Assignment 2, Cloud Application Development

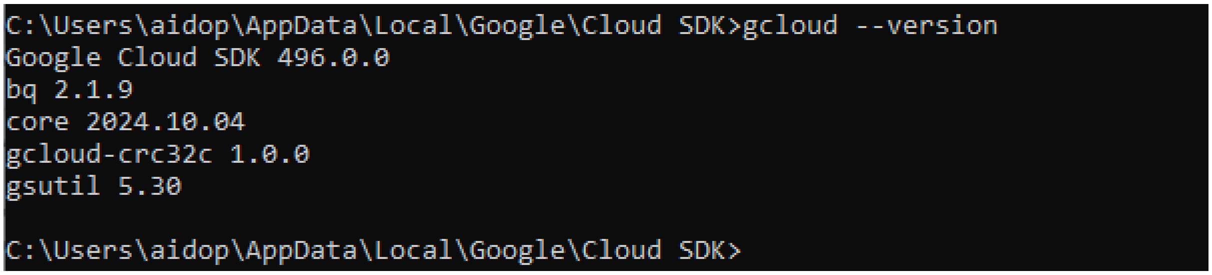
Put all deliverables into github repository in your profile. Defend by explaining deliverables and answering questions.
Deliverables: report in pdf

Google form: https://docs.google.com/forms/d/e/1FAIpQLSe0GyNdOYlvM1tX_I_CtlPod5jBf-ACLGdHYZq1gVZbUeBzIg/viewform?usp=sf_link

Exercise 1: Google App Engine

Objective: Deploy a simple web application on Google App Engine.

Instructions:

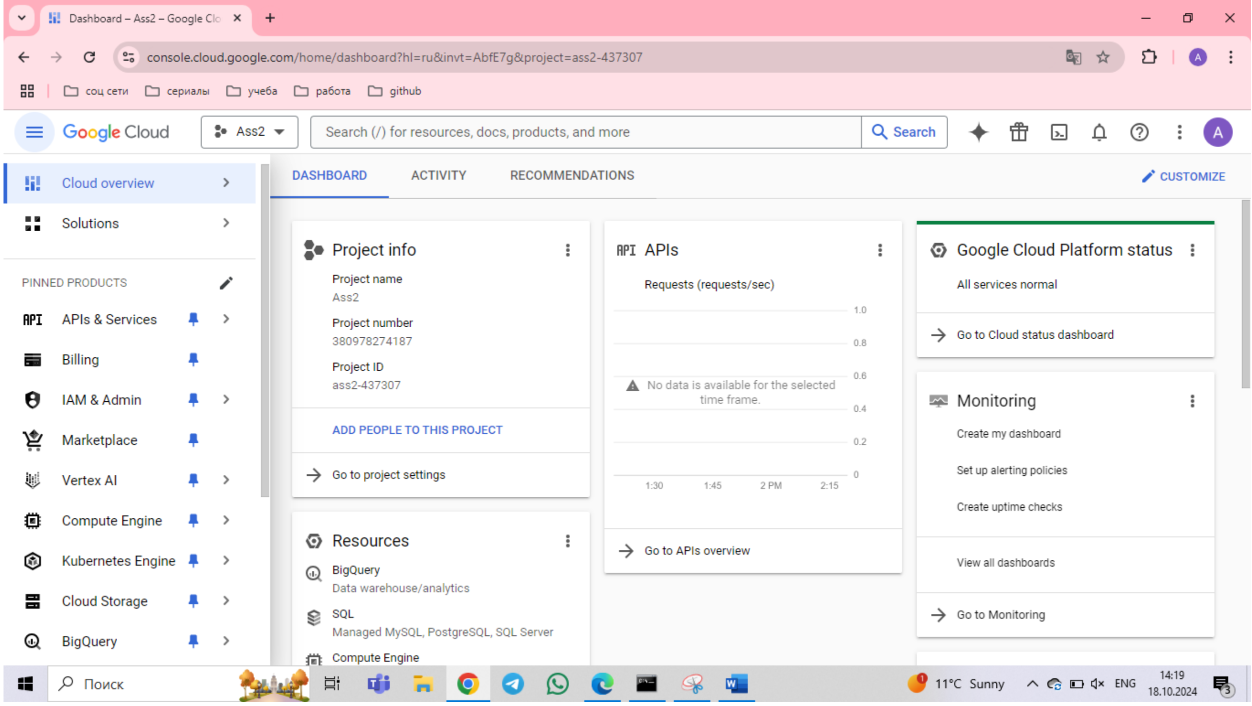


```
C:\Users\aidop\AppData\Local\Google\Cloud SDK>gcloud --version
Google Cloud SDK 496.0.0
bq 2.1.9
core 2024.10.04
gcloud-crc32c 1.0.0
gsutil 5.30

C:\Users\aidop\AppData\Local\Google\Cloud SDK>
```

1. **Setup**:
   - o Ensure you have a Google Cloud account.

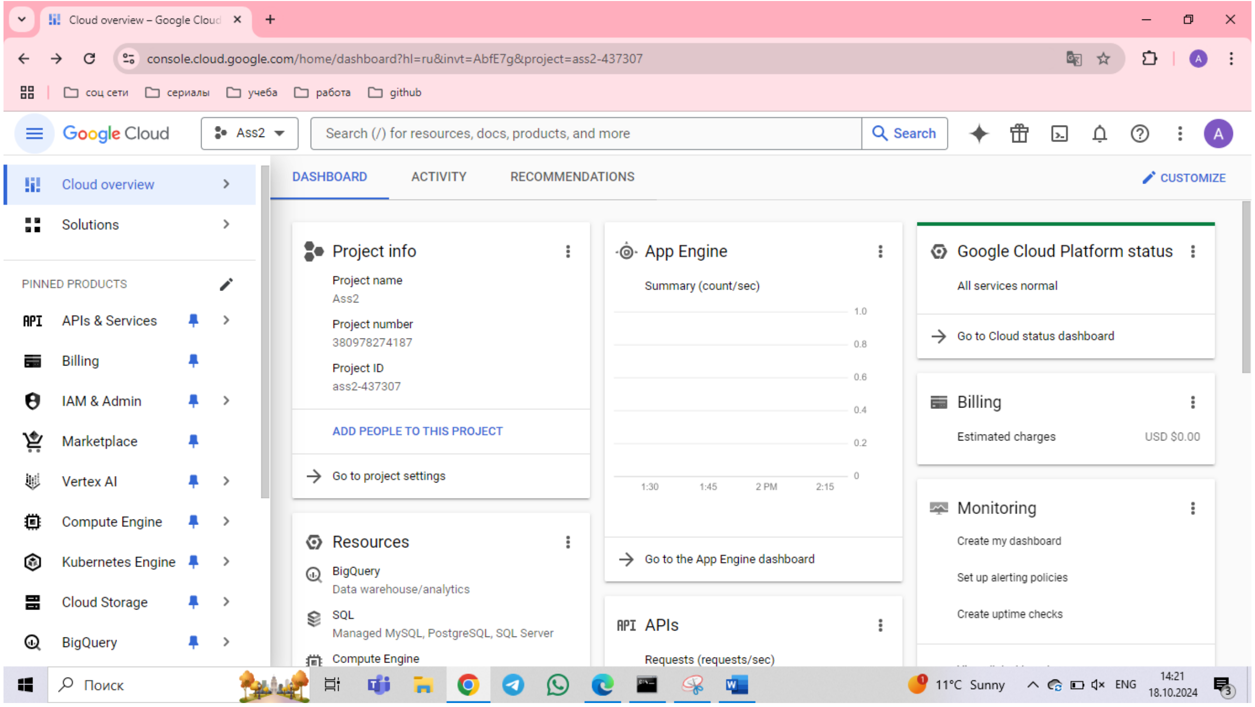
Install the Google Cloud SDK on your local machine.

2. **Create a Project**:



Project info
Project name
Ass2
Project number
380978274187
Project ID
ass2-437307

Create a new project in the Google Cloud Console.



Project info

Project name
Ass2

Project number
380978274187

Project ID
ass2-437307

App Engine

Summary (count/sec)

Google Cloud Platform status

All services normal

Billing

Estimated charges USD $0.00

Monitoring

Resources

BigQuery
Data warehouse/analytics

SQL
Managed MySQL, PostgreSQL, SQL Server

Compute Engine

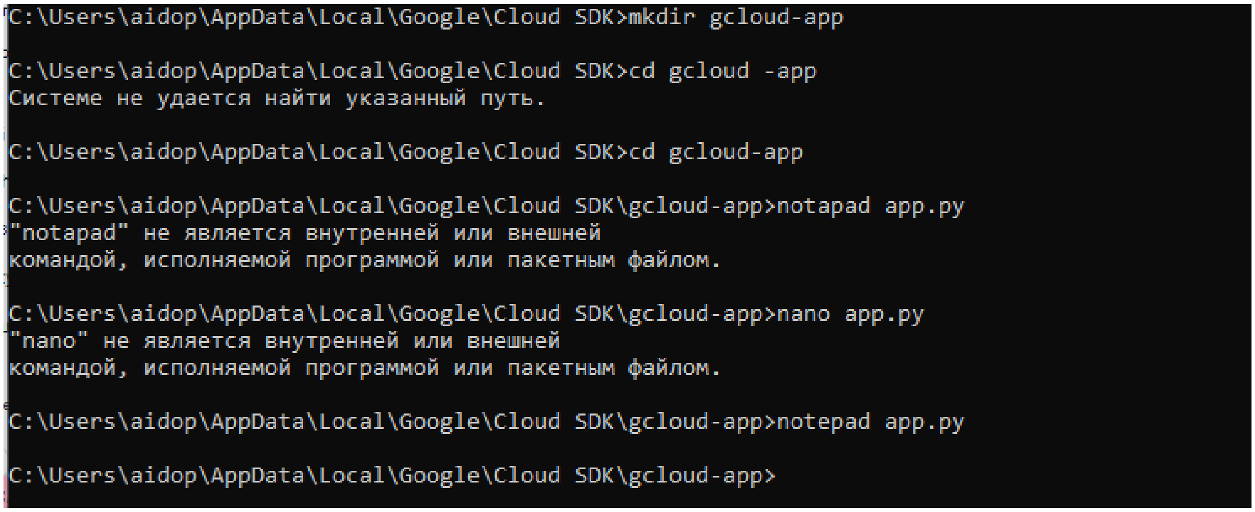
APIs

Requests (requests/sec)

3. **Prepare the Application**:
   - Write a simple "Hello, World!" web application using Python (Flask).

Example app.py:

```
from flask import Flaskapp =
Flask(__name__)

@app.route('/') def
hello_world():
        return 'Hello, World!'

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



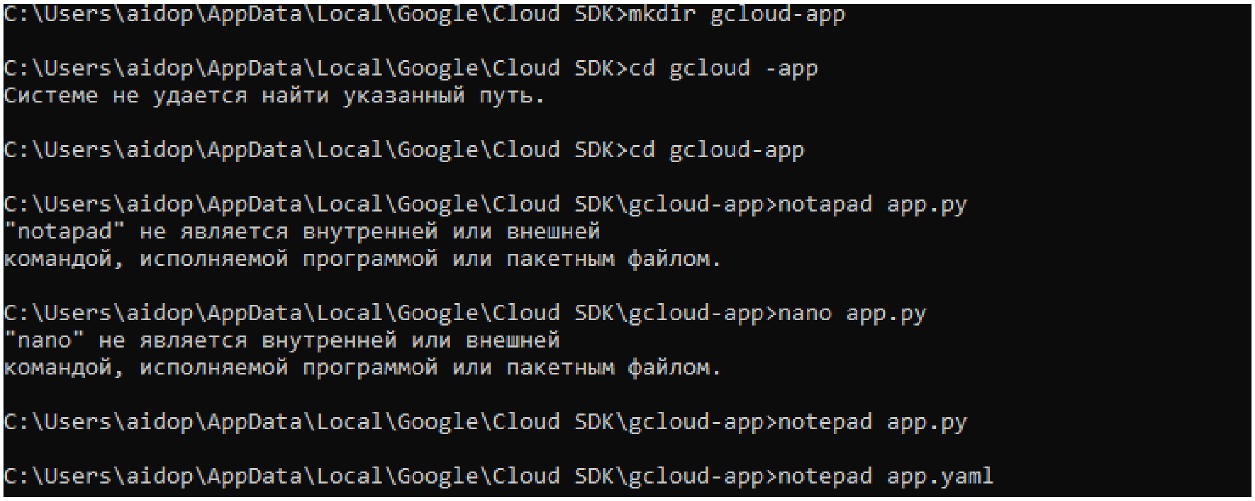
```
C:\Users\aidop\AppData\Local\Google\Cloud SDK>mkdir gcloud-app

C:\Users\aidop\AppData\Local\Google\Cloud SDK>cd gcloud -app
Системе не удается найти указанный путь.

C:\Users\aidop\AppData\Local\Google\Cloud SDK>cd gcloud-app

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notapad app.py
"notapad" не является внутренней или внешней
командой, исполняемой программой или пакетным файлом.

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>nano app.py
"nano" не является внутренней или внешней
командой, исполняемой программой или пакетным файлом.

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notepad app.py

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>
```

Save and exit nano app.py by pressing Ctrl + O, then press Enter, and finally Ctrl + X. I saved and exit from the code (just forgot to take this to photo)

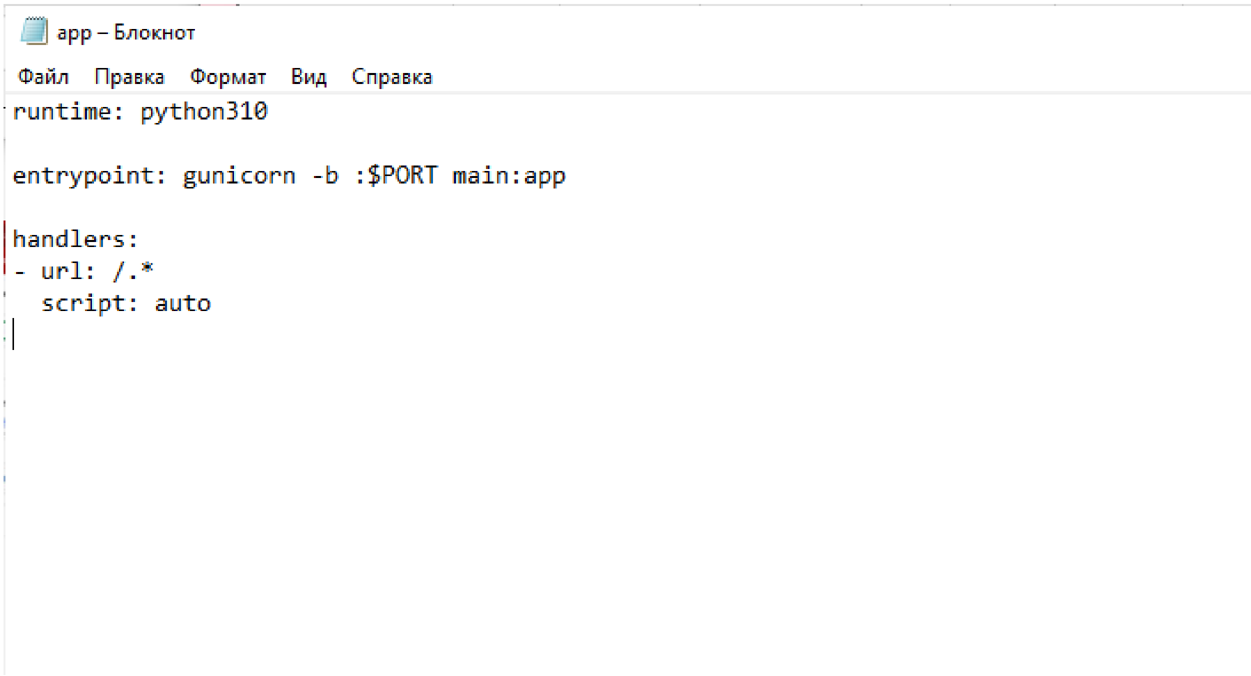
4. **Create the App Engine Configuration**:

Create a app.yamlfile with the following content:

```
runtime: python39
handlers:
  - url: /.* script:
      auto
```



```
C:\Users\aidop\AppData\Local\Google\Cloud SDK>mkdir gcloud-app

C:\Users\aidop\AppData\Local\Google\Cloud SDK>cd gcloud -app
Системе не удается найти указанный путь.

C:\Users\aidop\AppData\Local\Google\Cloud SDK>cd gcloud-app

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notapad app.py
"notapad" не является внутренней или внешней
командой, исполняемой программой или пакетным файлом.

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>nano app.py
"nano" не является внутренней или внешней
командой, исполняемой программой или пакетным файлом.

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notepad app.py

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notepad app.yaml
```

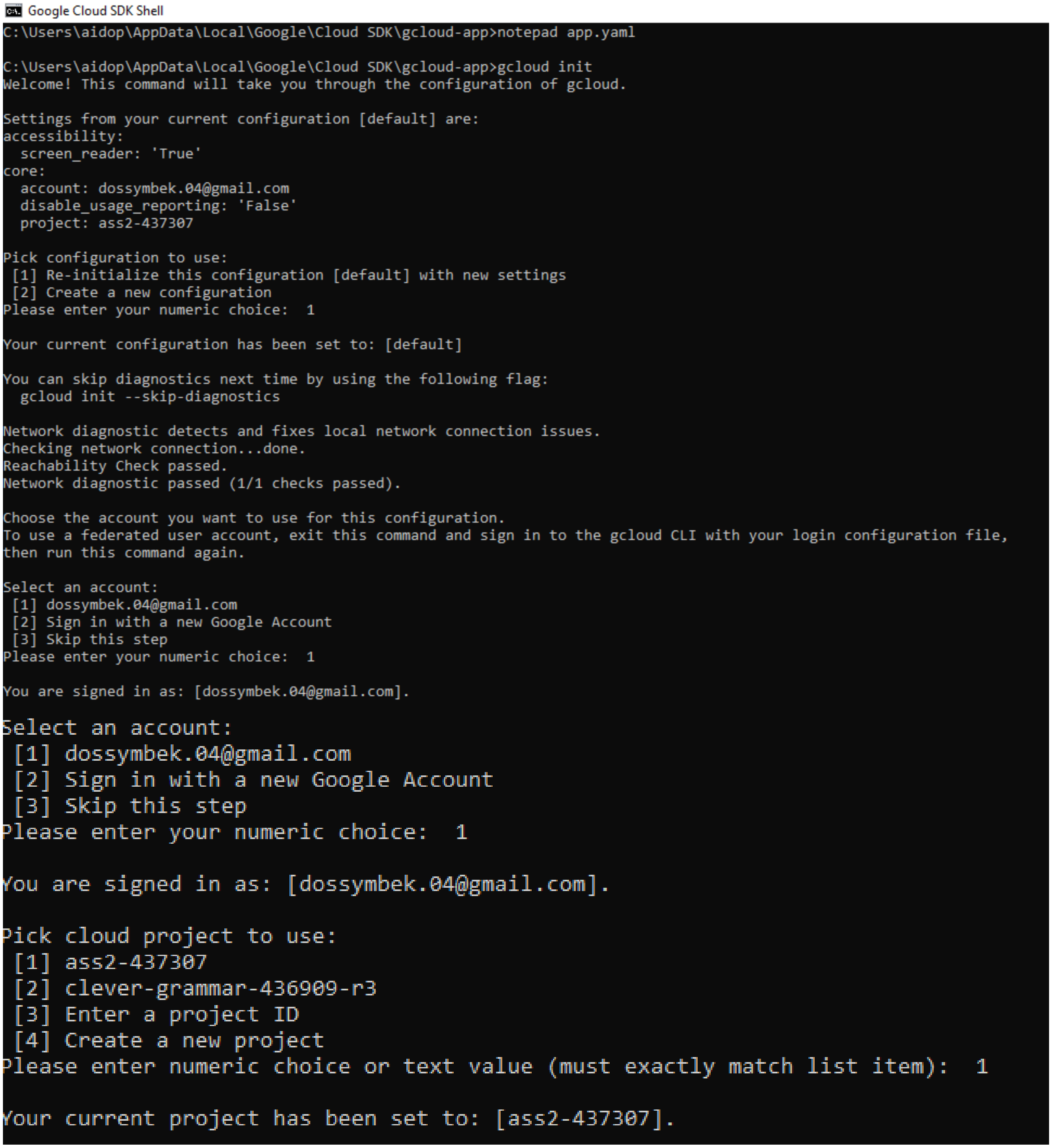


```
runtime: python310

entrypoint: gunicorn -b :$PORT main:app

handlers:
- url: /.*
  script: auto
```

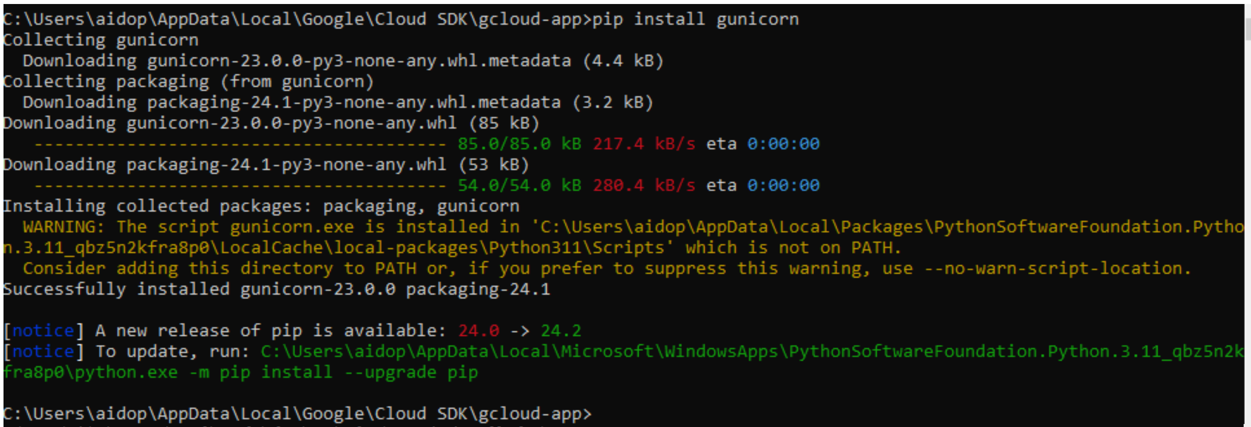
5. **Deploy the Application**:

Use the following command to deploy the application to Google App Engine:

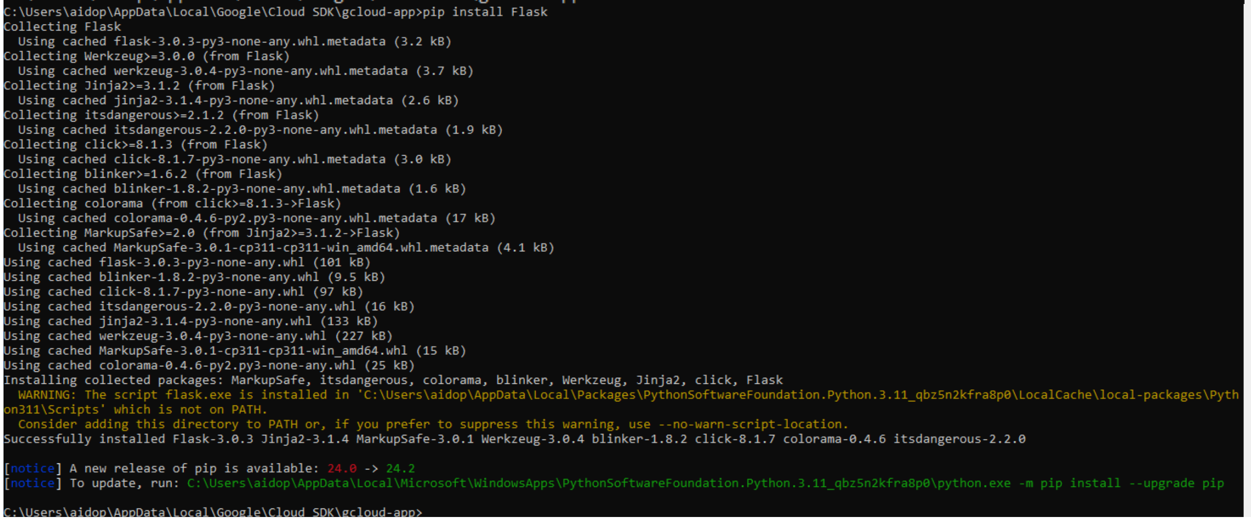
gcloud app deploy



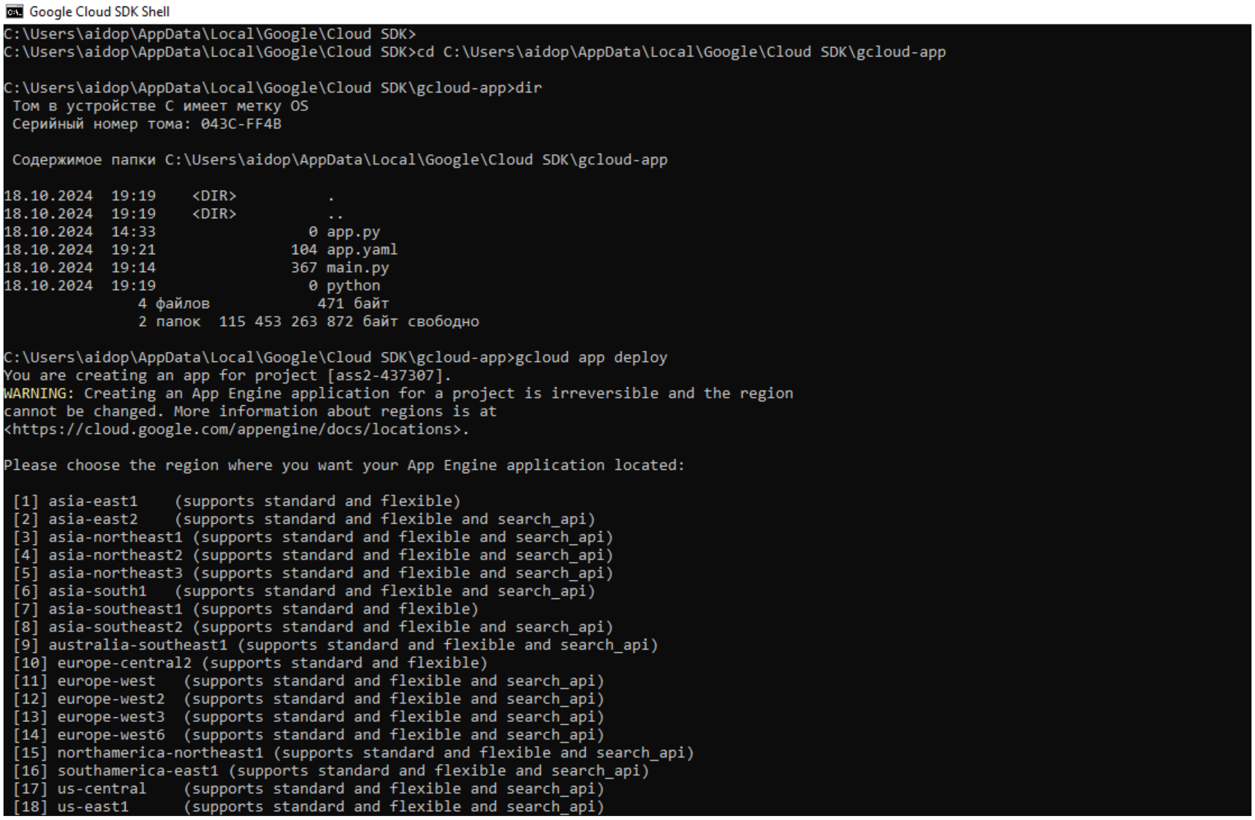
```
C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>notepad app.yaml

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>gcloud init
Welcome! This command will take you through the configuration of gcloud.

Settings from your current configuration [default] are:
accessibility:
  screen_reader: 'True'
core:
  account: dossymbek.04@gmail.com
  disable_usage_reporting: 'False'
  project: ass2-437307

Pick configuration to use:
 [1] Re-initialize this configuration [default] with new settings
 [2] Create a new configuration
Please enter your numeric choice:  1

Your current configuration has been set to: [default]

You can skip diagnostics next time by using the following flag:
  gcloud init --skip-diagnostics

Network diagnostic detects and fixes local network connection issues.
Checking network connection...done.
Reachability Check passed.
Network diagnostic passed (1/1 checks passed).

Choose the account you want to use for this configuration.
To use a federated user account, exit this command and sign in to the gcloud CLI with your login configuration file,
then run this command again.

Select an account:
 [1] dossymbek.04@gmail.com
 [2] Sign in with a new Google Account
 [3] Skip this step
Please enter your numeric choice:  1

You are signed in as: [dossymbek.04@gmail.com].

Select an account:
 [1] dossymbek.04@gmail.com
 [2] Sign in with a new Google Account
 [3] Skip this step
Please enter your numeric choice:  1

You are signed in as: [dossymbek.04@gmail.com].

Pick cloud project to use:
 [1] ass2-437307
 [2] clever-grammar-436909-r3
 [3] Enter a project ID
 [4] Create a new project
Please enter numeric choice or text value (must exactly match list item):  1

Your current project has been set to: [ass2-437307].
```



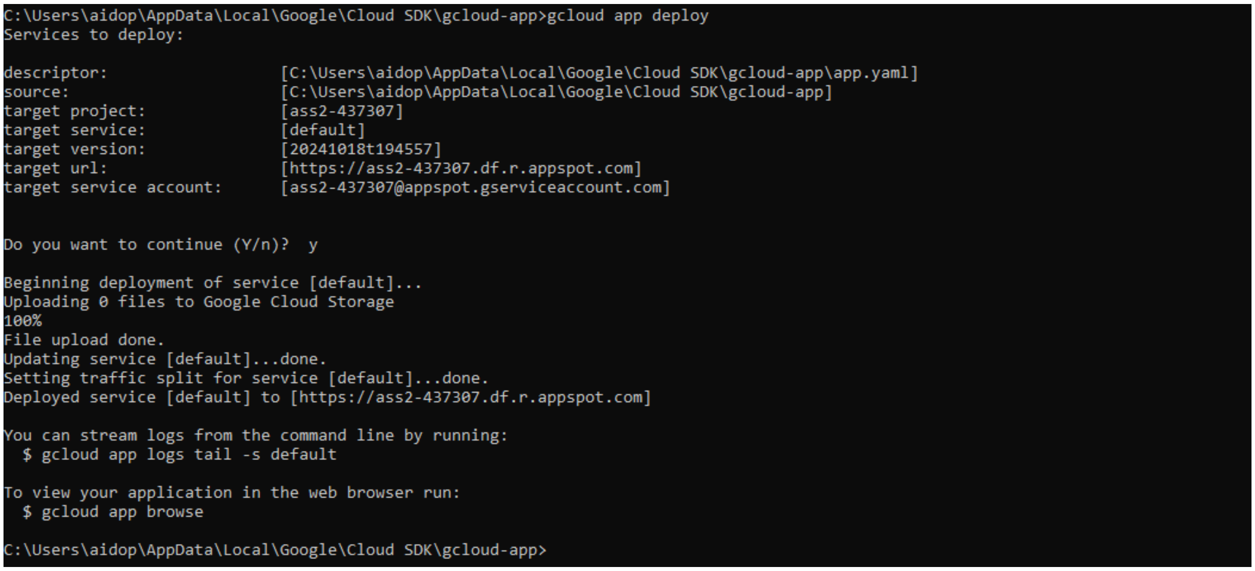
```
C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>pip install gunicorn
Collecting gunicorn
  Downloading gunicorn-23.0.0-py3-none-any.whl.metadata (4.4 kB)
Collecting packaging (from gunicorn)
  Downloading packaging-24.1-py3-none-any.whl.metadata (3.2 kB)
Downloading gunicorn-23.0.0-py3-none-any.whl (85 kB)
   ---------------------------------------- 85.0/85.0 kB 217.4 kB/s eta 0:00:00
Downloading packaging-24.1-py3-none-any.whl (53 kB)
   ---------------------------------------- 54.0/54.0 kB 280.4 kB/s eta 0:00:00
Installing collected packages: packaging, gunicorn
  WARNING: The script gunicorn.exe is installed in 'C:\Users\aidop\AppData\Local\Packages\PythonSoftwareFoundation.Pytho
n.3.11_qbz5n2kfra8p0\LocalCache\local-packages\Python311\Scripts' which is not on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed gunicorn-23.0.0 packaging-24.1

[notice] A new release of pip is available: 24.0 -> 24.2
[notice] To update, run: C:\Users\aidop\AppData\Local\Microsoft\WindowsApps\PythonSoftwareFoundation.Python.3.11_qbz5n2k
fra8p0\python.exe -m pip install --upgrade pip

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>
```



```
C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>pip install Flask
Collecting Flask
  Using cached flask-3.0.3-py3-none-any.whl.metadata (3.2 kB)
Collecting Werkzeug>=3.0.0 (from Flask)
  Using cached werkzeug-3.0.4-py3-none-any.whl.metadata (3.7 kB)
Collecting Jinja2>=3.1.2 (from Flask)
  Using cached jinja2-3.1.4-py3-none-any.whl.metadata (2.6 kB)
Collecting itsdangerous>=2.1.2 (from Flask)
  Using cached itsdangerous-2.2.0-py3-none-any.whl.metadata (1.9 kB)
Collecting click>=8.1.3 (from Flask)
  Using cached click-8.1.7-py3-none-any.whl.metadata (3.0 kB)
Collecting blinker>=1.6.2 (from Flask)
  Using cached blinker-1.8.2-py3-none-any.whl.metadata (1.6 kB)
Collecting colorama (from click>=8.1.3->Flask)
  Using cached colorama-0.4.6-py2.py3-none-any.whl.metadata (17 kB)
Collecting MarkupSafe>=2.0 (from Jinja2>=3.1.2->Flask)
  Using cached MarkupSafe-3.0.1-cp311-cp311-win_amd64.whl.metadata (4.1 kB)
Using cached flask-3.0.3-py3-none-any.whl (101 kB)
Using cached blinker-1.8.2-py3-none-any.whl (9.5 kB)
Using cached click-8.1.7-py3-none-any.whl (97 kB)
Using cached itsdangerous-2.2.0-py3-none-any.whl (16 kB)
Using cached jinja2-3.1.4-py3-none-any.whl (133 kB)
Using cached werkzeug-3.0.4-py3-none-any.whl (227 kB)
Using cached MarkupSafe-3.0.1-cp311-cp311-win_amd64.whl (15 kB)
Using cached colorama-0.4.6-py2.py3-none-any.whl (25 kB)
Installing collected packages: MarkupSafe, itsdangerous, colorama, blinker, Werkzeug, Jinja2, click, Flask
  WARNING: The script flask.exe is installed in 'C:\Users\aidop\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\LocalCache\local-packages\Pyth
on311\Scripts' which is not on PATH.
  Consider adding this directory to PATH or, if you prefer to suppress this warning, use --no-warn-script-location.
Successfully installed Flask-3.0.3 Jinja2-3.1.4 MarkupSafe-3.0.1 Werkzeug-3.0.4 blinker-1.8.2 click-8.1.7 colorama-0.4.6 itsdangerous-2.2.0

[notice] A new release of pip is available: 24.0 -> 24.2
[notice] To update, run: C:\Users\aidop\AppData\Local\Microsoft\WindowsApps\PythonSoftwareFoundation.Python.3.11_qbz5n2kfra8p0\python.exe -m pip install --upgrade pip

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>
```

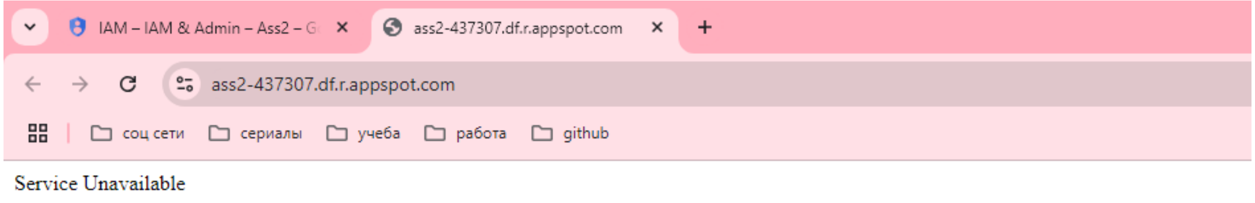


```
C:\Users\aidop\AppData\Local\Google\Cloud SDK>
C:\Users\aidop\AppData\Local\Google\Cloud SDK>cd C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>dir
 Том в устройстве C имеет метку OS
 Серийный номер тома: 043C-FF4B

 Содержимое папки C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app

18.10.2024  19:19    <DIR>          .
18.10.2024  19:19    <DIR>          ..
18.10.2024  14:33                 0 app.py
18.10.2024  19:21               104 app.yaml
18.10.2024  19:14               367 main.py
18.10.2024  19:19                 0 python
               4 файлов            471 байт
               2 папок  115 453 263 872 байт свободно

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>gcloud app deploy
You are creating an app for project [ass2-437307].
WARNING: Creating an App Engine application for a project is irreversible and the region
cannot be changed. More information about regions is at
<https://cloud.google.com/appengine/docs/locations>.

Please choose the region where you want your App Engine application located:

 [1] asia-east1    (supports standard and flexible)
 [2] asia-east2    (supports standard and flexible and search_api)
 [3] asia-northeast1 (supports standard and flexible and search_api)
 [4] asia-northeast2 (supports standard and flexible and search_api)
 [5] asia-northeast3 (supports standard and flexible and search_api)
 [6] asia-south1   (supports standard and flexible and search_api)
 [7] asia-southeast1 (supports standard and flexible)
 [8] asia-southeast2 (supports standard and flexible and search_api)
 [9] australia-southeast1 (supports standard and flexible and search_api)
 [10] europe-central2 (supports standard and flexible)
 [11] europe-west   (supports standard and flexible and search_api)
 [12] europe-west2  (supports standard and flexible and search_api)
 [13] europe-west3  (supports standard and flexible and search_api)
 [14] europe-west6  (supports standard and flexible and search_api)
 [15] northamerica-northeast1 (supports standard and flexible and search_api)
 [16] southamerica-east1 (supports standard and flexible and search_api)
 [17] us-central    (supports standard and flexible and search_api)
 [18] us-east1      (supports standard and flexible and search_api)
```



```
C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>gcloud app deploy
Services to deploy:

descriptor:                  [C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app\app.yaml]
source:                      [C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app]
target project:              [ass2-437307]
target service:              [default]
target version:              [20241018t194557]
target url:                  [https://ass2-437307.df.r.appspot.com]
target service account:      [ass2-437307@appspot.gserviceaccount.com]


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.
Deployed service [default] to [https://ass2-437307.df.r.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:
  $ gcloud app browse

C:\Users\aidop\AppData\Local\Google\Cloud SDK\gcloud-app>
```

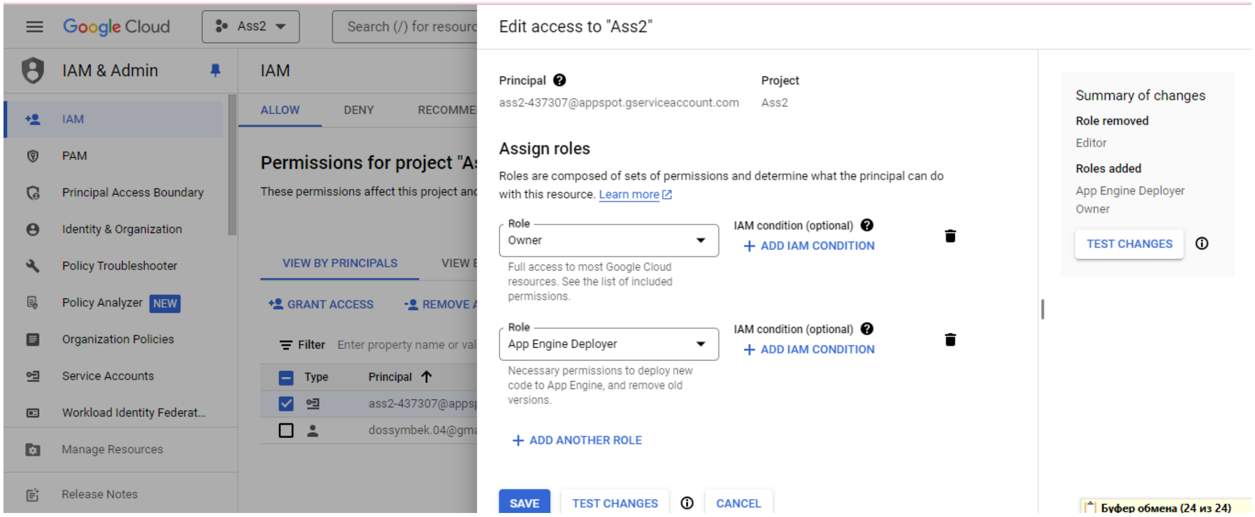
6. **Access the Application**:
   - Once deployed, access your application using the URL provided by Google App Engine.


IAM – IAM & Admin – Ass2 – G
ass2-437307.df.r.appspot.com
ass2-437307.df.r.appspot.com
соц сети
сериалы
учеба
работа
github

Service Unavailable

Deliverables:

- A deployed web application on Google App Engine.



Permissions for project "As

These permissions affect this project and

ass2-437307@apps

dossymbek.04@gma

Edit access to "Ass2"

Principal: ass2-437307@appspot.gserviceaccount.com

Project: Ass2

Assign roles

Roles are composed of sets of sets of permissions and determine what the principal can do with this resource. Learn more

Role: Owner — Full access to most Google Cloud resources. See the list of included permissions.

IAM condition (optional)

Role: App Engine Deployer — Necessary permissions to deploy new code to App Engine, and remove old versions.

IAM condition (optional)

Summary of changes

Role removed: Editor

Roles added: App Engine Deployer, Owner

- A screenshot of the running application.

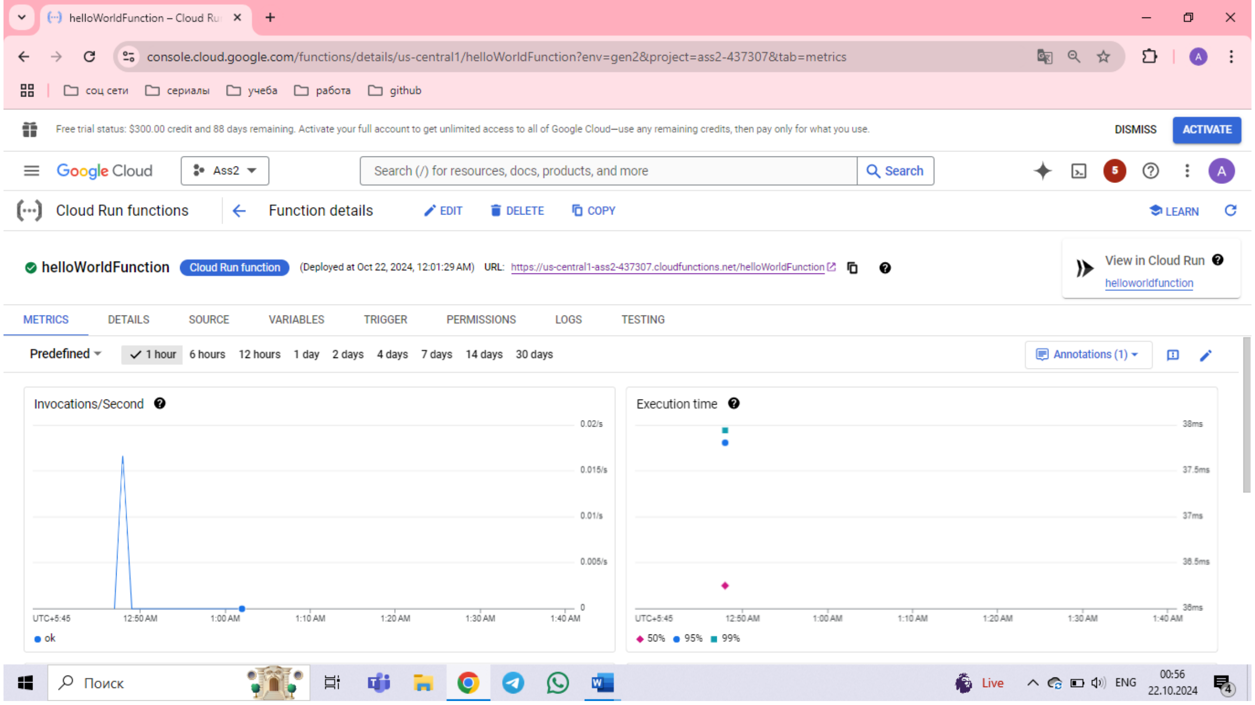
Exercise 2: Building with Google Cloud Functions

Objective: Create a Google Cloud Function that processes HTTP requests.

Instructions:

1. **Setup**:
   - Ensure you have a Google Cloud account.
   - Install the Google Cloud SDK on your local machine.
2. **Create a Function**:
   - Create a new Google Cloud Function using the following configuration:
     - **Name**: helloWorldFunction
     - **Trigger**: HTTP
     - **Runtime**: Node.js 18 (or another supported runtime)
     - **Entry Point**: helloWorld

I set all of them manually not with code

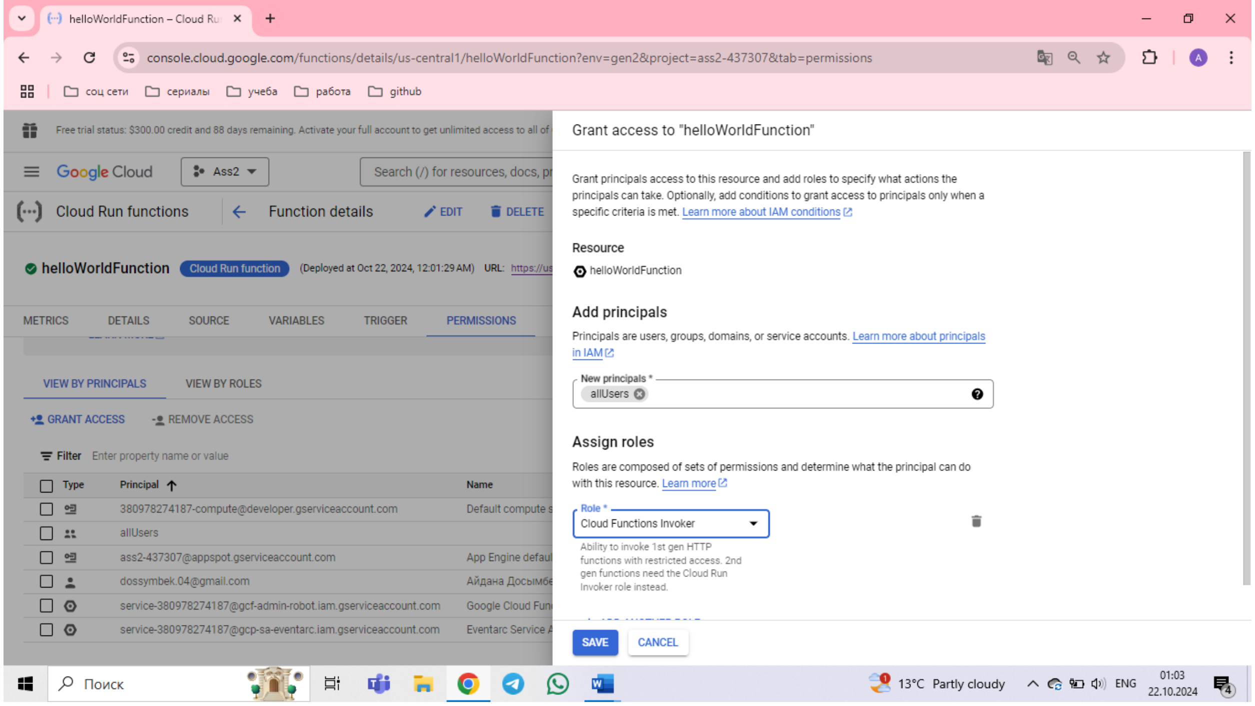


console.cloud.google.com/functions/details/us-central1/helloWorldFunction?env=gen2&project=ass2-437307&tab=metrics

Free trial status: $300.00 credit and 88 days remaining. Activate your full account to get unlimited access to all of Google Cloud—use any remaining credits, then pay only for what you use.

helloWorldFunction (Deployed at Oct 22, 2024, 12:01:29 AM) URL: https://us-central1-ass2-437307.cloudfunctions.net/helloWorldFunction

View in Cloud Run helloworldfunction



Free trial status: $300.00 credit and 88 days remaining. Activate your full account to get unlimited access to all of

helloWorldFunction Cloud Run function (Deployed at Oct 22, 2024, 12:01:29 AM) URL: https://us

Type	Principal ↑	Name
☐	380978274187-compute@developer.gserviceaccount.com	Default compute s
☐	allUsers	
☐	ass2-437307@appspot.gserviceaccount.com	App Engine defaul
☐	dossymbek.04@gmail.com	Айдана Досымбе
☐	service-380978274187@gcf-admin-robot.iam.gserviceaccount.com	Google Cloud Fun
☐	service-380978274187@gcp-sa-eventarc.iam.gserviceaccount.com	Eventarc Service A

Grant access to "helloWorldFunction"

Grant principals access to this resource and add roles to specify what actions the principals can take. Optionally, add conditions to grant access to principals only when a specific criteria is met. Learn more about IAM conditions

Resource

helloWorldFunction

Add principals

Principals are users, groups, domains, or service accounts. Learn more about principals in IAM

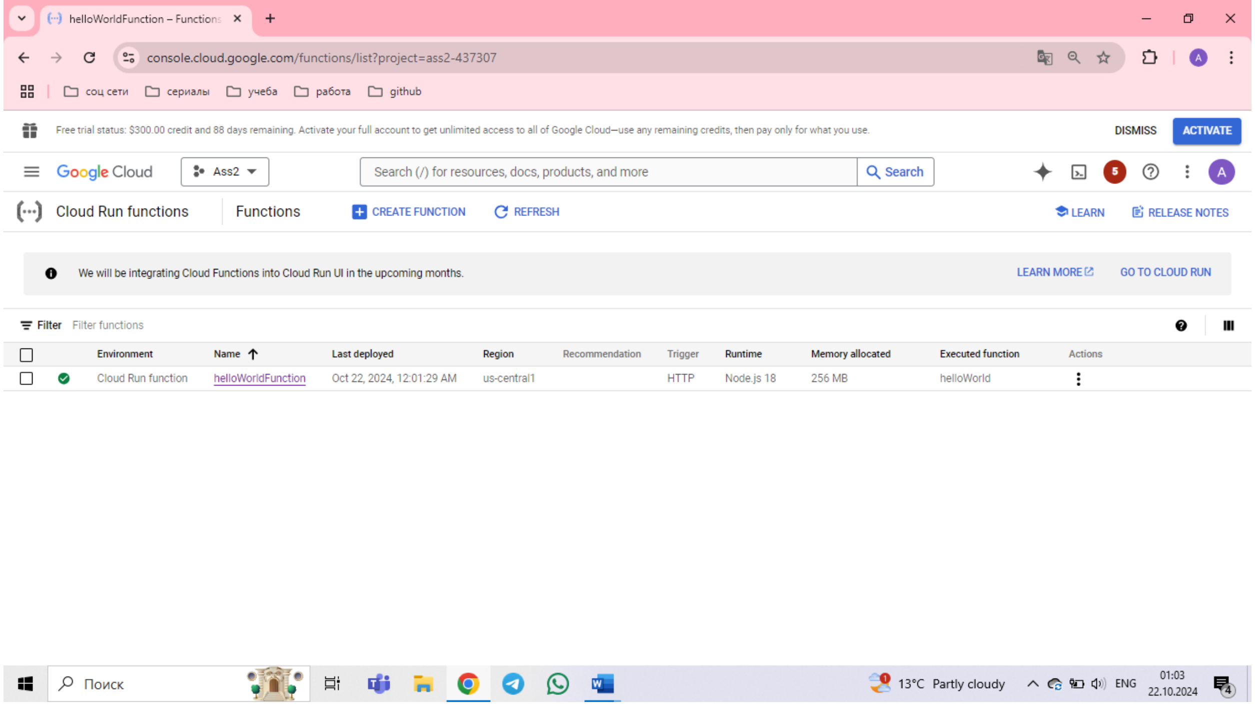
New principals *: allUsers

Assign roles

Roles are composed of sets of permissions and determine what the principal can do with this resource. Learn more

Role *: Cloud Functions Invoker

Ability to invoke 1st gen HTTP functions with restricted access. 2nd gen functions need the Cloud Run Invoker role instead.



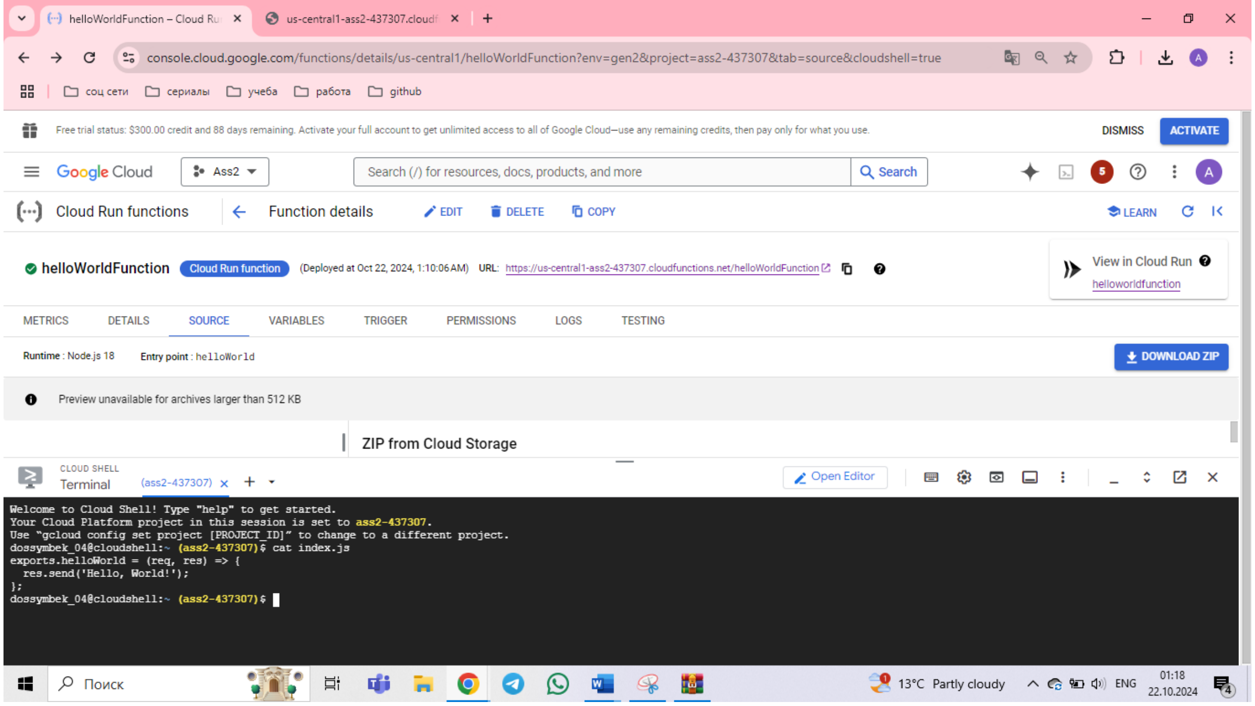
Free trial status: $300.00 credit and 88 days remaining. Activate your full account to get unlimited access to all of Google Cloud—use any remaining credits, then pay only for what you use.

We will be integrating Cloud Functions into Cloud Run UI in the upcoming months.

☐		Environment	Name ↑	Last deployed	Region	Recommendation	Trigger	Runtime	Memory allocated	Executed function	Actions
☐	✓	Cloud Run function	helloWorldFunction	Oct 22, 2024, 12:01:29 AM	us-central1		HTTP	Node.js 18	256 MB	helloWorld	⋮

3. **Write the Code**:
   - Write a simple function that returns "Hello, World!" when accessed via HTTP.Example index.js:

```
exports.helloWorld = (req, res) => {
  res.send('Hello, World!');
};
```



Free trial status: $300.00 credit and 88 days remaining. Activate your full account to get unlimited access to all of Google Cloud—use any remaining credits, then pay only for what you use.

helloWorldFunction — Cloud Run function (Deployed at Oct 22, 2024, 1:10:06 AM) URL: https://us-central1-ass2-437307.cloudfunctions.net/helloWorldFunction

View in Cloud Run: helloworldfunction

Runtime : Node.js 18 Entry point : helloWorld

Preview unavailable for archives larger than 512 KB

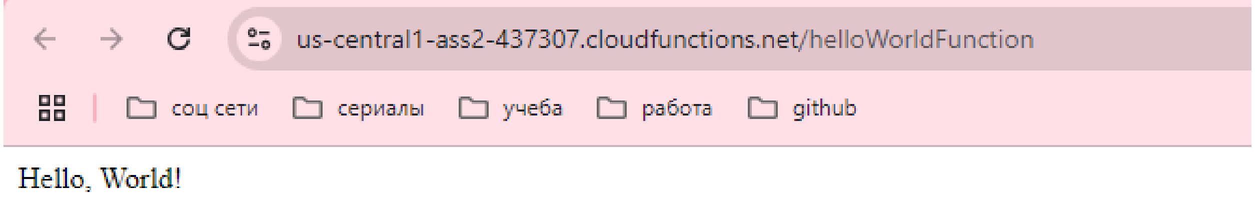
ZIP from Cloud Storage

```
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to ass2-437307.
Use “gcloud config set project [PROJECT_ID]” to change to a different project.
dossymbek_04@cloudshell:~ (ass2-437307)$ cat index.js
exports.helloWorld = (req, res) => {
  res.send('Hello, World!');
};
dossymbek_04@cloudshell:~ (ass2-437307)$
```

4. **Deploy the Function**:

Use the following command to deploy the function:

```
gcloud functions deploy helloWorldFunction --runtime nodejs18 --trigger-http
```



us-central1-ass2-437307.cloudfunctions.net/helloWorldFunction
соц сети
сериалы
учеба
работа
github

Hello, World!

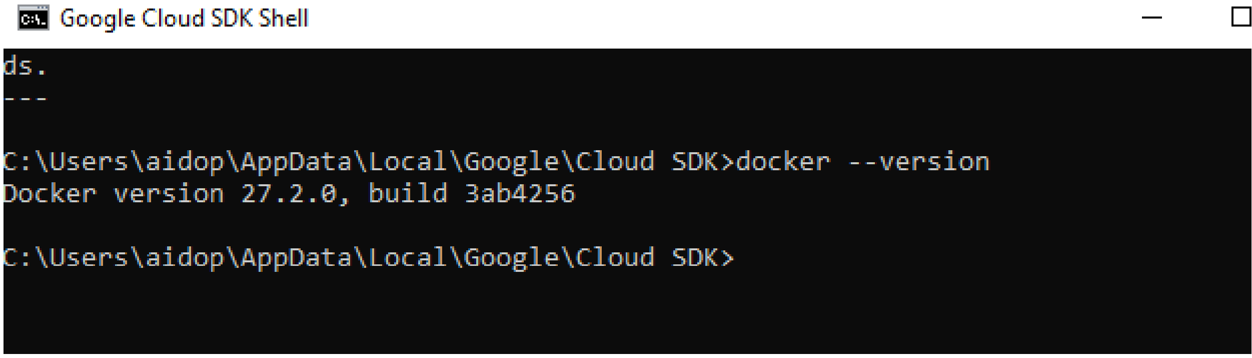
5. **Invoke the Function**:
    - Once deployed, use the provided URL to test the function by accessing it via a web browser or curl.
6. url: https://us-central1-ass2-437307.cloudfunctions.net/helloWorldFunction
7. uri: https://helloworldfunction-jxierkrvoa-uc.a.run.app

Deliverables:

- A deployed Google Cloud Function.
- A screenshot showing the response from the function.

Exercise 3: Containerizing Applications Objective:
Containerize a simple application using Docker.
Instructions:

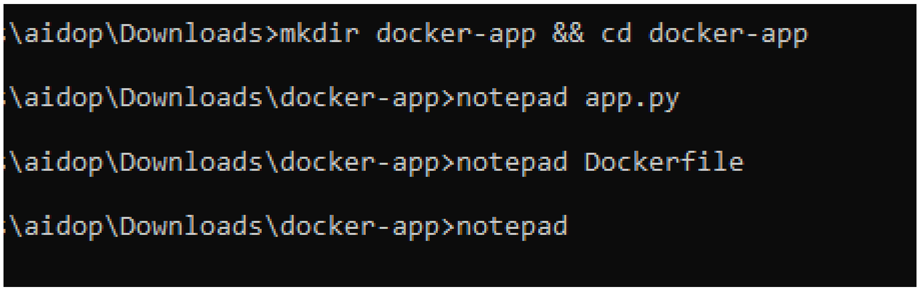
1. **Setup**:
    - Ensure Docker is installed on your local machine.



```
ds.
---

C:\Users\aidop\AppData\Local\Google\Cloud SDK>docker --version
Docker version 27.2.0, build 3ab4256

C:\Users\aidop\AppData\Local\Google\Cloud SDK>
```

2. **Create a Simple Application**:

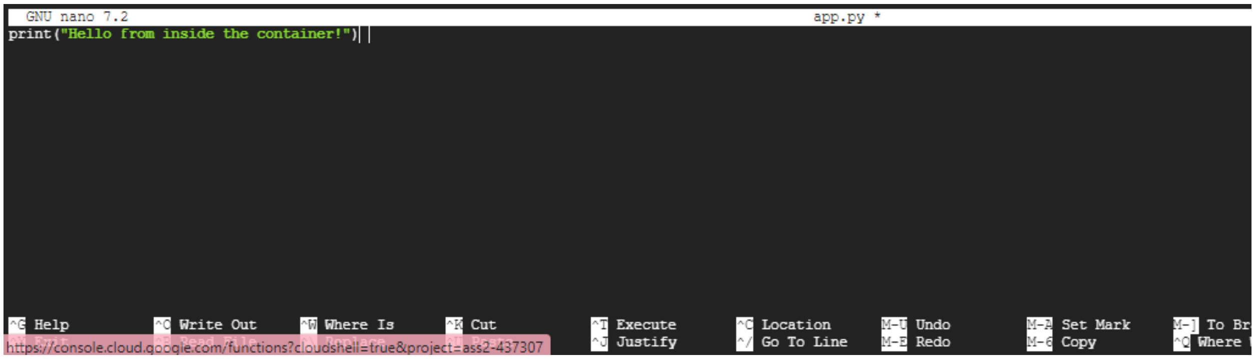
    - Write a simple Python application.



```
\aidop\Downloads>mkdir docker-app && cd docker-app

\aidop\Downloads\docker-app>notepad app.py

\aidop\Downloads\docker-app>notepad Dockerfile

\aidop\Downloads\docker-app>notepad
```

Example app.py:

DO

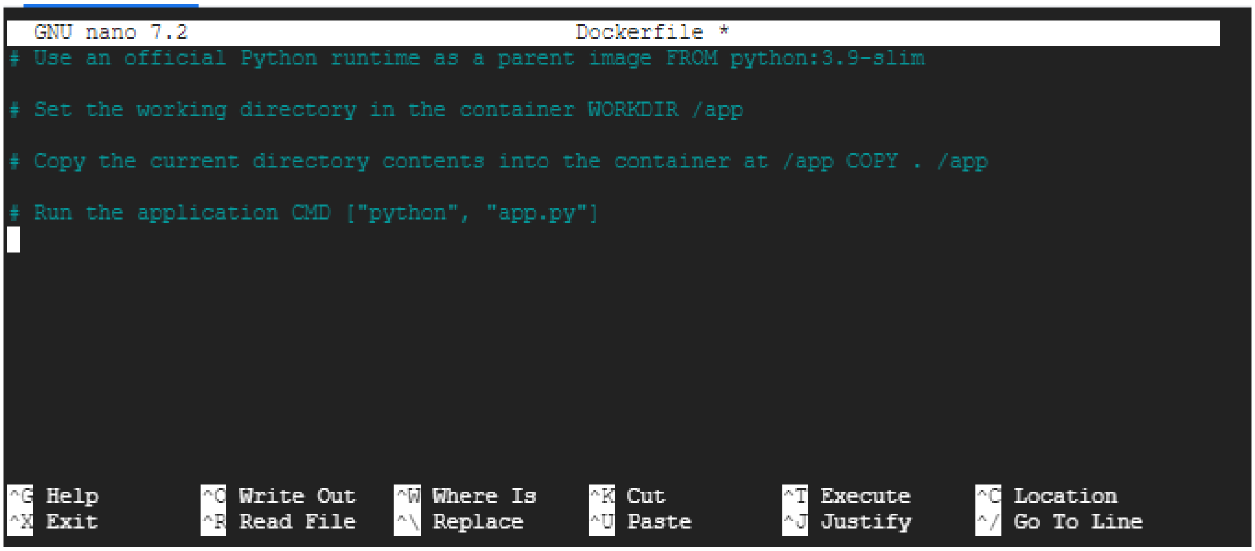


```
  GNU nano 7.2                                                                    app.py *
print("Hello from inside the container!")
```

3. **Create a Dockerfile**:
   - Write a Dockerfileto containerize the application.

Example Dockerfile:

```
# Use an official Python runtime as a parent imageFROM
python:3.9-slim

# Set the working directory in the containerWORKDIR /app

# Copy the current directory contents into the container at /appCOPY . /app

# Run the application CMD
["python", "app.py"]
```

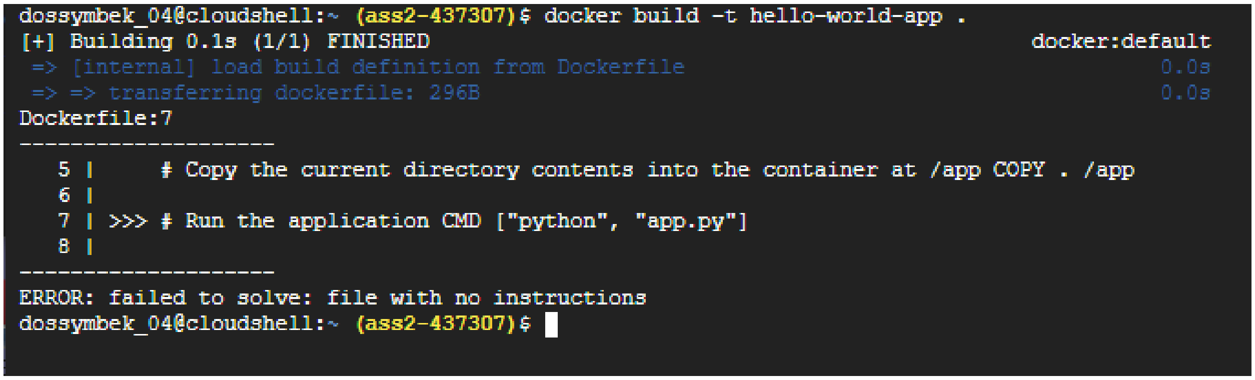


```
  GNU nano 7.2                                  Dockerfile *
# Use an official Python runtime as a parent image FROM python:3.9-slim

# Set the working directory in the container WORKDIR /app

# Copy the current directory contents into the container at /app COPY . /app

# Run the application CMD ["python", "app.py"]

```

4. **Build the Docker Image**:

Build the Docker image using the following command:

docker build -t hello-world-app .

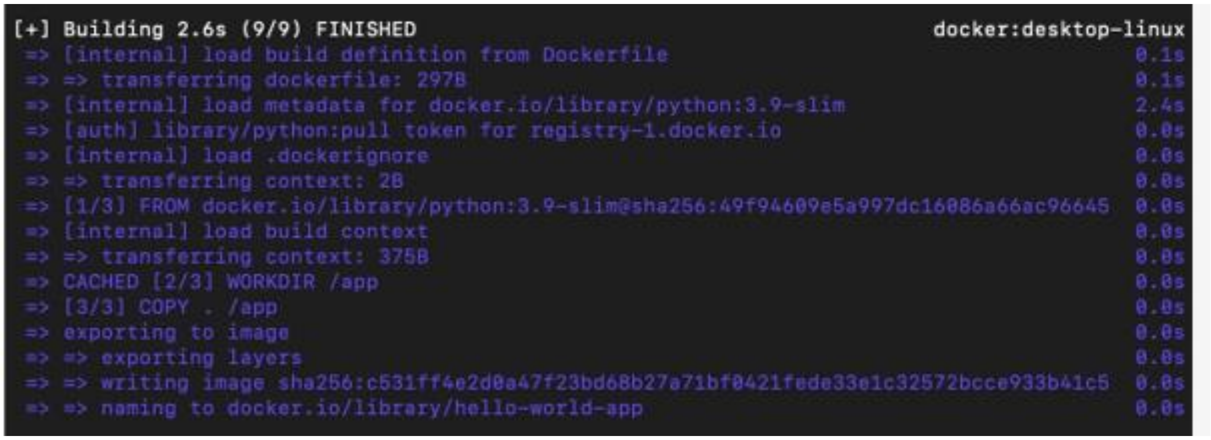


```
dossymbek_04@cloudshell:~ (ass2-437307)$ docker build -t hello-world-app .
[+] Building 0.1s (1/1) FINISHED                                          docker:default
 => [internal] load build definition from Dockerfile                                0.0s
 => => transferring dockerfile: 296B                                                0.0s
Dockerfile:7
--------------------
   5 |     # Copy the current directory contents into the container at /app COPY . /app
   6 |
   7 | >>> # Run the application CMD ["python", "app.py"]
   8 |
--------------------
ERROR: failed to solve: file with no instructions
dossymbek_04@cloudshell:~ (ass2-437307)$
```

5. **Run the Docker Container**:

Run the container using the following command:

docker run --rm hello-world-app



```
[+] Building 2.6s (9/9) FINISHED                                          docker:desktop-linux
 => [internal] load build definition from Dockerfile                                      0.1s
 => => transferring dockerfile: 297B                                                      0.1s
 => [internal] load metadata for docker.io/library/python:3.9-slim                        2.4s
 => [auth] library/python:pull token for registry-1.docker.io                             0.0s
 => [internal] load .dockerignore                                                         0.0s
 => => transferring context: 2B                                                           0.0s
 => [1/3] FROM docker.io/library/python:3.9-slim@sha256:49f94609e5a997dc16086a66ac96645  0.0s
 => [internal] load build context                                                         0.0s
 => => transferring context: 375B                                                         0.0s
 => CACHED [2/3] WORKDIR /app                                                             0.0s
 => [3/3] COPY . /app                                                                     0.0s
 => exporting to image                                                                    0.0s
 => => exporting layers                                                                   0.0s
 => => writing image sha256:c531ff4e2d0a47f23bd68b27a71bf0421fede33e1c32572bcce933b41c5  0.0s
 => => naming to docker.io/library/hello-world-app                                        0.0s
```

Deliverables:

- A Docker image that runs a simple application.
- A screenshot of the container output showing "Hello from inside the container!"