# Task 5.2D

1. **Creating a Private Container Registry on Google Cloud**

   **Objective**: Create a private Docker registry on Google Cloud to store and manage Docker images.

   **Steps**:

   I.   Open the terminal and log in to Google Cloud using:

   *gcloud auth login*

   ```
   C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>gcloud auth login
   Your browser has been opened to visit:

       https://accounts.google.com/o/oauth2/auth?response_type=code&client_id=32555940559.apps.googleusercontent.com&redire
   ct_uri=http%3A%2F%2Flocalhost%3A8085%2F&scope=openid+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fuserinfo.email+https%3A%2
   F%2Fwww.googleapis.com%2Fauth%2Fcloud-platform+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fappengine.admin+https%3A%2F%2Fw
   ww.googleapis.com%2Fauth%2Fsqlservice.login+https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fcompute+https%3A%2F%2Fwww.googleap
   is.com%2Fauth%2Faccounts.reauth&state=KaD2eNNahbFJ725OjfUhIoxD6LrecV&access_type=offline&code_challenge=CV1xEus0fAbdMcDQ
   JfrFvruK4fXvlzQ8q5IBWwDyQ5g&code_challenge_method=S256


   You are now logged in as [s223124219@deakin.edu.au].
   Your current project is [None].  You can change this setting by running:
     $ gcloud config set project PROJECT_ID
   ```

   After logging in successfully, select the project.

   *gcloud config set project sit737-25t1-tariq-4b52e3f*

   ```
   C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>gcloud config set project sit73
   7-25t1-tariq-4b52e3f
   Updated property [core/project].
   ```

   II.  Enable the Artifact Registry API:

   *gcloud services enable artifactregistry.googleapis.com*

   ```
   C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>gcloud services enable artifact
   registry.googleapis.com
   ```

   III. Create the private container registry in Google Cloud:

   *gcloud artifacts repositories create calculator-repo --repository-format=docker --location=australia-southeast1 --description="Docker repo for calculator microservice"*

   ```
   C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>gcloud artifacts repositories c
   reate calculator-repo --repository-format=docker --location=australia-southeast1 --description="Docker repo for calculat
   or microservice"
   Create request issued for: [calculator-repo]
   Waiting for operation [projects/sit737-25t1-tariq-4b52e3f/locations/australia-southeast1/operations/9e13c883-22fa-4945-
   8a22-42056affe6fd] to complete...done.
   Created repository [calculator-repo].
   ```

2. **Authenticate with Docker Registry**

   **Objective**: Authenticate Docker to access the private Google Cloud container registry.

   **Steps**:

   I.   Run the following command to authenticate Docker with the Google Cloud registry:

   *gcloud auth configure-docker australia-southeast1-docker.pkg.dev*

   ```
   C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>gcloud auth configure-docker au
   stralia-southeast1-docker.pkg.dev
   Adding credentials for: australia-southeast1-docker.pkg.dev
   After update, the following will be written to your Docker config file located at [C:\Users\musta\.docker\config.json]:
    {
      "credHelpers": {
        "australia-southeast1-docker.pkg.dev": "gcloud"
      }
    }

   Do you want to continue (Y/n)?  y

   Docker configuration file updated.
   ```

II. Docker will update the configuration file to use the Google Cloud authentication helper for pushing and pulling images.

## 3. Publish the Docker Image to the Registry

**Objective**: Push the Docker image to the private container registry created earlier.

**Steps**:

I. Tag the Docker image so that it points to the newly created registry:

*docker tag calculator-microservice australia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest*

```
C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>docker tag calculator-microserv
ice australia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest
```

II. Push the tagged image to the private registry:

*docker push australia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest*

```
C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>docker push australia-southeast
1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest
The push refers to repository [australia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-
microservice]
0c8cc2f24a4d: Pushed
1769b4ecfecd: Pushed
2ff1d7c41c74: Pushed
d9a8df589451: Pushed
1430b36cc8bc: Pushed
5f32ed3c3f27: Pushed
c27d1c09bb3a: Pushed
1de76e268b10: Pushed
7a2f888c8897: Pushed
f89ff5c5b4cb: Pushed
6f51ee005dea: Pushed
0d27a8e86132: Pushed
b253aeafeaa7: Pushed
3d2201bd995c: Pushed
latest: digest: sha256:5cfeda1d961a47eded6efea18968db5e2d300776229efe71dd838a36eb497e5b size: 856
```

Docker will upload the image to the registry. The progress of the upload will be displayed in the terminal.

| | Name | Container ID | Image | Port(s) | CPU (%) | Last started | Actions |
|---|---|---|---|---|---|---|---|
| ● | unruffled_hawking | e0b924882bb1 | sit737-25t1-tariq-4b52e3f/calculator | 3000:3000 | 0% | 27 minutes ago | ■ ⋮ 🗑 |

sit737-25t1-tariq-4b52e3f    repos    ✕   🔍 Search

📌 Repositories   + CREATE REPOSITORY   ✏ EDIT REPOSITORY   🗑 DELETE   SETUP INSTRUCTIONS

☰ Filter   Enter property name or value

| | Name ↑ | Format | Type | Location | Scanning | Description | Labels | Version policy ❓ | En |
|---|---|---|---|---|---|---|---|---|---|
| ☐ | 📁 calculator-repo | 🐳 Docker | Standard | australia-southeast1 (Sydney) | Active | Docker rep... ⌄ | — | | Go |

## 4. Run the Docker Image from the Registry

**Objective:** Verify that the microservice can run from the published image in the registry.

**Steps:**

I. Run the Docker container from the image that was just pushed to the registry:

*docker run -d -p 3000:3000 australia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest*

```
C:\My Work\data\Deakin\Semester 4\Cloud Native Applications\Task 5.2D\sit737-2025-prac5d>docker run -d -p 3000:3000 aust
ralia-southeast1-docker.pkg.dev/sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest
e0b924882bb1bf5e6cfcb17ae230da0f501bff28a88644935b39c22886ff369f
```

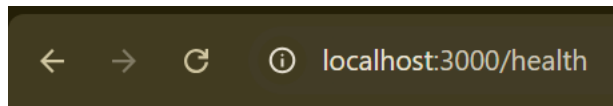This command runs the microservice and binds it to port 3000 on your local machine.

## 5. Test the Microservice

**Objective:** Test the functionality of the microservice using different operations.
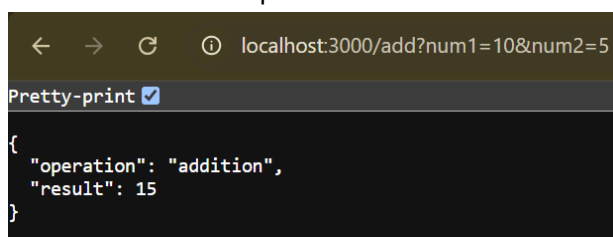
**Test Steps:**

I. **Health Check:**

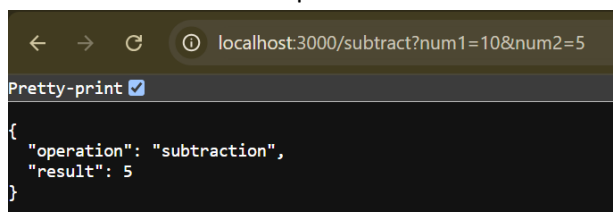Test the health endpoint by visiting *http://localhost:3000/health*. It should return *OK*.



II. **Addition:**
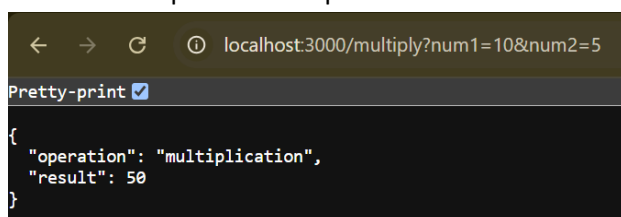
Test the addition endpoint with numbers 10 and 5:



III. **Subtraction:**
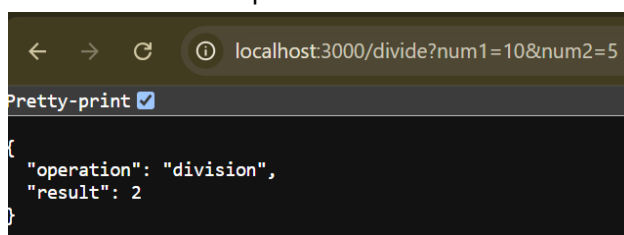
Test the subtraction endpoint with numbers 10 and 5:



IV. **Multiplication:**
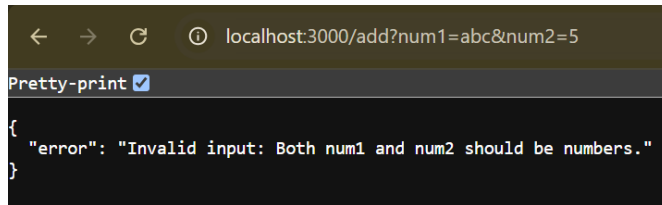
Test the multiplication endpoint with numbers 10 and 5:



V. **Division:**

Test the division endpoint with numbers 10 and 5:

**VI.** **Invalid Input**:

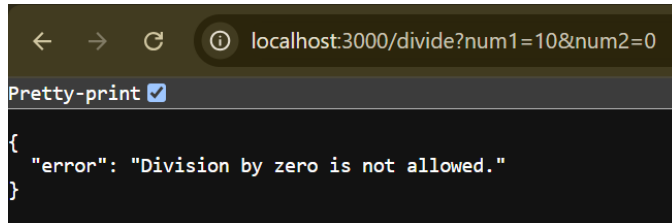Test invalid input (non-numeric values) with the following:

```
←  →  C    ⓘ  localhost:3000/add?num1=abc&num2=5
Pretty-print ☑

{
  "error": "Invalid input: Both num1 and num2 should be numbers."
}
```

**VII.** **Division by Zero**:

Test division by zero with the following:

```
←  →  C    ⓘ  localhost:3000/divide?num1=10&num2=0
Pretty-print ☑

{
  "error": "Division by zero is not allowed."
}
```

**VIII.** **Docker Output**

**unruffled_hawking**

⊛ e0b924882bb1 🗗    ⚙ sit737-25t1-tariq-4b52e3f/calculator-repo/calculator-microservice:latest
3000:3000 ↗

| Logs | Inspect | Bind mounts | Exec | Files | Stats |
| --- | --- | --- | --- | --- | --- |

```
2025-04-08 12:40:15 Calculator microservice running at http://localhost:3000
2025-04-08 12:57:26 info: Addition requested: 10 + 5 = 15 {"service":"calculator-microservice"}
2025-04-08 12:57:58 info: Subtraction requested: 10 - 5 = 5 {"service":"calculator-microservice"}
2025-04-08 13:00:00 info: Multiplication requested: 10 * 5 = 50 {"service":"calculator-microservice"}
2025-04-08 13:00:48 info: Division requested: 10 / 5 = 2 {"service":"calculator-microservice"}
2025-04-08 13:01:30 error: Invalid input: Both num1 and num2 should be numbers. {"service":"calculator-microservice"}
2025-04-08 13:01:59 error: Error: Division by zero is not allowed. {"service":"calculator-microservice"}
2025-04-08 13:02:24 info: Addition requested: 10 + 5 = 15 {"service":"calculator-microservice"}
```