

## HW10 - David Euijoon Kim - GDM (Google Deployment Manager)

[https://github.com/dk-davidekim/Google-Cloud-Computing\\_git](https://github.com/dk-davidekim/Google-Cloud-Computing_git)

### 1. Change app\_one.py

Create the database and the tables if they do not exist.

```
38         self.initialize_database()
39
40     def initialize_database(self):
41         with self.pool.connect() as conn:
42             conn.execute(text("CREATE DATABASE IF NOT EXISTS hw10db"))
43             conn.execute(text("USE hw10db"))
44             conn.execute(text("""
45             CREATE TABLE IF NOT EXISTS Clients (
46                 client_id INT AUTO_INCREMENT PRIMARY KEY,
47                 client_ip VARCHAR(255) UNIQUE NOT NULL,
48                 country VARCHAR(255),
49                 gender VARCHAR(255),
50                 age VARCHAR(255),
51                 income VARCHAR(255),
52                 is_banned BOOLEAN
53             );
54             """))
55             conn.execute(text("""
56             CREATE TABLE IF NOT EXISTS Files (
57                 file_id INT AUTO_INCREMENT PRIMARY KEY,
58                 file_name VARCHAR(255) UNIQUE NOT NULL
59             );
60             """))
61             conn.execute(text("""
62             CREATE TABLE IF NOT EXISTS Requests (
63                 id INT AUTO_INCREMENT PRIMARY KEY,
64                 client_id INT,
65                 file_id INT,
66                 time_of_day TIME,
67                 FOREIGN KEY (client_id) REFERENCES Clients(client_id),
68                 FOREIGN KEY (file_id) REFERENCES Files(file_id)
69             );
70             """))
71             conn.execute(text("""
72             CREATE TABLE IF NOT EXISTS ErrorCodes (
73                 error_code_id INT AUTO_INCREMENT PRIMARY KEY,
74                 error_code INT UNIQUE NOT NULL,
75                 description TEXT
76             );
77             """))
78             conn.execute(text("""
79             CREATE TABLE IF NOT EXISTS FailedRequests (
80                 id INT AUTO_INCREMENT PRIMARY KEY,
81                 time_of_request TIME,
82                 file_id INT,
83                 error_code_id INT,
84                 FOREIGN KEY (file_id) REFERENCES Files(file_id),
85                 FOREIGN KEY (error_code_id) REFERENCES ErrorCodes(error_code_id)
86             );
87             """))
```

### 2. Write a Declarative Configuration for GDM (deployment-config.yaml)

BU > DS561 > Google-Cloud-Computing > hw10 > deployment-config.yaml

```
1  resources:
2
3      # Tag for 8080 Firewall
4      - name: allow-web-8080
5        type: compute.v1.firewall
6        properties:
7          allowed:
8            - IPProtocol: TCP
9              ports:
10                - "8080"
11          description: "Allow port 8080 access to web servers"
12          sourceRanges: ["0.0.0.0/0"]
13          targetTags: ["web-server-8080"]
14
15      # Service Account
16      - name: service-account
17        type: iam.v1.serviceAccount
18        properties:
19          accountId: hw10-sa
20          displayName: hw10-sa
21
22      # VM Web Server
23      - name: webserver-vm
24        type: compute.v1.instance
25        properties:
26          properties:
27            machineType: zones/us-east1-b/machineTypes/e2-medium
28            disks:
29              - deviceName: boot
30                type: PERISTENT
31                boot: true
32                autoDelete: true
33              initializeParams:
34                sourceImage: projects/debian-cloud/global/images/family/debian-11
35            networkInterfaces:
36              - network: global/networks/default
37            serviceAccounts:
38              - email: hw10-sa@ds-561.iam.gserviceaccount.com
39                scopes:
40                  - https://www.googleapis.com/auth/cloud-platform
41          metadata:
42            items:
43              - key: startup-script
44                value: |
45                  #!/bin/bash
46                  sudo systemctl enable hw10webserver
47                  sudo systemctl start hw10webserver
48          dependsOn:
49            - service-account
50          tags:
51            items:
52              - allow-web-8080
53              - web-server-8080
```

```
54
55      # VM for Pub/Sub Listener
56      - name: pubsub-listener-vm
57        type: compute.v1.instance
58        properties:
59          properties:
60            zones: us-east1-b/machineTypes/e2-medium
61            disks:
62              - deviceName: boot
63                type: PERISTENT
64                boot: true
65                autoDelete: true
66              initializeParams:
67                sourceImage: projects/debian-cloud/global/images/family/debian-11
68            networkInterfaces:
69              - network: global/networks/default
70            serviceAccounts:
71              - email: hw10-sa@ds-561.iam.gserviceaccount.com
72                scopes:
73                  - https://www.googleapis.com/auth/pubsub
74          metadata:
75            dependsOn:
76              - service-account
77
78      # Cloud SQL Database
79      - name: sql-database-instance
80        type: sqladmin.v1.instance
81        properties:
82          properties:
83            region: us-east1
84            project: ds-561
85            settings:
86              tier: db-custom-4-16384
87
88      # Pub/Sub Topic
89      - name: hw10-topic
90        type: gcp-types/pubsub-v1/projects.topics
91        properties:
92          properties:
93            topics: hw10-topic
94
95      # Pub/Sub Subscription
96      - name: hw10-sub
97        type: gcp-types/pubsub-v1/projects.subscriptions
98        properties:
99          subscription: hw10-sub
100          topics: projects/ds-561/topics/hw10-topic
101          metadata:
102            dependsOn:
103              - hw10-topic
104
105      # Bucket
106      - name: hw10_bucket
107        type: storage.v1.bucket
108        properties:
109          location: US
```

### 3. Deploy the Configuration

1. `gcloud deployment-manager deployments create [DEPLOYMENT_NAME] --config [YOUR_YAML_FILE].yaml`
  - a. `gcloud deployment-manager deployments create hw10 --config deployment-config.yaml`

```
~/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10 git:(main) ±1 (2m 36.34s)
gcloud deployment-manager deployments create hw10 --config deployment-config.yaml
The fingerprint of the deployment is b'NrErAgUdVGMgyjTt0GbZWg=='
Waiting for create [operation-1700807214413-60ae009d8b69f-2a16c5d1-4fcc340a]...done.
Create operation operation-1700807214413-60ae009d8b69f-2a16c5d1-4fcc340a completed successfully.
NAME                                     TYPE                                     STATE   ERRORS  INTENT
allow-web-8080                          compute.v1.firewall                   COMPLETED []
hw10-sub                                gcp-types/pubsub-v1:projects.subscriptions COMPLETED []
hw10-topic                              gcp-types/pubsub-v1:projects.topics   COMPLETED []
pubsub-listener-vm                      compute.v1.instance                  COMPLETED []
service-account                         iam.v1.serviceAccount                COMPLETED []
sql-admin-instance                      sqladmin.v1beta4.instance            COMPLETED []
webserver-vm                           compute.v1.instance                  COMPLETED []
```



Deployment Manager

Deployments

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Deployments



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<input type="checkbox"/>	<input checked="" type="radio"/>	Name ↑	Created on	Last modified	Labels
<input type="checkbox"/>	<input checked="" type="radio"/>	hw10	4 minutes ago	2 minutes ago	None

### 4. Service Account Permissions



[hw10-sa@ds-561.iam.gserviceaccount.com](#)

Enabled

hw10-sa



#### 1. CloudSQL Admin

- a. `gcloud projects add-iam-policy-binding ds-561 \`  
`--member="serviceAccount:hw10-sa@ds-561.iam.gserviceaccount.com" \`  
`--role="roles/cloudsql.admin"`

#### 2. Storage Admin

- a. `gcloud projects add-iam-policy-binding ds-561 \`  
`--member="serviceAccount:hw10-sa@ds-561.iam.gserviceaccount.com" \`  
`--role="roles/storage.admin"`

#### 3. Pub/Sub Admin Role

- a. `gcloud projects add-iam-policy-binding ds-561 \`

### 3. Check Files

hw10\_bucket

Location

us-east1 (South Carolina)

Storage class

Standard

Public access

Public to internet

Protection

None

OBJECTS

CONFIGURATION

PERMISSIONS

PROTECTION

LIFECYCLE

OBSERVABILITY

INVENTORY REPORTS

Buckets

>

hw10\_bucket

>

hw10\_output

UPLOAD FILES

UPLOAD FOLDER

CREATE FOLDER

TRANSFER DATA

MANAGE HOLDS

DOWNLOAD

DELETE

Filter by name prefix only

Filter

Filter objects and folders

Name	Size	Type	Created	Storage class	Last modified
0.html	104.4 KB	text/html	Dec 4, 2023, 11:56:27 PM	Standard	Dec 4, 2023, 11:56:27 PM
1.html	92.3 KB	text/html	Dec 4, 2023, 11:53:54 PM	Standard	Dec 4, 2023, 11:53:54 PM
10.html	49.8 KB	text/html	Dec 4, 2023, 11:56:33 PM	Standard	Dec 4, 2023, 11:56:33 PM
100.html	67.2 KB	text/html	Dec 4, 2023, 11:46:45 PM	Standard	Dec 4, 2023, 11:46:45 PM
1000.html	46 KB	text/html	Dec 4, 2023, 11:53:15 PM	Standard	Dec 4, 2023, 11:53:15 PM
1001.html	95.7 KB	text/html	Dec 4, 2023, 11:49:57 PM	Standard	Dec 4, 2023, 11:49:57 PM
1002.html	115.1 KB	text/html	Dec 4, 2023, 11:56:12 PM	Standard	Dec 4, 2023, 11:56:12 PM
1003.html	91.4 KB	text/html	Dec 4, 2023, 11:54:08 PM	Standard	Dec 4, 2023, 11:54:08 PM
1004.html	118.5 KB	text/html	Dec 4, 2023, 11:58:54 PM	Standard	Dec 4, 2023, 11:58:54 PM

a.

## 6. Cloud SQL

### 1. Set Password:

- a. `gcloud sql users set-password root --host=% --instance=sql-database-instance --password=dk98`

### 2. Update .env for app\_one.py

```
BU > DS561 > Google-Cloud-Computing > hw10 > .env
1 DB_CONNECTION_STRING=ds-561:us-east1:sql-database-instance
2 DB_USER=root
3 DB_PASSWORD=dk98
4 DB_DATABASE=hw10db
```

a.

### 3. Create hw10db

Name	Collation	Character set	Type
hw10db	utf8mb3_general_ci	utf8mb3	User

a.

## 7. VM1 - webserver-vm

✓

webserver-vm

us-east1-b

SSH

⌵

⋮

### 1. Reserve Static IP Address

- a. 34.138.168.90

### 2. Edit app\_one.py based on new instances

### 3. Send app\_one.py and .env file to VM

- a. `gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10/app_one.py webserver-vm:~/app_one.py --zone us-east1-b`
- b. `gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10/.env webserver-vm:~/env --zone us-east1-b`

### 4. Install Dependencies in SSH

- a. `sudo apt-get update`
  - b. `sudo apt-get install python3 python3-pip`
  - c. `pip3 install cloud-sql-python-connector python-dotenv sqlalchemy pymysql`
  - d. `pip3 install Flask google-cloud-storage google-cloud-pubsub google-cloud-logging`
5. Configure Webserver in SSH
  - a. `sudo nano /etc/systemd/system/hw10webserver.service`
  - b. [Unit]  
Description=HW10 Web Server  
[Service]  
ExecStart=/usr/bin/python3 app\_one.py  
Restart=always  
User=dk98  
WorkingDirectory=/home/davidekim  
[Install]  
WantedBy=multi-user.target
  - c. Restart VM to start the webserver

## 8. VM2 - pubsub-listener-vm

- ☐ ☒ [pubsub-listener-vm](#) us-east1-b SSH ▾ ⋮
1. Edit `app_two.py` based on new instances
  2. Send `app_two.py` to VM
    - a. `gcloud compute scp /Users/davidekim/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10/app_two.py pubsub-listener-vm:~/app_two.py --zone us-east1-b`
  3. Install Dependencies in SSH
    - a. `sudo apt-get update`
    - b. `sudo apt-get install python3 python3-pip`
    - c. `pip3 install google-cloud-pubsub`
  4. Run `python3 app_two.py`

```
dk98@pubsub-listener-vm:~/home/davidekim$ ls
app_two.py
dk98@pubsub-listener-vm:~/home/davidekim$ python3 app_two.py
Listening for messages on: projects/ds-561/subscriptions/hw10-sub
```

## 9. Curl Commands

### 1. Status 200

- a. `curl -X GET \`  
    `-H "X-country: South Korea" \`  
    `-H "X-client-IP: 0.0.0.0" \`  
    `-H "X-gender: Male" \`  
    `-H "X-age: 20-25" \`  
    `-H "X-income: 200k-300k" \`  
    `"http://34.138.168.90:8080/hw10_output/1234.html"`

```
~ (0.596s)
curl -X GET \
-H "X-country: South Korea" \
-H "X-client-IP: 0.0.0.0" \
-H "X-gender: Male" \
-H "X-age: 20-25" \
-H "X-income: 200k-300k" \
"http://34.138.168.90:8080/hw10_output/1234.html"
<a HREF="4978.html"> This is a link </a>
<p>
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad
minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in v
oluptate velit esse
cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id es
t laborum.
<p>
<a HREF="3230.html"> This is a link </a>
<p>
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad
minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in v
oluptate velit esse
cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id es
t laborum.
<p>
```

### 2. Status 404

- a. `curl -X GET \`  
    `-H "X-country: USA" \`  
    `-H "X-client-IP: 1.2.3.4" \`  
    `-H "X-gender: Female" \`  
    `-H "X-age: 20-24" \`  
    `-H "X-income: 400k-500k" \`  
    `"http://34.138.168.90:8080/hw10_output/12345.html"`

```
~ (0.426s)
curl -X GET \
-H "X-country: USA" \
-H "X-client-IP: 1.2.3.4" \
-H "X-gender: Female" \
-H "X-age: 20-24" \
-H "X-income: 400k-500k" \
"http://34.138.168.90:8080/hw10_output/12345.html"

File not found
```

### 3. Status 501

a. `curl -X POST \`

`-H "X-country: North Korea" \`

`-H "X-client-IP: 1.2.3.4" \`

`-H "X-gender: Male" \`

`-H "X-age: 20-25" \`

`-H "X-income: 10k-20k" \`

`"http://34.138.168.90:8080/hw10_output/1234.html"`

~ (0.308s)

`curl -X POST \`

`-H "X-country: North Korea" \`

`-H "X-client-IP: 1.2.3.4" \`

`-H "X-gender: Male" \`

`-H "X-age: 20-25" \`

`-H "X-income: 10k-20k" \`

`"http://34.138.168.90:8080/hw10_output/1234.html"`

Not implemented

### 10. http-client.py

- `python3 http-client.py -d 34.138.168.90 -b /hw10_bucket -w hw10_output -n 100 -i 11000 -p 8080 -v -f`

~/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10 git:(main) ±1

`python3 http-client.py -d 34.138.168.90 -b /hw10_bucket -w hw10_output -n 100 -i 11000 -p 8080 -v -f`

```
128.197.29.238 - - [05/Dec/2023 07:43:10] "GET /hw10_bucket/hw10_output/10052.html HTTP/1.1" 404 -
128.197.29.238 - - [05/Dec/2023 07:43:10] "GET /hw10_bucket/hw10_output/3695.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:10] "GET /hw10_bucket/hw10_output/7106.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:11] "GET /hw10_bucket/hw10_output/2566.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:11] "GET /hw10_bucket/hw10_output/7688.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:12] "GET /hw10_bucket/hw10_output/7141.html HTTP/1.1" 400 -
128.197.29.238 - - [05/Dec/2023 07:43:12] "GET /hw10_bucket/hw10_output/980.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:12] "GET /hw10_bucket/hw10_output/4661.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:13] "GET /hw10_bucket/hw10_output/9989.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:13] "GET /hw10_bucket/hw10_output/8282.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:14] "GET /hw10_bucket/hw10_output/10596.html HTTP/1.1" 404 -
128.197.29.238 - - [05/Dec/2023 07:43:14] "GET /hw10_bucket/hw10_output/9522.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:15] "GET /hw10_bucket/hw10_output/2115.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:15] "GET /hw10_bucket/hw10_output/1188.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:15] "GET /hw10_bucket/hw10_output/28.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:16] "GET /hw10_bucket/hw10_output/5873.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:16] "GET /hw10_bucket/hw10_output/2436.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:17] "GET /hw10_bucket/hw10_output/749.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:17] "GET /hw10_bucket/hw10_output/6312.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:18] "GET /hw10_bucket/hw10_output/1509.html HTTP/1.1" 400 -
128.197.29.238 - - [05/Dec/2023 07:43:18] "GET /hw10_bucket/hw10_output/4714.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:18] "GET /hw10_bucket/hw10_output/6472.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:19] "GET /hw10_bucket/hw10_output/3252.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:19] "GET /hw10_bucket/hw10_output/9951.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:20] "GET /hw10_bucket/hw10_output/3648.html HTTP/1.1" 200 -
128.197.29.238 - - [05/Dec/2023 07:43:20] "GET /hw10_bucket/hw10_output/79.html HTTP/1.1" 200 -
```

```
dk98@pubsub-listener-vm:/home/davidekim$ python3 app_two.py
Listening for messages on: projects/ds-561/subscriptions/hw10-sub
Received message: {'400 Forbidden from country': 'North Korea'}
Received message: {'400 Forbidden from country': 'Syria'}
Received message: {'400 Forbidden from country': 'Iraq'}
Received message: {'400 Forbidden from country': 'Sudan'}
Received message: {'400 Forbidden from country': 'Sudan'}
Received message: {'400 Forbidden from country': 'Sudan'}
Received message: {'400 Forbidden from country': 'Libya'}
```

All instances > sql-database-instance

✓ **sql-database-instance**

MySQL 8.0

A log of operations your database instance is currently running and has completed. [Learn more](#)

Creation Time	Completion Time	Type	Status
Dec 5, 2023, 2:46:41 AM	Dec 5, 2023, 2:47:04 AM	Update	Update finished

```
mysql> use hw10db
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+-----+
| Tables_in_hw10db |
+-----+
| Clients           |
| ErrorCodes        |
| Failed_Requests   |
| Files             |
| Requests          |
+-----+
5 rows in set (0.00 sec)
```

```
mysql> SELECT * FROM Requests
-> ;
+-----+-----+-----+-----+
| id | client_id | file_id | time_of_day |
+-----+-----+-----+-----+
| 1 | 1 | 1 | 07:03:36 |
| 2 | 18 | 19 | 07:42:35 |
| 3 | 19 | 20 | 07:42:36 |
| 4 | 20 | 21 | 07:42:36 |
| 5 | 21 | 22 | 07:42:36 |
| 6 | 23 | 24 | 07:42:37 |
| 7 | 24 | 25 | 07:42:38 |
| 8 | 25 | 26 | 07:42:39 |
| 9 | 26 | 27 | 07:42:39 |
| 10 | 27 | 28 | 07:42:40 |
| 11 | 28 | 29 | 07:42:40 |
| 12 | 29 | 30 | 07:42:41 |
| 13 | 30 | 31 | 07:42:41 |
| 14 | 31 | 32 | 07:42:42 |
| 15 | 32 | 33 | 07:42:42 |
| 16 | 33 | 34 | 07:42:42 |
| 17 | 34 | 35 | 07:42:43 |
| 18 | 35 | 36 | 07:42:43 |
| 19 | 36 | 37 | 07:42:44 |
| 20 | 38 | 39 | 07:42:45 |
```

```
mysql> SELECT * FROM Failed_Requests;
+-----+-----+-----+-----+
| id | time_of_request | file_id | error_code_id |
+-----+-----+-----+-----+
| 1 | 07:04:45 | 2 | 1 |
| 2 | 07:05:15 | 1 | 2 |
| 3 | 07:41:46 | 3 | 1 |
| 4 | 07:41:47 | 4 | 1 |
| 5 | 07:41:47 | 5 | 1 |
| 6 | 07:41:47 | 6 | 1 |
| 7 | 07:41:48 | 7 | 1 |
| 8 | 07:41:48 | 8 | 1 |
| 9 | 07:41:48 | 9 | 1 |
| 10 | 07:41:49 | 10 | 1 |
| 11 | 07:41:49 | 11 | 1 |
| 12 | 07:41:49 | 12 | 1 |
| 13 | 07:41:50 | 13 | 1 |
| 14 | 07:41:50 | 14 | 1 |
| 15 | 07:41:51 | 15 | 1 |
| 16 | 07:41:51 | 16 | 1 |
| 17 | 07:41:52 | 17 | 1 |
| 18 | 07:41:52 | 18 | 1 |
| 19 | 07:42:37 | 23 | 1 |
| 20 | 07:42:44 | 38 | 3 |
```



## 11. Shut Down GDM and Clean Up Resources

### 1. Delete all resources using GDM

- `gcloud deployment-manager deployments delete [DEPLOYMENT_NAME]`
- `gcloud deployment-manager deployments delete hw10`

```
~/Desktop/DataScience/BU/DS561/Google-Cloud-Computing/hw10 git:(main) ±1 (1m 59.83s)
gcloud deployment-manager deployments delete hw10
The following deployments will be deleted:
- hw10

Do you want to continue (y/N)? y

Waiting for delete [operation-1701762787569-60bbe8671f0bb-48ef8561-320909d7]...done.
Delete operation operation-1701762787569-60bbe8671f0bb-48ef8561-320909d7 completed successfully.
```



Deployment Manager

Deployments

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■ STOP

🗑️ DELETE



Deployments



Type registry



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Filter Filter deployments



Name ↑

Created on

Last modified

Labels

No rows to display

END