This document assumes that:
- **you downloaded and installed the Google Cloud SDK**
    o **https://dl.google.com/dl/cloudsdk/channels/rapid/GoogleCloudSDKInstaller.exe**
- **you have the correct Python Flask code to deploy, which implements file uploading to a previous project's bucket**
- **you are working on your own computer, at the folder that contains the code**

Replace <your user email> with your own email for Google Cloud purposes, e.g. myemail@gmail.com

1) Learn about your "active accounts"

```
gcloud auth list
Credentialed Accounts
ACTIVE  ACCOUNT
        another@gmail.com
        yet_another@gmail.com
*       <your user email>
        it_never_ends@gmail.com

To set the active account, run:
    $ gcloud config set account `ACCOUNT`
```

2) Make sure you are logged-into one of the accounts (one with an associated billing account)

```
gcloud auth login
# will require interaction with a web browser
# will end (if OK) with the URL: https://cloud.google.com/sdk/auth_success

gcloud auth application-default login
Your browser has been opened to visit: ...
```
...

```
Credentials saved to file: [<some path on your PC>\application_default_credentials.json]
```

These credentials will be used by any library that requests **Application Default Credentials** (ADC).

3) You can also explicitly state the current account

   gcloud config set account <your user email>
   Updated property [core/account].

4) Create a new project "your-project-id-1234" (replace this identifier with something of your choice)

   gcloud projects create your-project-id-1234 --name "Testing 240313" --labels=goal=am4am
   Create in progress for [https://cloudresourcemanager.googleapis.com/v1/projects/your-project-id-1234].
   Waiting for [operations/cp.4845311379474...] to finish...done.
   Enabling service [cloudapis.googleapis.com] on project [your-project-id-1234]...
   Operation "operations/acat.p2-747437372170-b414498a-f28e-..." finished successfully.

5) You can explicitly set the current account

   gcloud config set project your-project-id-1234

6) You can explicitly set this as the "quota project" (a project that can track usages)
The following command will also get you an "application_default_credentials.json" file.

   gcloud auth application-default set-quota-project your-project-id-1234
   API [cloudresourcemanager.googleapis.com] not enabled on project [your-project-id-1234]. Would you like
to enable and retry (this will
   take a few minutes)? (y/N)? y

   Enabling service [cloudresourcemanager.googleapis.com] on project [your-project-id-1234]...
   Operation "operations/acat.p2-747437372170-..." finished successfully.

   Credentials saved to file: [<some path on your PC>**application_default_credentials.json**]

   These credentials will be used by any library that requests **Application Default Credentials** (**ADC**).

   Quota project "your-project-id-1234" was added to **ADC** which can be used by Google client libraries for
billing and quota. Note that some services may still bill the project owning the resource.

7) You can create a service-account for the project

```
gcloud iam service-accounts create sa-test-240313 --description="SA for your-project-id-1234" --display-
name="Sa-test-240313"
Created service account [sa-test-240313].


gcloud iam service-accounts list
DISPLAY NAME        EMAIL                                                DISABLED
Sa-test-240313  sa-test-240313@your-project-id-1234.iam.gserviceaccount.com  False
# NOTICE: there is no service account for GAE: it suggests that the project has no associated billing
account, which can happen if you already have 3+ projects (solution ahead).
# Once a billing account is set, the project should receive a corresponding GAE service account
```

8) Give the newly created service-account the permission to create storage objects

```
gcloud projects add-iam-policy-binding your-project-id-1234 --member="serviceAccount:sa-test-
240313@your-project-id-1234.iam.gserviceaccount.com" --role="roles/storage.objectCreator"
Updated IAM policy for project [your-project-id-1234].
bindings:
- members:
  - user:<your user email>
  role: roles/owner
- members:
  - serviceAccount:sa-test-240313@your-project-id-1234.iam.gserviceaccount.com
  role: roles/storage.objectCreator
etag: BwYTeijIzVQ=
version: 1
```

9) You can write a corresponding private key

```
gcloud iam service-accounts keys create ./pk-sa-test-240313.json --iam-account sa-test-240313@your-
project-id-1234.iam.gserviceaccount.com
created key [88e70d42d671768956d45c...] of type [json] as [./pk-sa-test-240313.json] for [sa-test-
240313@your-project-id-1234.iam.gserviceaccount.com]
```

10) Learn about the existing regions

```
gcloud app regions list
REGION                    SUPPORTS STANDARD    SUPPORTS FLEXIBLE    SUPPORTS GAE SEARCH
asia-east1                YES                  YES                  NO
asia-east2                YES                  YES                  YES
asia-northeast1           YES                  YES                  YES
asia-northeast2           YES                  YES                  YES
asia-northeast3           YES                  YES                  YES
asia-south1               YES                  YES                  YES
asia-southeast1           YES                  YES                  NO
asia-southeast2           YES                  YES                  YES
australia-southeast1      YES                  YES                  YES
europe-central2           YES                  YES                  NO
europe-west               YES                  YES                  YES
europe-west2              YES                  YES                  YES
europe-west3              YES                  YES                  YES
europe-west6              YES                  YES                  YES
northamerica-northeast1   YES                  YES                  YES
southamerica-east1        YES                  YES                  YES
us-central                YES                  YES                  YES
us-east1                  YES                  YES                  YES
us-east4                  YES                  YES                  YES
us-west1                  YES                  YES                  NO
us-west2                  YES                  YES                  YES
us-west3                  YES                  YES                  YES
us-west4                  YES                  YES                  YES
```

11) You can try to create an "app" for Google App Engine, for the selected project
... but it will fail (in the example it does fail, and a solution is presented) if it is not associated
with a valid billing account

```
gcloud app create --region=europe-west
```
```
You are creating an app for project [your-project-id-1234].
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>.
```

```
Creating App Engine application in project [your-project-id-1234] and region [europe-west]....failed.
   ERROR: (gcloud.app.create) PERMISSION_DENIED: Read access to project 'your-project-id-1234' was denied:
please check billing account associated and retry
   => it will fail if the billing account is linked to 3+ projects. Before retrying, unlink 1+ of the
project(s).
```

12) Know your projects

```
gcloud projects list
PROJECT_ID              NAME              PROJECT_NUMBER
mine-prj-240308         mine-prj-240308   390668...
my-cn-prj-240308        my-cn-prj-240308  662747...
oval-flow-414115        My First Project  626571...
your-project-id-1234    Testing 240313    7474373...
```

**13) Select one project you don't mind "disabling" and describe it, to see its corresponding billing
account id, then unlink it, then link the new project**

```
gcloud beta billing projects describe oval-flow-414115
billingAccountName: billingAccounts/123434-XPTOO-BLABLE
billingEnabled: true
name: projects/oval-flow-414115/billingInfo
projectId: oval-flow-414115

gcloud beta billing projects describe your-project-id-1234
billingAccountName: ''  <= NOTICE NO BILLING ACCOUNT
billingEnabled: false
name: projects/your-project-id-1234/billingInfo
projectId: your-project-id-1234

gcloud beta billing projects unlink oval-flow-414115
billingAccountName: ''  <= NO BILLING ACCOUNT FOR THE 1ST PROJECT
billingEnabled: false
name: projects/oval-flow-414115/billingInfo
projectId: oval-flow-414115
```

```
gcloud beta billing projects link PROJECT_ID --billing-account=BILLING_ACCOUNT_ID
gcloud beta billing projects link your-project-id-1234 --billing-account=123434-XPTOO-BLABLE
gcloud app create --region=europe-west
You are creating an app for project [your-project-id-1234].
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>.
```

14) Notice that once the new project got a billing account, it also got a GAE account (@appspot…)

gcloud app describe
```
authDomain: gmail.com
codeBucket: staging.your-project-id-1234.appspot.com
databaseType: CLOUD_DATASTORE_COMPATIBILITY
defaultBucket: your-project-id-1234.appspot.com
defaultHostname: your-project-id-1234.ew.r.appspot.com
featureSettings:
  splitHealthChecks: true
  useContainerOptimizedOs: true
gcrDomain: eu.gcr.io
id: your-project-id-1234
locationId: europe-west
name: apps/your-project-id-1234
serviceAccount: your-project-id-1234@appspot.gserviceaccount.com
servingStatus: SERVING
```

gcloud iam service-accounts list
```
DISPLAY NAME                        EMAIL
DISABLED
  App Engine default service account  your-project-id-1234@appspot.gserviceaccount.com
False
  Sa-test-240313               sa-test-240313@your-project-id-1234.iam.gserviceaccount.com  False
```

```
gcloud projects add-iam-policy-binding PROJECT_ID \
  --member="serviceAccount:YOUR_APP_ENGINE_DEFAULT_SERVICE_ACCOUNT_EMAIL" \
  --role="roles/storage.objectCreator"

gcloud projects add-iam-policy-binding your-project-id-1234 \
  --member="serviceAccount:your-project-id-1234@appspot.gserviceaccount.com" \
  --role="roles/storage.objectCreator"
```

15) Explicitly tell the service-account for the GAE that it can create Storage objects, for the project

```
gcloud projects add-iam-policy-binding your-project-id-1234 --member="serviceAccount:your-project-id-
1234@appspot.gserviceaccount.com" --role="roles/storage.objectCreator"
Updated IAM policy for project [your-project-id-1234].
bindings:
- members:
  - serviceAccount:service-747437372170@gcp-gae-service.iam.gserviceaccount.com
  role: roles/appengine.serviceAgent
- members:
  - serviceAccount:your-project-id-1234@appspot.gserviceaccount.com
  role: roles/editor
- members:
  - serviceAccount:service-747437372170@gcp-sa-firestore.iam.gserviceaccount.com
  role: roles/firestore.serviceAgent
- members:
  - user:<your user email>
  role: roles/owner
- members:
  - serviceAccount:your-project-id-1234@appspot.gserviceaccount.com
  - serviceAccount:sa-test-240313@your-project-id-1234.iam.gserviceaccount.com
  role: roles/storage.objectCreator
etag: BwYTenesFvA=
version: 1
```

16) Deploy the app and visit its URL, try to upload a file, you'll probably get an error

gcloud app deploy

```
# open an URL like https://your-project-id-1234.ew.r.appspot.com/
```
gcloud app browse

```
# if "Internal Server Error" you can try to understand the problem, by reading the logs
```
gcloud app logs read --limit=50
```
# if wanting to filter by severity (DEBUG, INFO, WARNING, ERROR, CRITICAL, ALERT, EMERGENCY)
```
gcloud app logs read --limit=50 --severity=ERROR

17) The error was because the bucket that the code uses is from another project

```
# an error 403 usually means some permissions problem
Check the permissions on the bucket mentioned in the code
gsutil iam get gs://educloud2024bucket240308
```

in this case, no explicit permission is given to GAE's default service account, so that explains the 403.
```
{
  "bindings": [
    {
      "members": [
        "projectEditor:mine-prj-240308",
        "projectOwner:mine-prj-240308"
      ],
      "role": "roles/storage.legacyBucketOwner"
    },
    {
      "members": [
        "projectViewer:mine-prj-240308"
      ],
      "role": "roles/storage.legacyBucketReader"
    }
  ],
  "etag": "CAE="
}
```

18) Explicitly permit GAE's SA to the other project's bucket, no need to re-deploy

```
# you can explicitly authorize the GAE's default service account for the project, on the desired bucket
gsutil iam ch serviceAccount:your-project-id-1234@appspot.gserviceaccount.com:objectCreator
gs://educloud2024bucket240308
```

```
# but that won't be enough for situations where an object with the same name already exists, requiring
update/deletion, so:
gsutil iam ch serviceAccount:prj-id-am-test-240312@appspot.gserviceaccount.com:admin
gs://educloud2024bucket240308
And it should work.
```