Week#7 Labs

Neha Agrawal

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07.1g: Kubernetes Guestbook

1. Kubernetes

No screenshots required

2. Setup

No screenshots required

3. Assigning privileges

No screenshots required

4. Create Kubernetes cluster

Go to Compute Engine and navigate around to answer the following questions in your lab notebook:

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

  gke-guestbook-default-pool-23ab3b3f

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

  gke-guestbook-default-pool-23ab3b3f-grp

- **What are the names of the two nodes?**

  gke-guestbook-default-pool-23ab3b3f-19sj *and* gke-guestbook-default-pool-23ab3b3f-3jns

5. Prepare a container image

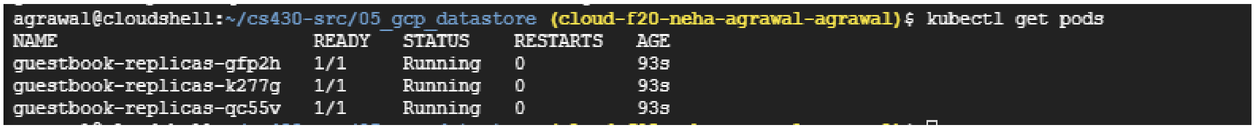
No screenshots required

6. kubernetes.yaml

No screenshots required

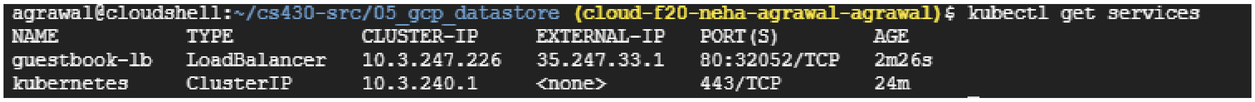
7. Deploy the configuration

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



```
agrawal@cloudshell:~/cs430-src/05_gcp_datastore (cloud-f20-neha-agrawal-agrawal)$ kubectl get pods
NAME                        READY   STATUS    RESTARTS   AGE
guestbook-replicas-gfp2h    1/1     Running   0          93s
guestbook-replicas-k277g    1/1     Running   0          93s
guestbook-replicas-qc55v    1/1     Running   0          93s
```

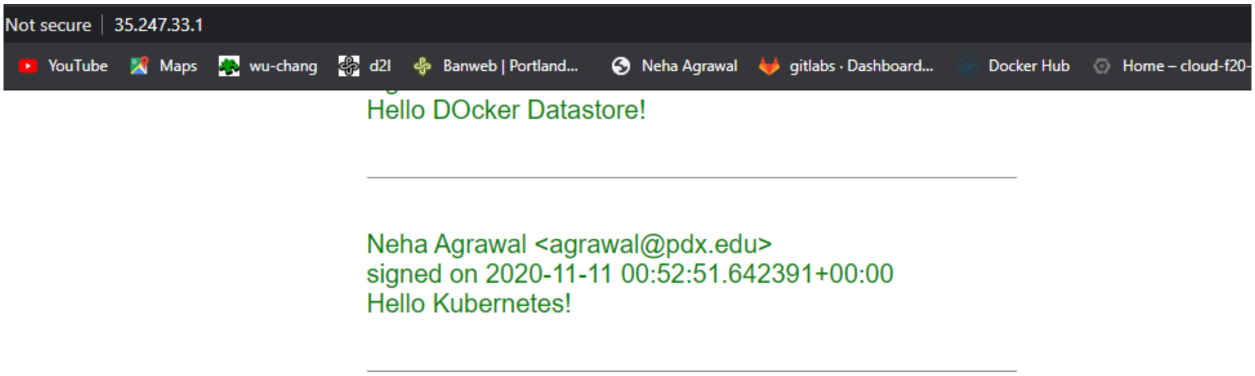
Show a screenshot of listing services with LoadBalancer indicating an external IP address that is ready for access.



```
agrawal@cloudshell:~/cs430-src/05_gcp_datastore (cloud-f20-neha-agrawal-agrawal)$ kubectl get services
NAME          TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S)        AGE
guestbook-lb  LoadBalancer   10.3.247.226   35.247.33.1   80:32052/TCP   2m26s
kubernetes    ClusterIP      10.3.240.1     <none>        443/TCP        24m
```

8. View the Guestbook

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



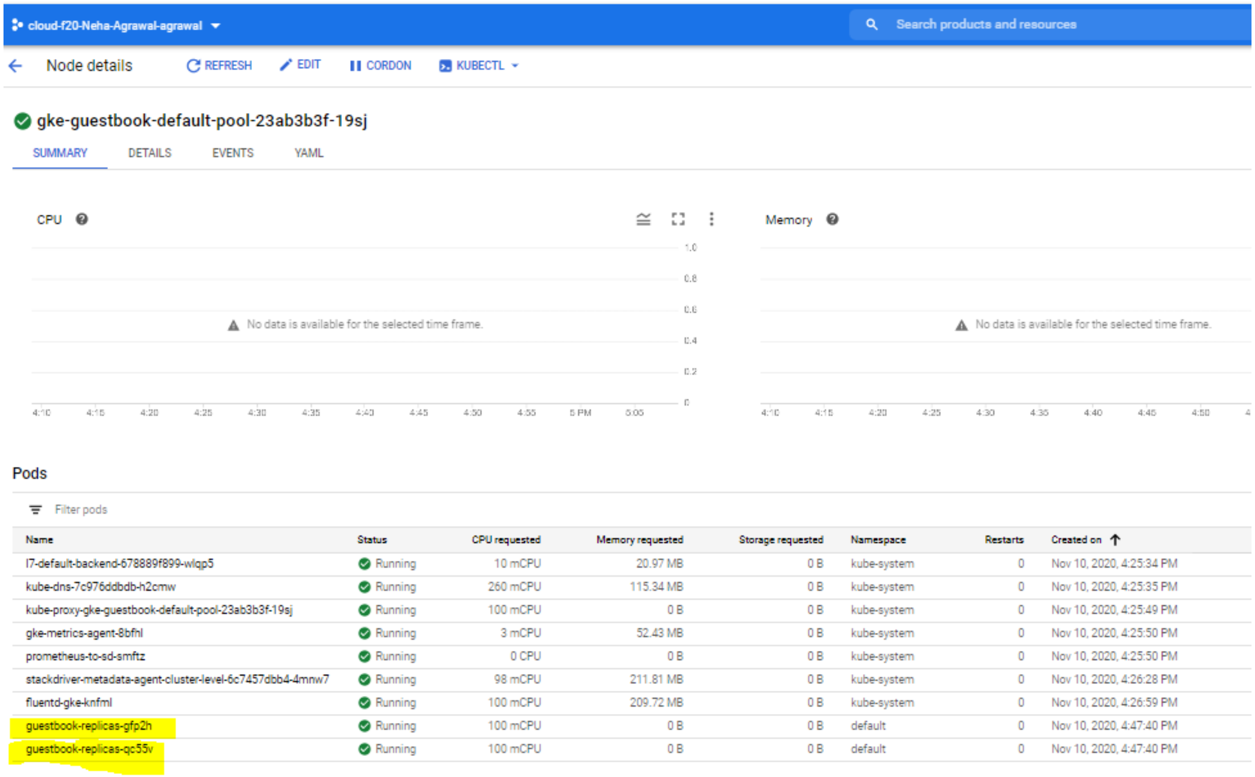
Hello DOcker Datastore!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-11 00:52:51.642391+00:00
Hello Kubernetes!

Kubernetes has deployed a number of resources across your cloud project. It's important to understand what they are. Go back to the web console and perform the following

- **Visit Kubernetes engine via the web console and view the cluster nodes, the workload of pod replicas placed on them, and the service exported**

  Node 1: gke-guestbook-default-pool-23ab3b3f-19sj

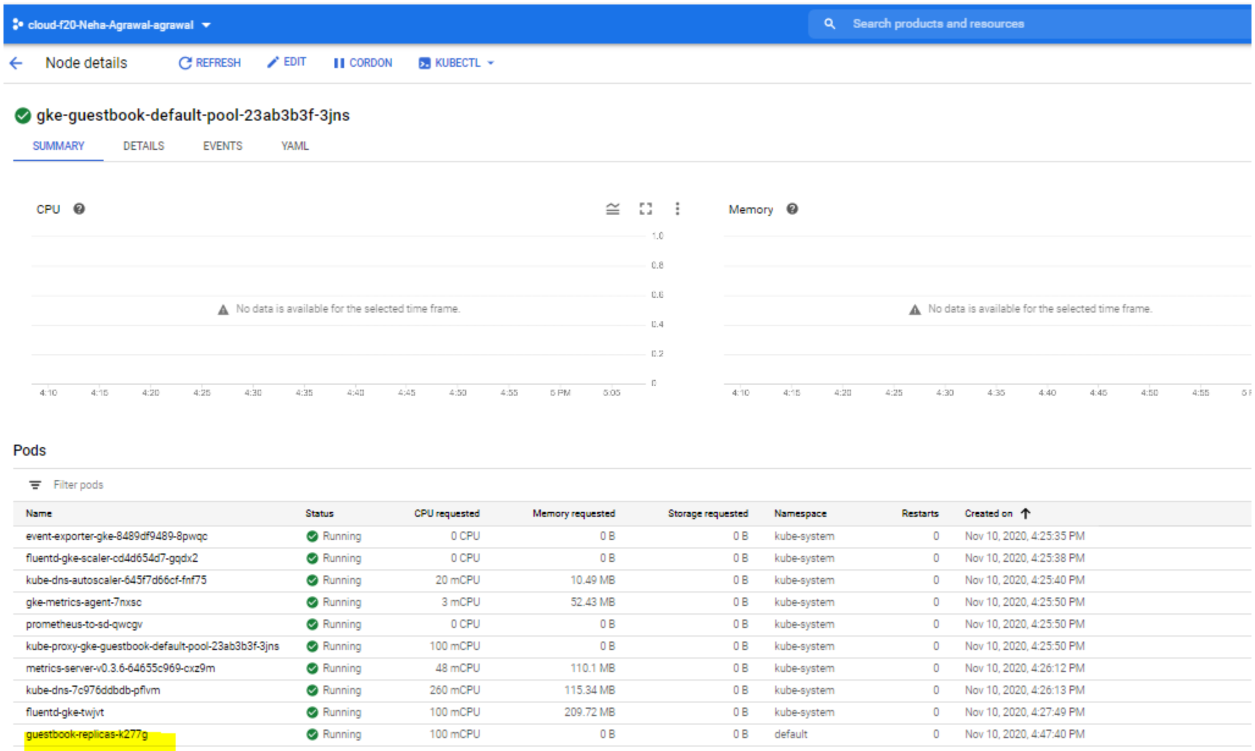

cloud-f20-Neha-Agrawal-agrawal
Search products and resources
Node details
REFRESH
EDIT
CORDON
KUBECTL
SUMMARY
DETAILS
EVENTS
YAML
CPU
Memory
No data is available for the selected time frame.
No data is available for the selected time frame.
1.0
0.8
0.6
0.4
0.2
0
4:10
4:15
4:20
4:25
4:30
4:35
4:40
4:45
4:50
4:55
5 PM
5:05
Filter pods

gke-guestbook-default-pool-23ab3b3f-19sj

Pods

Name	Status	CPU requested	Memory requested	Storage requested	Namespace	Restarts	Created on ↑
l7-default-backend-678889f899-wlqp5	✓ Running	10 mCPU	20.97 MB	0 B	kube-system	0	Nov 10, 2020, 4:25:34 PM
kube-dns-7c976ddbdb-h2cmw	✓ Running	260 mCPU	115.34 MB	0 B	kube-system	0	Nov 10, 2020, 4:25:35 PM
kube-proxy-gke-guestbook-default-pool-23ab3b3f-19sj	✓ Running	100 mCPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:49 PM
gke-metrics-agent-8bfhl	✓ Running	3 mCPU	52.43 MB	0 B	kube-system	0	Nov 10, 2020, 4:25:50 PM
prometheus-to-sd-smftz	✓ Running	0 CPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:50 PM
stackdriver-metadata-agent-cluster-level-6c7457dbb4-4mnw7	✓ Running	98 mCPU	211.81 MB	0 B	kube-system	0	Nov 10, 2020, 4:26:28 PM
fluentd-gke-knfml	✓ Running	100 mCPU	209.72 MB	0 B	kube-system	0	Nov 10, 2020, 4:26:59 PM
guestbook-replicas-gfp2h	✓ Running	100 mCPU	0 B	0 B	default	0	Nov 10, 2020, 4:47:40 PM
guestbook-replicas-qc55v	✓ Running	100 mCPU	0 B	0 B	default	0	Nov 10, 2020, 4:47:40 PM

Node 2: gke-guestbook-default-pool-23ab3b3f-3jns



gke-guestbook-default-pool-23ab3b3f-3jns

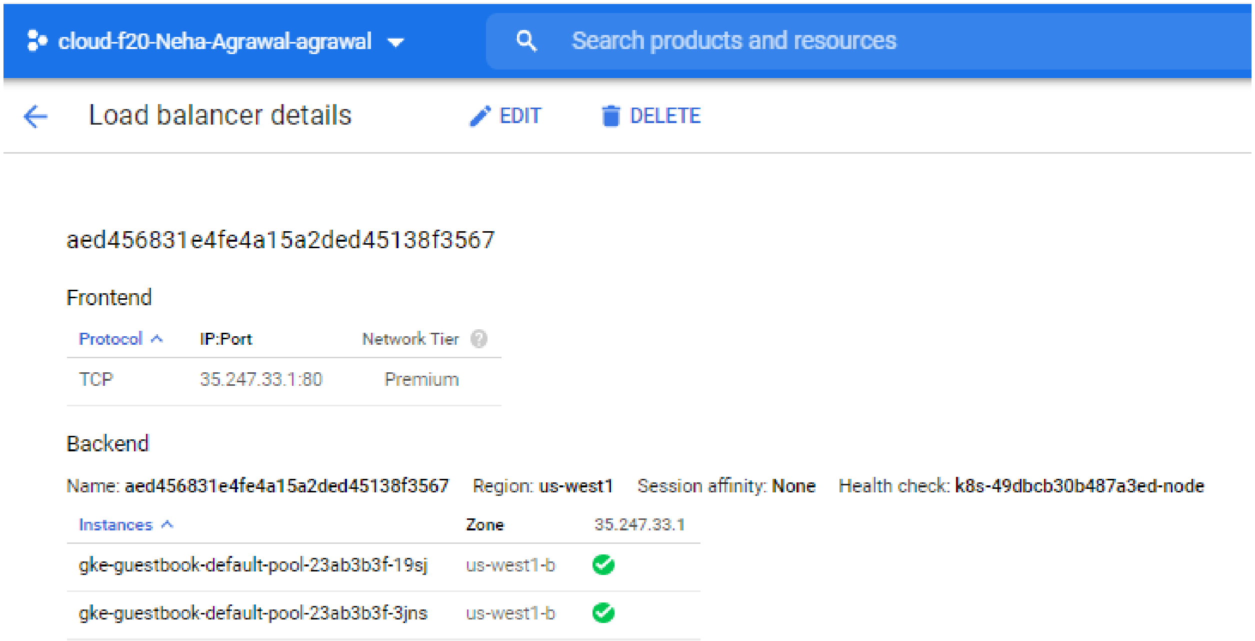
No data is available for the selected time frame.

No data is available for the selected time frame.

Pods

Name	Status	CPU requested	Memory requested	Storage requested	Namespace	Restarts	Created on ↑
event-exporter-gke-8489df9489-8pwqc	✓ Running	0 CPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:35 PM
fluentd-gke-scaler-cd4d654d7-gqdx2	✓ Running	0 CPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:38 PM
kube-dns-autoscaler-645f7d66cf-fnf75	✓ Running	20 mCPU	10.49 MB	0 B	kube-system	0	Nov 10, 2020, 4:25:40 PM
gke-metrics-agent-7nxsc	✓ Running	3 mCPU	52.43 MB	0 B	kube-system	0	Nov 10, 2020, 4:25:50 PM
prometheus-to-sd-qwcgv	✓ Running	0 CPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:50 PM
kube-proxy-gke-guestbook-default-pool-23ab3b3f-3jns	✓ Running	100 mCPU	0 B	0 B	kube-system	0	Nov 10, 2020, 4:25:50 PM
metrics-server-v0.3.6-64655c969-cxz9m	✓ Running	48 mCPU	110.1 MB	0 B	kube-system	0	Nov 10, 2020, 4:26:12 PM
kube-dns-7c976ddbdb-pflvm	✓ Running	260 mCPU	115.34 MB	0 B	kube-system	0	Nov 10, 2020, 4:26:13 PM
fluentd-gke-twjvt	✓ Running	100 mCPU	209.72 MB	0 B	kube-system	0	Nov 10, 2020, 4:27:49 PM
guestbook-replicas-k277g	✓ Running	100 mCPU	0 B	0 B	default	0	Nov 10, 2020, 4:47:40 PM

- **Visit Network Services and show the load balancer and its details**



aed456831e4fe4a15a2ded45138f3567

Frontend

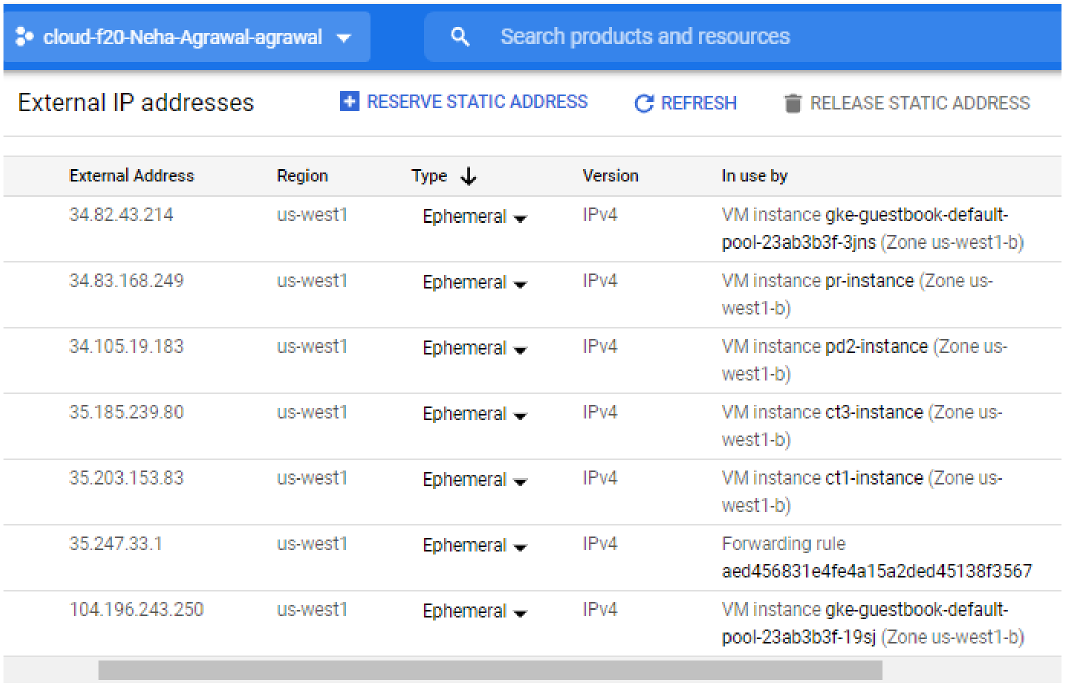
Protocol ^	IP:Port	Network Tier
TCP	35.247.33.1:80	Premium

Backend

Name: aed456831e4fe4a15a2ded45138f3567 Region: us-west1 Session affinity: None Health check: k8s-49dbcb30b487a3ed-node

Instances ^	Zone	35.247.33.1
gke-guestbook-default-pool-23ab3b3f-19sj	us-west1-b	✓
gke-guestbook-default-pool-23ab3b3f-3jns	us-west1-b	✓

- **Visit VPC network and External IP addresses to see the addresses allocated. Which ones are associated with nodes and which ones are associated with the load balancer?**



External IP addresses

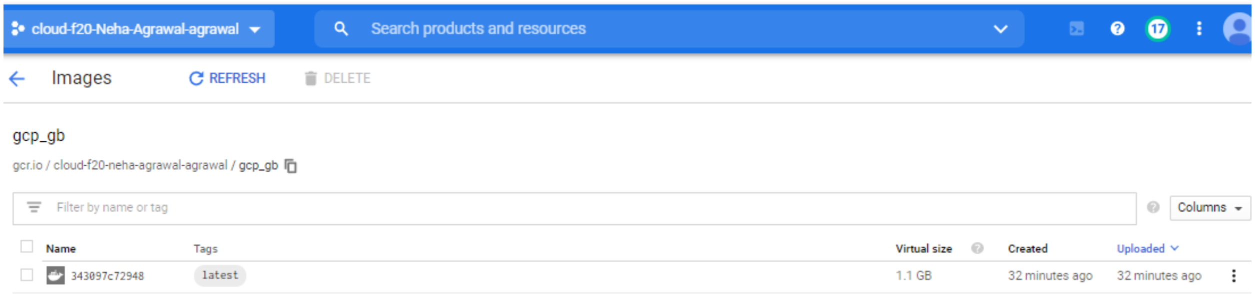
External Address	Region	Type	Version	In use by
34.82.43.214	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-23ab3b3f-3jns (Zone us-west1-b)
34.83.168.249	us-west1	Ephemeral	IPv4	VM instance pr-instance (Zone us-west1-b)
34.105.19.183	us-west1	Ephemeral	IPv4	VM instance pd2-instance (Zone us-west1-b)
35.185.239.80	us-west1	Ephemeral	IPv4	VM instance ct3-instance (Zone us-west1-b)
35.203.153.83	us-west1	Ephemeral	IPv4	VM instance ct1-instance (Zone us-west1-b)
35.247.33.1	us-west1	Ephemeral	IPv4	Forwarding rule aed456831e4fe4a15a2ded45138f3567
104.196.243.250	us-west1	Ephemeral	IPv4	VM instance gke-guestbook-default-pool-23ab3b3f-19sj (Zone us-west1-b)

Load balancer: 35.247.33.1

Node 1: gke-guestbook-default-pool-23ab3b3f-19sj : 104.196.243.250

Node 2: gke-guestbook-default-pool-23ab3b3f-3jns : 34.82.43.214

- **Visit Container Registry and see the Docker image created.**



gcp_gb

gcr.io / cloud-f20-neha-agrawal-agrawal / gcp_gb

Name	Tags	Virtual size	Created	Uploaded
343097c72948	latest	1.1 GB	32 minutes ago	32 minutes ago

9. Clean Up

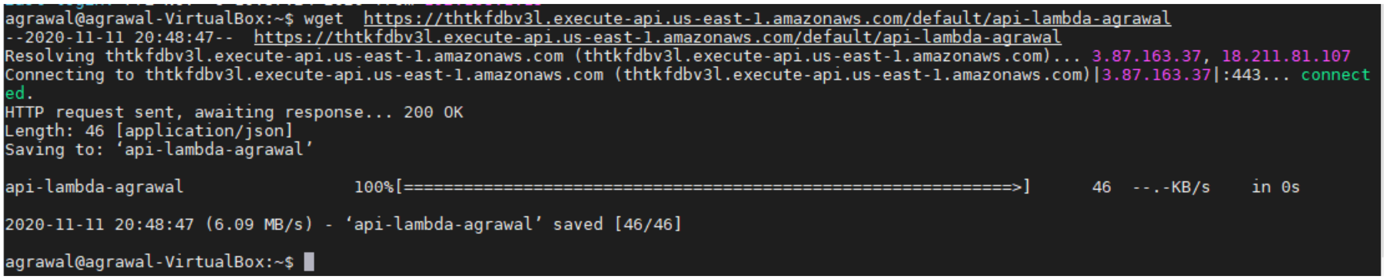
No screenshots required

07.2a: APIs (gettime)

1. gettime API

No screenshots required

2. Test code



```
agrawal@agrawal-VirtualBox:~$ wget  https://thtkfdbv3l.execute-api.us-east-1.amazonaws.com/default/api-lambda-agrawal
--2020-11-11 20:48:47--  https://thtkfdbv3l.execute-api.us-east-1.amazonaws.com/default/api-lambda-agrawal
Resolving thtkfdbv3l.execute-api.us-east-1.amazonaws.com (thtkfdbv3l.execute-api.us-east-1.amazonaws.com)... 3.87.163.37, 18.211.81.107
Connecting to thtkfdbv3l.execute-api.us-east-1.amazonaws.com (thtkfdbv3l.execute-api.us-east-1.amazonaws.com)|3.87.163.37|:443... connect
ed.
HTTP request sent, awaiting response... 200 OK
Length: 46 [application/json]
Saving to: ‘api-lambda-agrawal’

api-lambda-agrawal                 100%[==============================================================>]      46  --.-KB/s    in 0s

2020-11-11 20:48:47 (6.09 MB/s) - ‘api-lambda-agrawal’ saved [46/46]

agrawal@agrawal-VirtualBox:~$ █
```

3. Clean up

No screenshots required

07.2g: APIs (Slack, Knowledge Graph)

1. Slack and Knowledge Graph integration

No screenshots required

2. Code

- **Could we have used the API Discovery package to interact with the Vision API?**

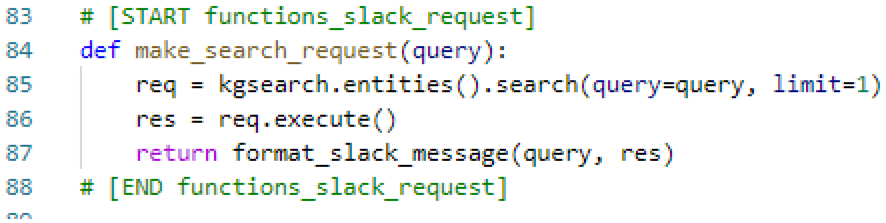
  yes

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

  no

3. Code

Visit the file and perform the following for your lab notebook:



```
83  # [START functions_slack_request]
84  def make_search_request(query):
85      req = kgsearch.entities().search(query=query, limit=1)
86      res = req.execute()
87      return format_slack_message(query, res)
88  # [END functions_slack_request]
```

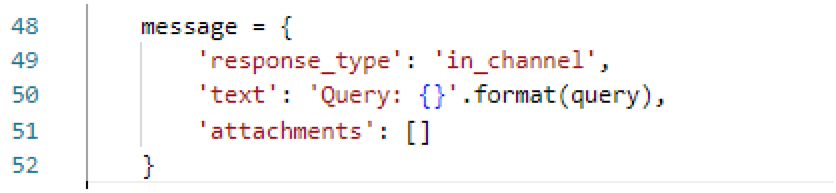
- **Show the source line that constructs the query we wish to send to the Knowledge Graph API.**

  Line 85

- **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?**

  Line 86, make_search_request()

Upon receiving a response from the Knowledge Graph API, it is formatted using the function format_slack_message() in order to pass it back to the Slack workspace. **Visit the file and answer the following questions:**



```
    message = {
        'response_type': 'in_channel',
        'text': 'Query: {}'.format(query),
        'attachments': []
    }
```

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

  dict

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

  response_type, text, attachments

4. Knowledge Graph setup

No screenshots required

5. Create a Slack workspace

Answer the following questions:

- **What would be the difference between an adversary finding out YOUR_SLACK_SIGNING_SECRET versus finding out YOUR_KG_API_KEY?**

  If an adversary finds out the KG_API_KEY then they will be able to access our website and databases, and our website may be compromised.

  When Slack sends our app a request, our app must check to make sure it's authentic. It can be done using slack signature. If an adversary knows our SLACK_SIGNING_SECRET, he might act disguise himself as the slack owner and send foul messages.

6. Configure and Deploy

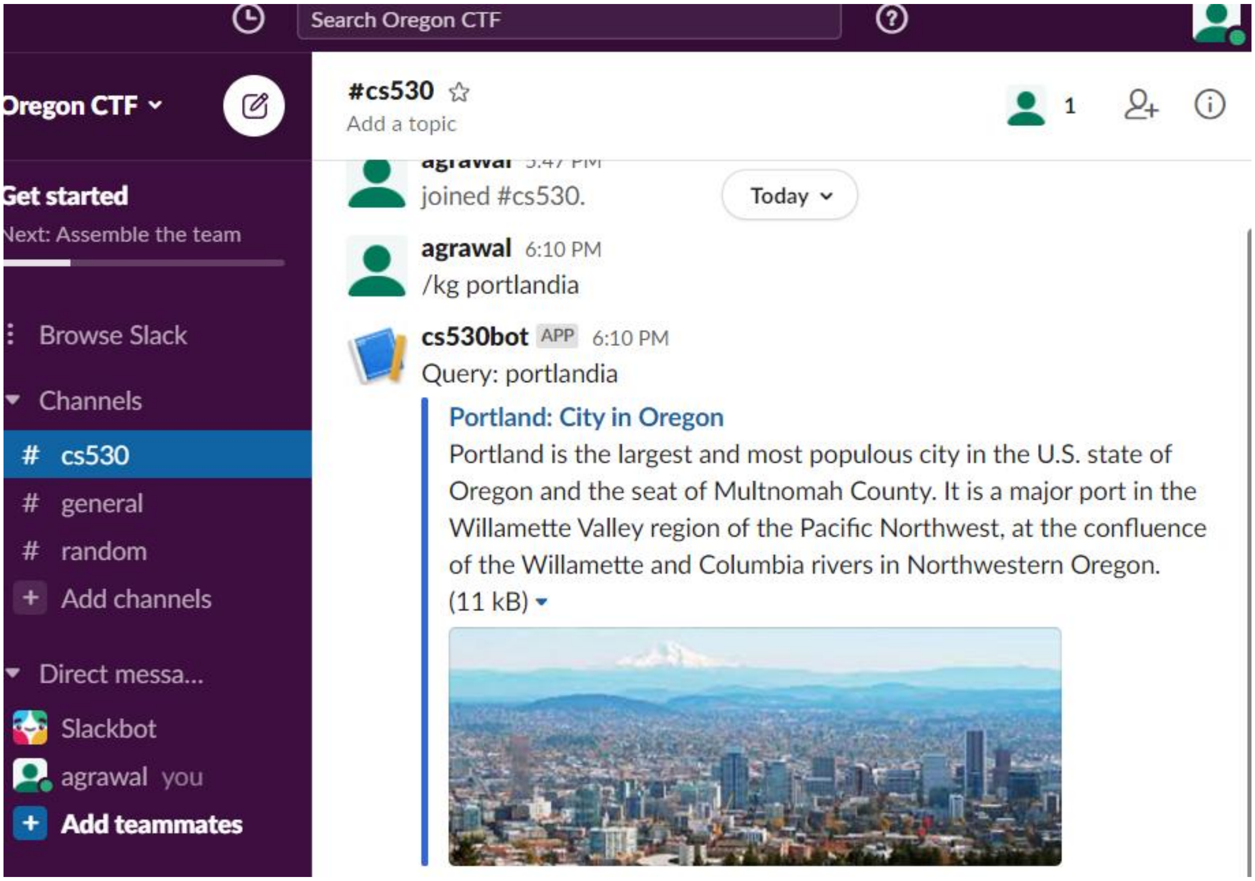
No screenshots required

7. Create Slack command

No screenshots required

8. Test the command

No screenshots required



agrawal 5:47 PM
joined #cs530.

agrawal 6:10 PM
/kg portlandia

cs530bot APP 6:10 PM
Query: portlandia

Portland: City in Oregon
Portland is the largest and most populous city in the U.S. state of Oregon and the seat of Multnomah County. It is a major port in the Willamette Valley region of the Pacific Northwest, at the confluence of the Willamette and Columbia rivers in Northwestern Oregon.
(11 kB)

07.3a: Lambda, API Gateway Guestbook

1. Overview

No screenshots required

2. Create a Lambda execution role

No screenshots required

3. Create a Cloud9 Environment

No screenshots required

4. Obtain AWS account ID

No screenshots required

5. REST API Code

- **What might go wrong when we call scan? Think about the way DynamoDB works, and look at the scan documentation for a hint. What could be done to address this problem?**

  A single Scan operation reads up to the maximum number of items set (if using the Limit parameter) or a maximum of 1 MB of data. If the total number of scanned items exceeds the maximum dataset size limit of 1 MB, the scan stops, and results are returned to the user as a LastEvaluatedKey value to continue the scan in a subsequent operation.

6. Deploy the Lambda for viewing entries

No screenshots required

7. Create API in API Gateway

No screenshots required

8. Enable API to invoke Lambda function

No screenshots required

9. API endpoint for viewing entries (1)

No screenshots required

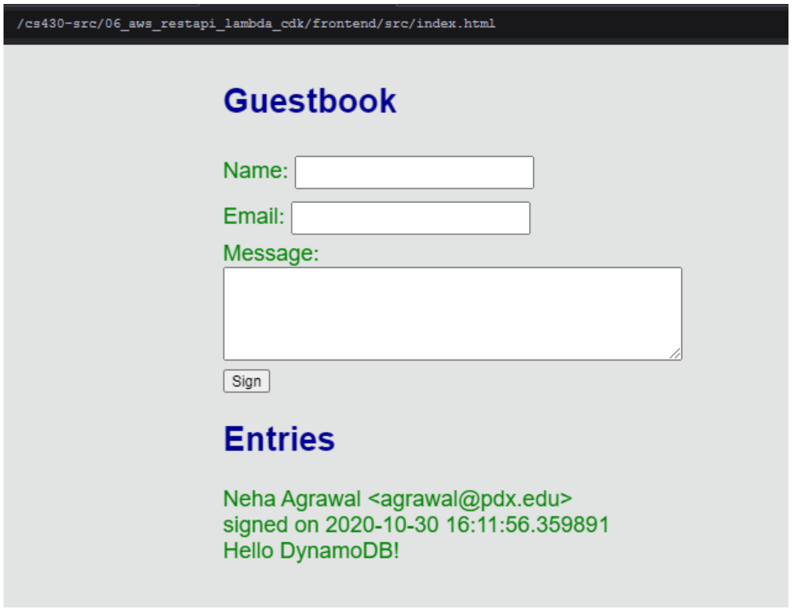
10. API endpoint for viewing entries (2)

No screenshots required

11. CORS setup for viewing entries

No screenshots required

12. Deploy API to production and view entries



/cs430-src/06_aws_restapi_lambda_cdk/frontend/src/index.html

Guestbook

Name:

Email:

Message:

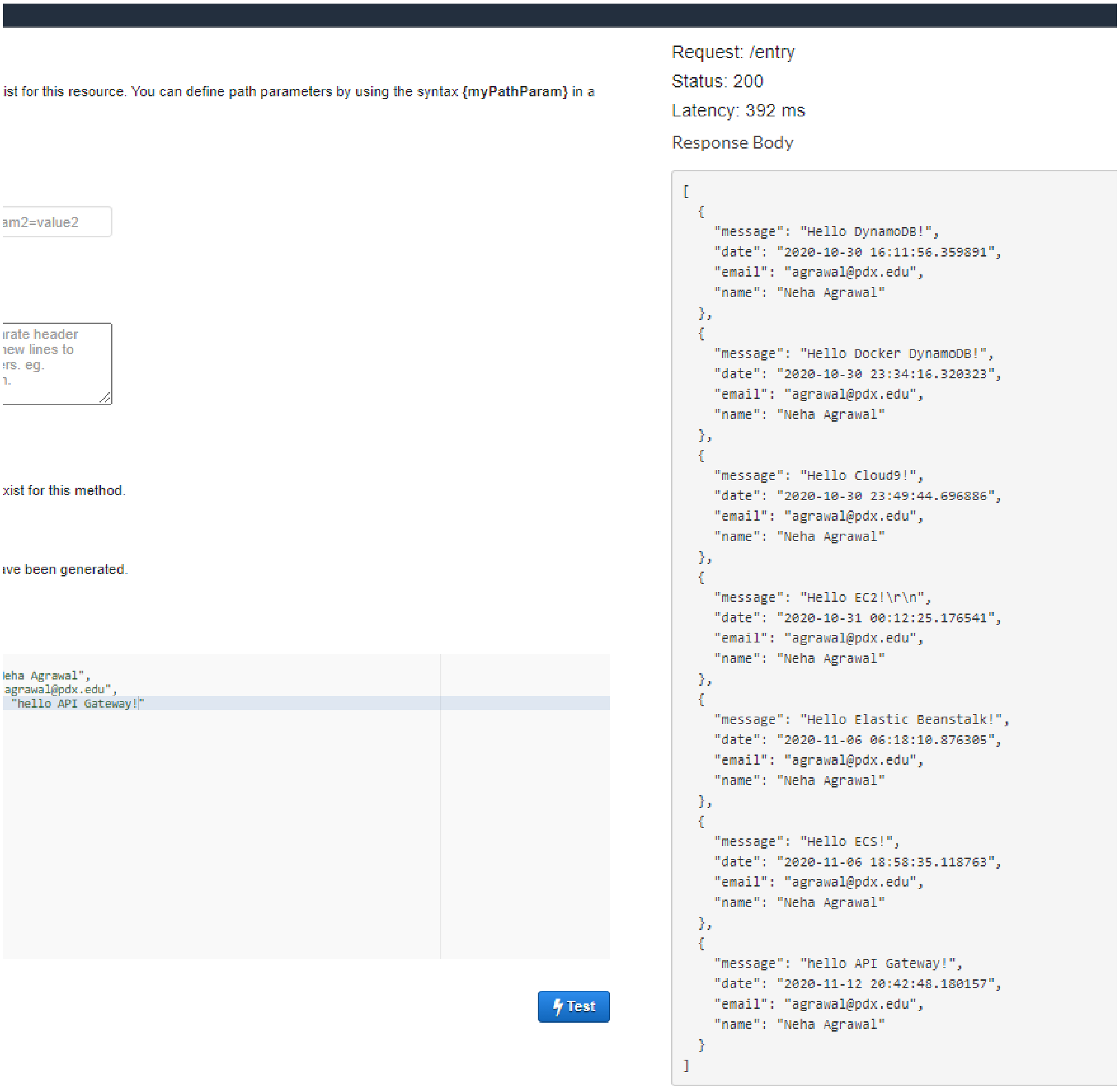
Entries

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-10-30 16:11:56.359891
Hello DynamoDB!

13. API endpoint for signing (1)

No screenshots required

14. API endpoint for signing (2)



ist for this resource. You can define path parameters by using the syntax {myPathParam} in a

xist for this method.

ive been generated.

```
leha Agrawal",
agrawal@pdx.edu",
 "hello API Gateway!"
```

Request: /entry

Status: 200

Latency: 392 ms

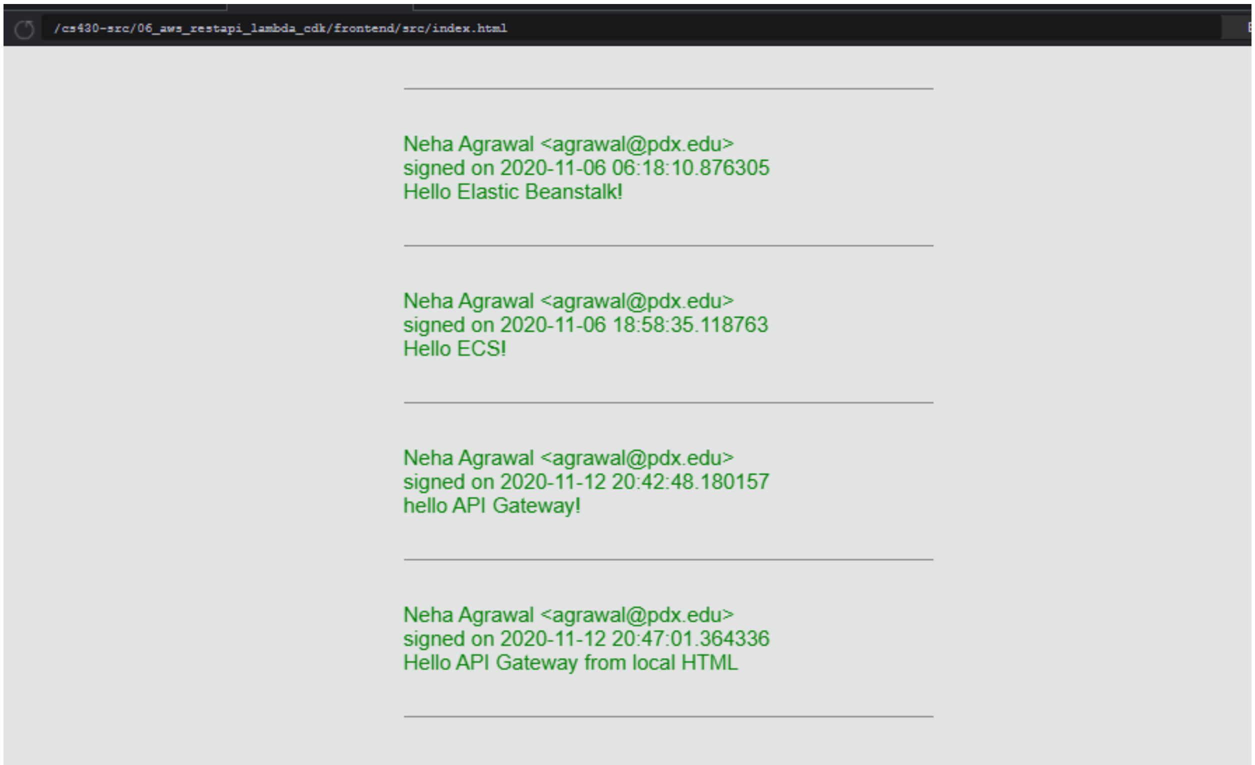
Response Body

```
[
  {
    "message": "Hello DynamoDB!",
    "date": "2020-10-30 16:11:56.359891",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "Hello Docker DynamoDB!",
    "date": "2020-10-30 23:34:16.320323",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "Hello Cloud9!",
    "date": "2020-10-30 23:49:44.696886",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "Hello EC2!\r\n",
    "date": "2020-10-31 00:12:25.176541",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "Hello Elastic Beanstalk!",
    "date": "2020-11-06 06:18:10.876305",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "Hello ECS!",
    "date": "2020-11-06 18:58:35.118763",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  },
  {
    "message": "hello API Gateway!",
    "date": "2020-11-12 20:42:48.180157",
    "email": "agrawal@pdx.edu",
    "name": "Neha Agrawal"
  }
]
```

15. CORS setup for signing

No screenshots required

16. Deploy API to production and sign



/cs430-src/06_aws_restapi_lambda_cdk/frontend/src/index.html

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-06 06:18:10.876305
Hello Elastic Beanstalk!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-06 18:58:35.118763
Hello ECS!

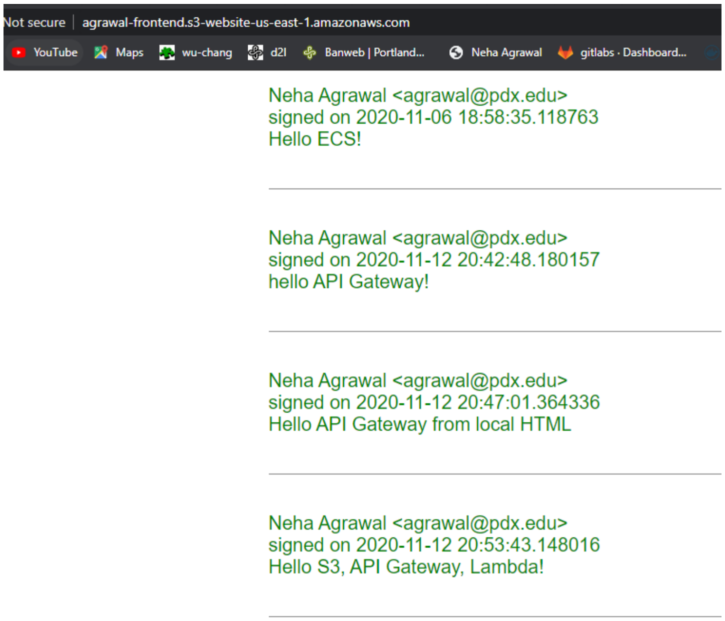
Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 20:42:48.180157
hello API Gateway!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 20:47:01.364336
Hello API Gateway from local HTML

17. Frontend Code

No screenshots required

18. Configure and Deploy the Frontend



Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-06 18:58:35.118763
Hello ECS!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 20:42:48.180157
hello API Gateway!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 20:47:01.364336
Hello API Gateway from local HTML

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 20:53:43.148016
Hello S3, API Gateway, Lambda!

19. Clean up

No screenshots required

07.3g: Cloud Functions API Guestbook

1. Cloud Functions

No screenshots required

2. REST API (GET)

No screenshots required

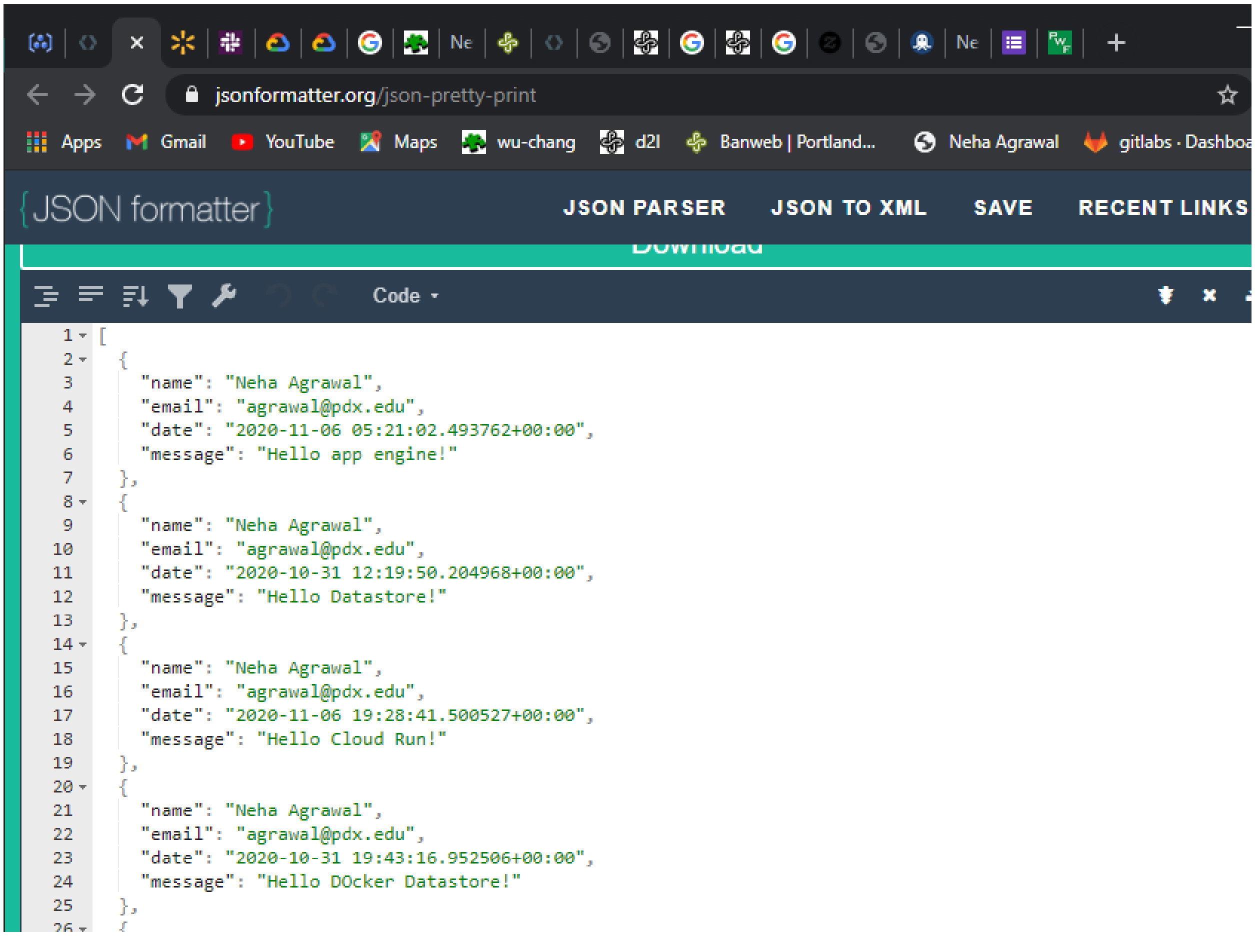
3. REST API (POST)

No screenshots required

4. Deploy the API

No screenshots required

5. Test the API via Cloud Functions (POST)

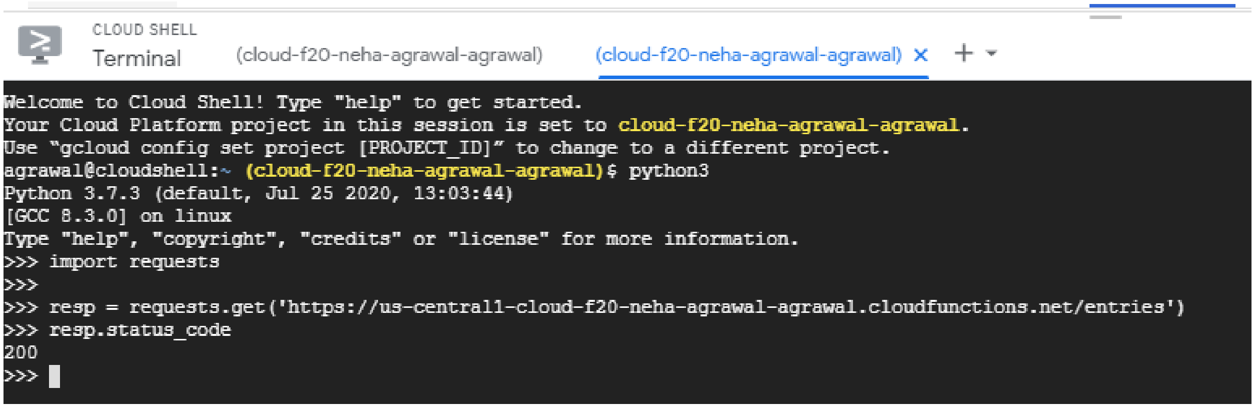


```
[
  {
    "name": "Neha Agrawal",
    "email": "agrawal@pdx.edu",
    "date": "2020-11-06 05:21:02.493762+00:00",
    "message": "Hello app engine!"
  },
  {
    "name": "Neha Agrawal",
    "email": "agrawal@pdx.edu",
    "date": "2020-10-31 12:19:50.204968+00:00",
    "message": "Hello Datastore!"
  },
  {
    "name": "Neha Agrawal",
    "email": "agrawal@pdx.edu",
    "date": "2020-11-06 19:28:41.500527+00:00",
    "message": "Hello Cloud Run!"
  },
  {
    "name": "Neha Agrawal",
    "email": "agrawal@pdx.edu",
    "date": "2020-10-31 19:43:16.952506+00:00",
    "message": "Hello DOcker Datastore!"
  },
  {
```

6. Test the API via Python Requests (GET)

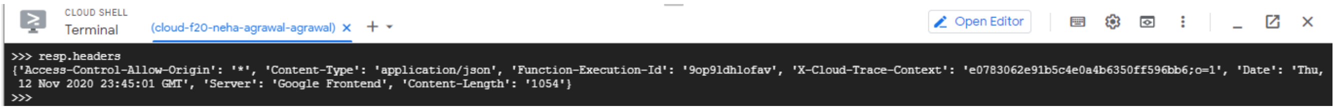
Using the interpreter and the resp object, use Python's print() function to show the following for the response:

- Response HTTP status_code


CLOUD SHELL
Terminal
(cloud-f20-neha-agrawal-agrawal)
(cloud-f20-neha-agrawal-agrawal)

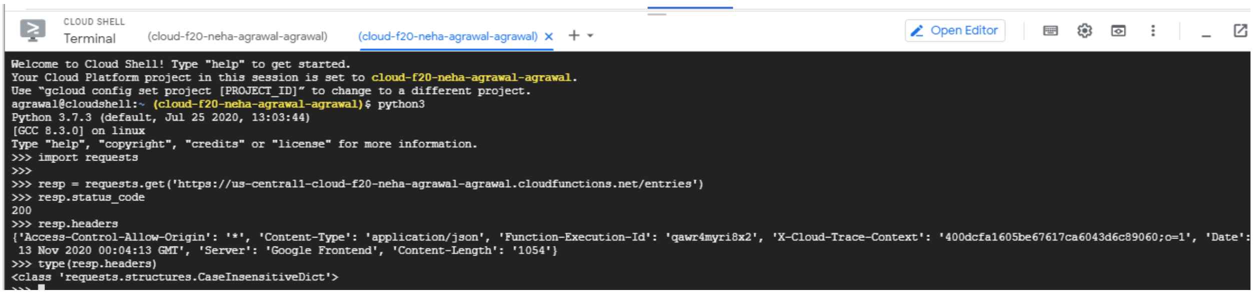
```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to cloud-f20-neha-agrawal-agrawal.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
agrawal@cloudshell:~ (cloud-f20-neha-agrawal-agrawal)$ python3
Python 3.7.3 (default, Jul 25 2020, 13:03:44)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import requests
>>>
>>> resp = requests.get('https://us-central1-cloud-f20-neha-agrawal-agrawal.cloudfunctions.net/entries')
>>> resp.status_code
200
>>>
```

- Response headers



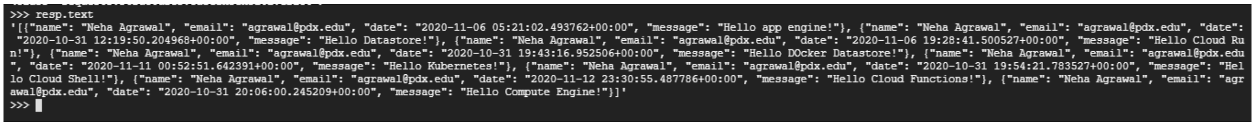
```
>>> resp.headers
{'Access-Control-Allow-Origin': '*', 'Content-Type': 'application/json', 'Function-Execution-Id': '9op9ldhlofav', 'X-Cloud-Trace-Context': 'e0783062e91b5c4e0a4b6350ff596bb6;o=1', 'Date': 'Thu,
 12 Nov 2020 23:45:01 GMT', 'Server': 'Google Frontend', 'Content-Length': '1054'}
>>>
```

- Data type of the response headers (using the type()) function of Python


CLOUD SHELL
Terminal
(cloud-f20-neha-agrawal-agrawal)
(cloud-f20-neha-agrawal-agrawal)
Open Editor

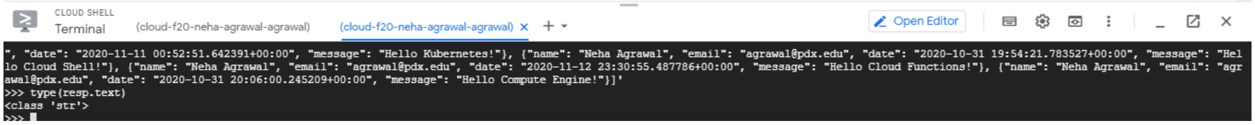
```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to cloud-f20-neha-agrawal-agrawal.
Use "gcloud config set project [PROJECT_ID]" to change to a different project.
agrawal@cloudshell:~ (cloud-f20-neha-agrawal-agrawal)$ python3
Python 3.7.3 (default, Jul 25 2020, 13:03:44)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import requests
>>>
>>> resp = requests.get('https://us-central1-cloud-f20-neha-agrawal-agrawal.cloudfunctions.net/entries')
>>> resp.status_code
200
>>> resp.headers
{'Access-Control-Allow-Origin': '*', 'Content-Type': 'application/json', 'Function-Execution-Id': 'qawr4myri8x2', 'X-Cloud-Trace-Context': '400dcfa1605be67617ca6043d6c89060;o=1', 'Date':
 13 Nov 2020 00:04:13 GMT', 'Server': 'Google Frontend', 'Content-Length': '1054'}
>>> type(resp.headers)
<class 'requests.structures.CaseInsensitiveDict'>
>>>
```

- Response text



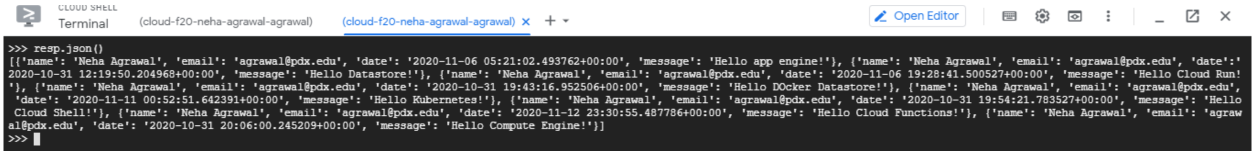
```
>>> resp.text
'[{"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-11-06 05:21:02.493762+00:00", "message": "Hello app engine!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date":
 "2020-10-31 12:19:50.204968+00:00", "message": "Hello Datastore!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-11-06 19:28:41.500527+00:00", "message": "Hello Cloud Ru
n!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-10-31 19:43:16.952506+00:00", "message": "Hello DOcker Datastore!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu
", "date": "2020-11-11 00:52:51.642391+00:00", "message": "Hello Kubernetes!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-10-31 19:54:21.783527+00:00", "message": "Hel
lo Cloud Shell!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-11-12 23:30:55.487786+00:00", "message": "Hello Cloud Functions!"}, {"name": "Neha Agrawal", "email": "agr
awal@pdx.edu", "date": "2020-10-31 20:06:00.245209+00:00", "message": "Hello Compute Engine!"}]'
>>>
```

- Data type of the response text


CLOUD SHELL
Terminal
(cloud-f20-neha-agrawal-agrawal)
(cloud-f20-neha-agrawal-agrawal)
Open Editor

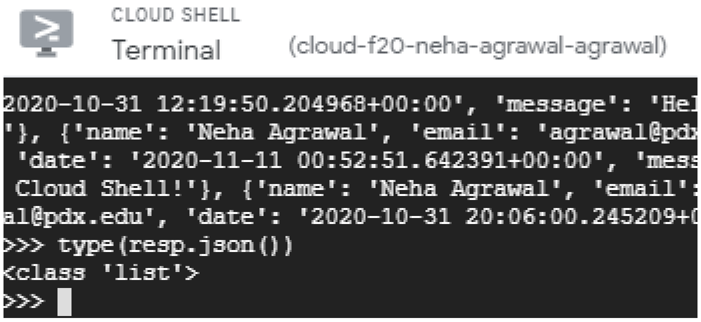
```
", "date": "2020-11-11 00:52:51.642391+00:00", "message": "Hello Kubernetes!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-10-31 19:54:21.783527+00:00", "message": "Hel
lo Cloud Shell!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-11-12 23:30:55.487786+00:00", "message": "Hello Cloud Functions!"}, {"name": "Neha Agrawal", "email": "agr
awal@pdx.edu", "date": "2020-10-31 20:06:00.245209+00:00", "message": "Hello Compute Engine!"}]'
>>> type(resp.text)
<class 'str'>
>>>
```

- Response JSON


CLOUD SHELL
Terminal
(cloud-f20-neha-agrawal-agrawal)
(cloud-f20-neha-agrawal-agrawal)
Open Editor

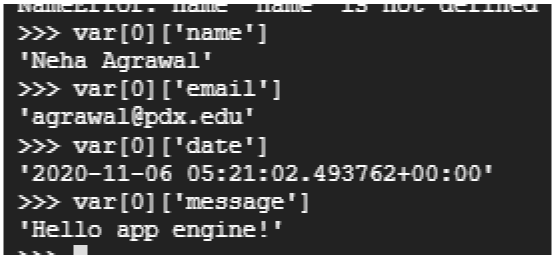
```
>>> resp.json()
[{'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date': '2020-11-06 05:21:02.493762+00:00', 'message': 'Hello app engine!'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date':'
2020-10-31 12:19:50.204968+00:00', 'message': 'Hello Datastore!'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date': '2020-11-06 19:28:41.500527+00:00', 'message': 'Hello Cloud Run!
'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date': '2020-10-31 19:43:16.952506+00:00', 'message': 'Hello DOcker Datastore!'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu',
 'date': '2020-11-11 00:52:51.642391+00:00', 'message': 'Hello Kubernetes!'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date': '2020-10-31 19:54:21.783527+00:00', 'message': 'Hello
 Cloud Shell!'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx.edu', 'date': '2020-11-12 23:30:55.487786+00:00', 'message': 'Hello Cloud Functions!'}, {'name': 'Neha Agrawal', 'email': 'agraw
al@pdx.edu', 'date': '2020-10-31 20:06:00.245209+00:00', 'message': 'Hello Compute Engine!'}]
>>> 
```

- Data type of the response JSON



```
2020-10-31 12:19:50.204968+00:00', 'message': 'Hel
'}, {'name': 'Neha Agrawal', 'email': 'agrawal@pdx
 'date': '2020-11-11 00:52:51.642391+00:00', 'mess
 Cloud Shell!'}, {'name': 'Neha Agrawal', 'email':
al@pdx.edu', 'date': '2020-10-31 20:06:00.245209+0
>>> type(resp.json())
<class 'list'>
>>> 
```

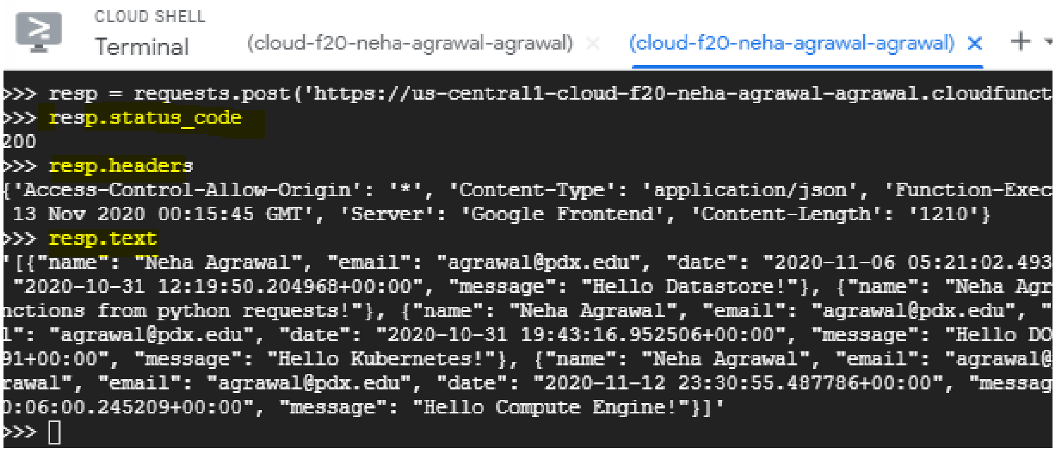
Then, assign the response JSON to a variable and use the interpreter to individually print the name, email, signed_on, and message of the first Guestbook entry returned. Refer back to this sequence as needed when integrating a REST API into applications you write.



```
NameError: name 'name' is not defined
>>> var[0]['name']
'Neha Agrawal'
>>> var[0]['email']
'agrawal@pdx.edu'
>>> var[0]['date']
'2020-11-06 05:21:02.493762+00:00'
>>> var[0]['message']
'Hello app engine!'
>>> 
```

7. Test the API via Python Requests (POST)

As done in the previous step, show the response status, the response headers, and the response text that indicates a successful insertion.


CLOUD SHELL
Terminal
(cloud-f20-neha-agrawal-agrawal)
(cloud-f20-neha-agrawal-agrawal)

```
>>> resp = requests.post('https://us-central1-cloud-f20-neha-agrawal-agrawal.cloudfunct
>>> resp.status_code
200
>>> resp.headers
{'Access-Control-Allow-Origin': '*', 'Content-Type': 'application/json', 'Function-Exec
 13 Nov 2020 00:15:45 GMT', 'Server': 'Google Frontend', 'Content-Length': '1210'}
>>> resp.text
'[{"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "date": "2020-11-06 05:21:02.493
 "2020-10-31 12:19:50.204968+00:00", "message": "Hello Datastore!"}, {"name": "Neha Agr
nctions from python requests!"}, {"name": "Neha Agrawal", "email": "agrawal@pdx.edu", "
l": "agrawal@pdx.edu", "date": "2020-10-31 19:43:16.952506+00:00", "message": "Hello DO
91+00:00", "message": "Hello Kubernetes!"}, {"name": "Neha Agrawal", "email": "agrawal@
rawal", "email": "agrawal@pdx.edu", "date": "2020-11-12 23:30:55.487786+00:00", "messag
0:06:00.245209+00:00", "message": "Hello Compute Engine!"}]'
>>> 
```

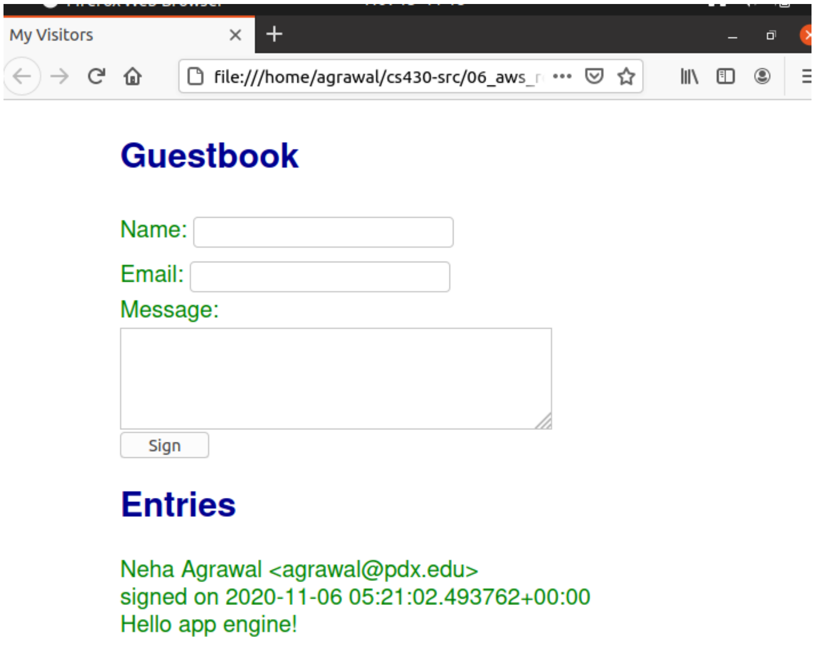
8. Client-side Guestbook application

No screenshots required

9. guestbook.js

No screenshots required

10. Version #1: Local file system



Guestbook

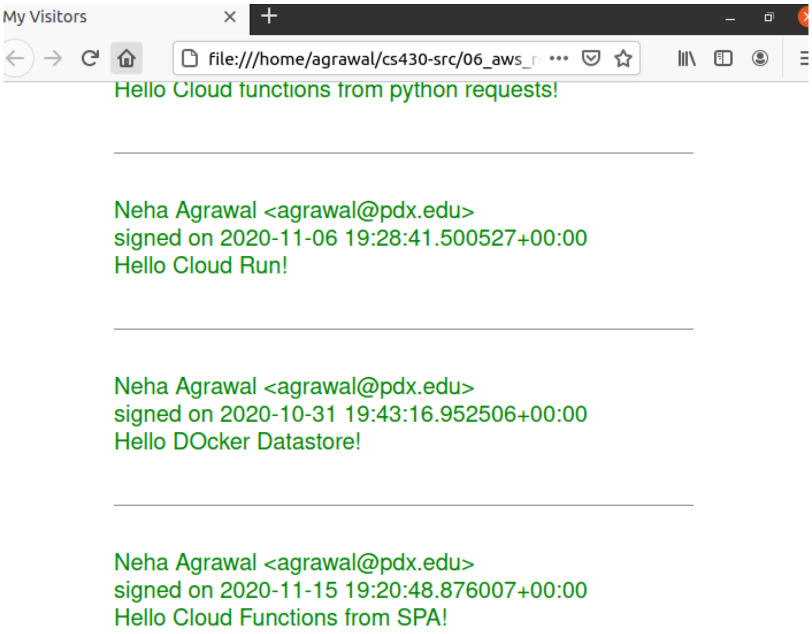
Name:

Email:

Message:

Entries

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-06 05:21:02.493762+00:00
Hello app engine!



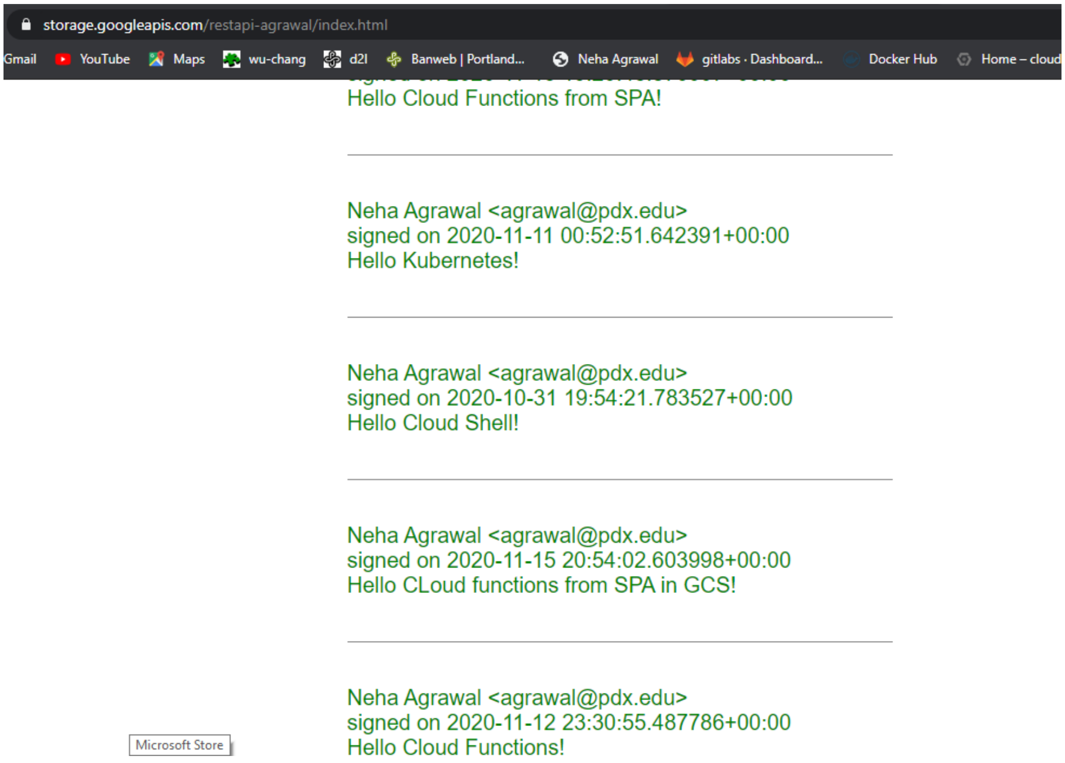
Hello Cloud functions from python requests!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-06 19:28:41.500527+00:00
Hello Cloud Run!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-10-31 19:43:16.952506+00:00
Hello DOcker Datastore!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-15 19:20:48.876007+00:00
Hello Cloud Functions from SPA!

11. Version #2: Google Cloud Storage bucket



Hello Cloud Functions from SPA!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-11 00:52:51.642391+00:00
Hello Kubernetes!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-10-31 19:54:21.783527+00:00
Hello Cloud Shell!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-15 20:54:02.603998+00:00
Hello CLoud functions from SPA in GCS!

Neha Agrawal <agrawal@pdx.edu>
signed on 2020-11-12 23:30:55.487786+00:00
Hello Cloud Functions!

12. Clean up

No screenshots required