Step-by-Step Guide to Creating and Deploying a New Spring Boot Application to Google App Engine

Prerequisites:

1. **Google Cloud CLI:**
   - Download and install the Google Cloud CLI for your operating system. Follow the instructions on the official page: Google Cloud CLI Download.
2. **GCP Credit Application:**
   - Ensure you have applied for Google Cloud Platform (GCP) credits with the instructions mentioned on Ed Discussion.
3. **Billing Information:**
   - Set up your billing information in your Google Cloud account. Even with credits, GCP requires billing information to deploy applications. Follow the GCP Setup Guide on class website – points 1-4.

Process:

Step 1: Create a Google Cloud Project

1. **Navigate to the Google Cloud Console:**
   - Log in with your Google account.
2. **Create a New Project:**
   - Click on the "Select a Project" drop-down and then "New Project."
   - Name your project (e.g., "SpringBootDemo") and choose a billing account.
   - Click "Create" to set up your new project.

Step 2: Create a New Spring Boot Application

1. **Go to Spring Initializr:**
   - Spring Initializr is a web-based tool for generating new Spring Boot projects.
2. **Configure Your Project:**
   - **Project:** Select **Maven**.
   - **Packaging:** Choose **JAR**.
   - **Java Version:** Select **Java 17/21/22** or a compatible version.
   - **Group:** Enter a group ID (e.g., `com.example`).
   - **Artifact:** Enter an artifact ID (e.g., `springbootdemo`).
   - **Dependencies:** Add **Spring Web** (needed for creating REST endpoints).
   - Click **Generate** to create and download your project as a ZIP file.
3. **Unzip the Project:**
   - Unzip the downloaded file to a folder on your computer.
   - Open the project in your preferred development environment (e.g., Visual Studio Code, IntelliJ, or Eclipse).

Step 3: Create a HelloWorld Controller

1. **Navigate to the Main Java Package:**
   - Go to `src/main/java/com/example/springbootdemo` (replace `com/example/springbootdemo` with your package structure).
2. **Create a New Java Class:**
   - Name the class `simpleEndpointController.java`.
3. **Add the Following Code to the Class:**

```
import org.springframework.web.bind.annotation.GetMapping;
import org.springframework.web.bind.annotation.RestController;

@RestController
public class simpleEndpointController{

    @GetMapping("/")
    public String home() {
        return "Welcome to my Spring Boot App Deployed on GCP App
Engine!";
    }
}
```

   - **Explanation:**
     - `@RestController` marks the class as a RESTful web service controller.
     - `@GetMapping("/")` maps HTTP GET requests to the `/hello` endpoint.
     - When accessed, this endpoint will return the text `"Hello, World!"`.

Step 4: Update the `pom.xml` File

1. **Open the `pom.xml` File:**
   - Locate and open the `pom.xml` file in the root directory of your project.
2. **Add the Google Cloud Tools Plugin:**
   - Add the following plugin configuration inside the `<build>` section:

```
<build>
    <plugins>
        <plugin>
            <groupId>com.google.cloud.tools</groupId>
            <artifactId>appengine-maven-plugin</artifactId>
            <version>2.3.0</version>
        </plugin>
    </plugins>
</build>
```

   - **Explanation:**
     - This plugin allows you to deploy the application to Google App Engine directly from Maven.
3. **Save the `pom.xml` File:**
   - Save your changes and close the file.

Step 5: Create the `app.yaml` File

1. **Go to the Root Directory of Your Project:**
   - Make sure you are in the root directory of your Spring Boot project (where your `pom.xml` file is located).
2. **Create a New File Named `app.yaml`:**
   - In your code editor, create a new file named `app.yaml`.
3. **Add the Following Content to the `app.yaml` File:**

```
runtime: java17
env: standard
service: default
```

   - **Explanation:**
     - `runtime: java`: Specifies the Java runtime.
     - `env: standard`: Uses the standard App Engine environment.
     - `service: default`: Defines the default service name to handle all traffic.
4. **Save the `app.yaml` File:**
   - Ensure the `app.yaml` file is saved in the root directory of your project.

Step 6: Build Your Spring Boot Application

1. **Open a Terminal in the Root Directory of Your Project:**
   - You can use the integrated terminal in your development environment or a system terminal.
2. **Run the Maven Build Command:**
   - For Linux or macOS:

```
./mvnw clean install -DskipTests
```

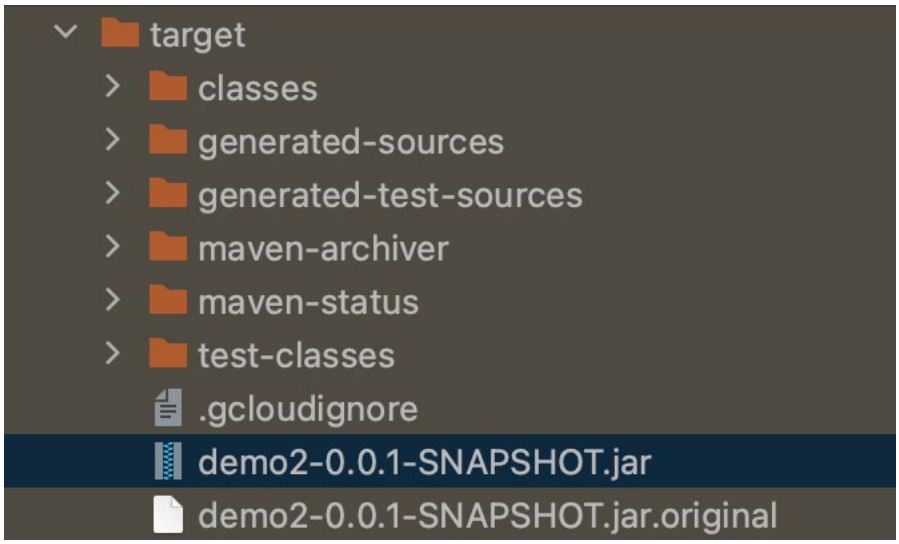
   - For Windows:

```
.\mvnw.cmd clean install -DskipTests
```

   - This command compiles your project and packages it into a JAR file located in the `target` directory.

On making any changes to the app, run

.\mvnw.cmd clean install -DskipTests



Step 7: Enable API

Enable app engine admin API service on your google console project - ave permission for `gcloud app deploy` to trigger builds and manage deployments.

Enable other APIs as needed like Cloud Storage API, Cloud Build API, Google Places API etc.

Step 8: Deploy to Google App Engine

1. **Initialize Google Cloud CLI:**
   - Open your terminal and check if the Google Cloud CLI is installed:

     ```
     gcloud -v
     ```

   - Initialize the CLI with:

     ```
     gcloud init
     ```

   - Follow the prompts to:
     - Choose the default configuration.
     - Log in with your Google account (ensure it has billing set up).
     - Select the project you created in Step 1.
2. **Deploy Your Application:**
   - Deploy your application to App Engine using the following command at the root level:

     ```
     gcloud app deploy
     ```

   - This command uses the `app.yaml` file to determine the configuration for the deployment.
3. **Follow the Prompts:**
   - Choose a deployment region (e.g., `us-east1`).

- Wait for the deployment to complete. A URL will be displayed where your application is hosted.

Step 9: Verify Deployment

1. **Open Your Application:**
   - Run the following command to open your deployed application in the browser:

```
gcloud app browse
```

   - This command will take you to the URL of your deployed application.

Extra Step: Clean Up to Avoid Billing Charges

1. **Shut Down the GCP Project If Not Needed:**
   - If you do not need the deployed application anymore or want to avoid billing charges (which you should)
   - Go to the Google Cloud Console.
   - Navigate to **Project Settings** and select **Shut Down Project**.

Step 10: Set Up Firebase CLI

1. Install Node.js

- Download and install Node.js from: https://nodejs.org/
- This will also install `npm` (Node Package Manager)
- Ensure you have version 20 or higher

2. Install Firebase CLI globally

Open **any terminal** (Command Prompt, PowerShell, or VS Code Terminal), **from any directory**, and run:

```
npm install -g firebase-tools
```

3. Verify installation

```
firebase --version
```

You should see something like:

```
12.3.1
```

Step 11: Add Firebase to Your GCP Project

1. Go to: https://console.firebase.google.com/
2. Click **"Add project"**
3. Choose **"Import an existing GCP project"**
4. Select your project (e.g., `springboot-461718`)
5. Click **Continue**, then **Finish** (no need to enable Google Analytics unless you want to)

This links your **GCP project to Firebase Hosting** and makes it available to the Firebase CLI.

Step 12: Log in and Initialize Firebase Hosting

1. From your terminal, navigate to the **project root** (where `index.html` and `springbootdemobackend/` live):

```
cd path/to/project-root
```

2. Log in to Firebase:

```
firebase login
```

3. Initialize Firebase Hosting:

```
firebase init hosting
```

When prompted:

- Choose: `Use an existing project`
- Select the **same GCP project** used for Spring Boot deployment
- Set **public directory** to: .
- Configure as a single-page app: **No**
- Overwrite `index.html`: **No**

This tells Firebase to use the **root directory** where `index.html` is already located and to ignore the backend folder.

🪜 Step 13: Edit index.html

When you run `firebase init hosting`, Firebase offers to generate a default `index.html`. If you accept, it creates a page that:

1. **Displays a welcome message**
2. **Loads the full Firebase SDK (in "compat" mode)**
3. **Initializes all Firebase services (e.g., Auth, Firestore, Storage, etc.)**
4. **Provides starter code for using Firebase features**
5. **Prints SDK loading status at the bottom of the page**

We will keep the default Firebase Hosting landing page and add a button that calls your Spring Boot backend on App Engine.

This is ideal if:

- ✅ You want to test backend API calls.
- ✅ You may later integrate Firebase services (Auth, Firestore, etc.).
- ✅ You prefer to keep the Firebase scaffolding intact.
- just before `</body>`, add the following:

```
<h2>Test Backend API Call</h2>
<button onclick="callBackend()">Call Backend</button>
<p id="result"></p>

<script>
  function callBackend() {
    fetch('https://<your-app-id>.appspot.com/)
      .then(res => res.text())
      .then(data => document.getElementById("result").innerText = data)
      .catch(err => console.error(err));
  }
</script>
```

🔁 **Replace** `<your-app-id>` with your actual App Engine deployment URL (e.g. `springboot-461718.ue.r.appspot.com`).

🚀 Step 14: Deploy Frontend to Firebase Hosting

1. Run:

   ```
   firebase deploy --only hosting
   ```

2. After deployment, Firebase will output a public URL like:

   ```
   Hosting URL: https://your-project-id.web.app
   ```

3. Open the URL in a browser.
   Click the **"Call Backend"** button — it should display the response from your Spring Boot API deployed on App Engine.

⚠️ Step 15: Enable CORS

If you get a CORS error in the browser console, update your Spring Boot controller:

```
import org.springframework.web.bind.annotation.CrossOrigin;


@CrossOrigin(origins = "https://springboot-461718.web.app")
@RestController
public class HelloWorldController {

    @CrossOrigin(origins = "*") // or restrict to your Firebase domain
    @GetMapping("/")
    public String home() {
        return "Welcome to my Spring Boot App Deployed on GCP App Engine!";
    }
}

.\mvnw.cmd clean install -DskipTests
gcloud app deploy
firebase deploy --only hosting
```

☑ Final Structure Summary

You now have:

- A **Spring Boot backend** deployed on Google App Engine
- A **Firebase-hosted frontend** calling that backend

Frontend: `https://your-project-id.web.app`
Backend: `https://your-app-id.appspot.com/`