -f
```

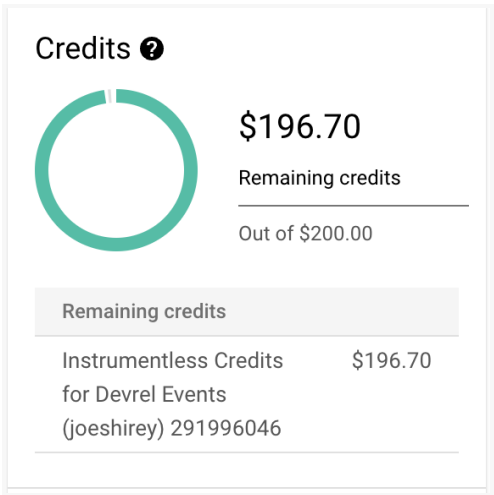
Concurrently up to 10,000 times

```
dk98@hw4-2:/home/davidekim$ seq 100 | xargs -I{} -P100 python3 http-client.py -d 35.237.163.169 -b /bu-ds561-dk98-bucket -w hw2_output -n 100 -i 11000 -p 8080 -f
```

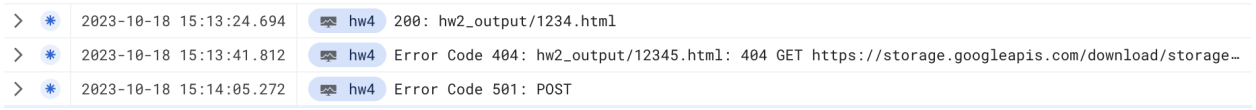
Result: Crashed.

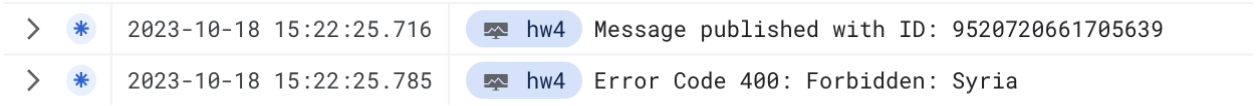
```
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
    sock.connect(sa)
TimeoutError: [Errno 110] Connection timed out
```

```
ConnectionResetError: [Errno 104] Connection reset by peer
    return self._sock.recv_into(b)
ConnectionResetError: [Errno 104] Connection reset by peer
    return self._sock.recv_into(b)
ConnectionResetError: [Errno 104] Connection reset by peer
    return self._sock.recv_into(b)
ConnectionResetError: [Errno 104] Connection reset by peer
```



32. Logs


2023-10-18 15:13:24.694 hw4 200: hw2_output/1234.html
2023-10-18 15:13:41.812 hw4 Error Code 404: hw2_output/12345.html: 404 GET https://storage.googleapis.com/download/storage…
2023-10-18 15:14:05.272 hw4 Error Code 501: POST


2023-10-18 15:22:25.716 hw4 Message published with ID: 9520720661705639
2023-10-18 15:22:25.785 hw4 Error Code 400: Forbidden: Syria