App Dev - Processing Cloud Pub/Sub Data using Cloud Functions: Node.js

Overview

In this lab, you enhance the online Quiz application by creating a Cloud Function to process Cloud Pub/Sub messages.

This process harnesses several GCP products in a serverless environment: Cloud Pub/Sub, Cloud Natural Language API, and Cloud Spanner.

Objectives

In this lab, you learn how to perform the following tasks:

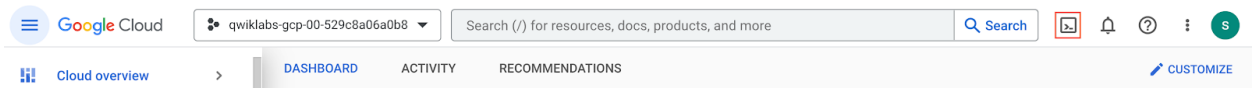
- Create a Cloud Function that responds to Cloud Pub/Sub messages.
- Deploy multiple files to a Cloud Function.

Activate Google Cloud Shell

Google Cloud Shell is a virtual machine that is loaded with development tools. It offers a persistent 5GB home directory and runs on the Google Cloud.

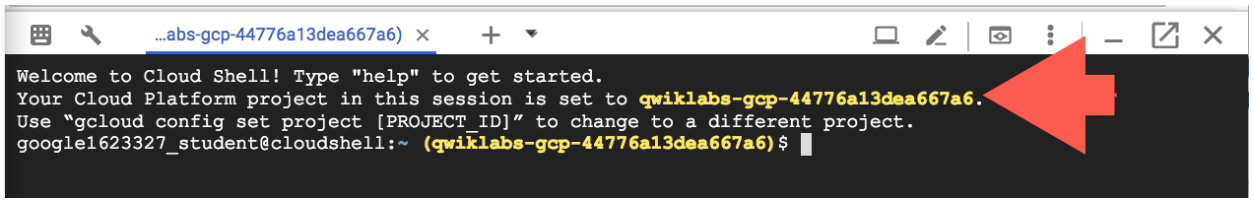
Google Cloud Shell provides command-line access to your Google Cloud resources.

1. In Cloud console, on the top right toolbar, click the Open Cloud Shell button.



2. Click **Continue**.

It takes a few moments to provision and connect to the environment. When you are connected, you are already authenticated, and the project is set to your *PROJECT_ID*. For example:



gcloud is the command-line tool for Google Cloud. It comes pre-installed on Cloud Shell and supports tab-completion.

- You can list the active account name with this command:

```
gcloud auth list
```

Output:

```
Credentialed accounts:
 - @.com (active)
```

Example output:

```
Credentialed accounts:
 - google1623327_student@qwiklabs.net
```

- You can list the project ID with this command:

```
gcloud config list project
```

Output:

```
[core]
project =
```

Example output:

```
[core]
project = qwiklabs-gcp-44776a13dea667a6
```

Note: Full documentation of **gcloud** is available in the gcloud CLI overview guide .

Task 1. Preparing the case study application

In this section, you access Cloud Shell, clone the git repository containing the Quiz application, configure environment variables, and run the application.

Clone source code in Cloud Shell

1. To clone the repository for the class, enter the following command:

```
git clone --depth=1
https://github.com/GoogleCloudPlatform/training-data-analyst
```

2. Create a soft link as a shortcut to your working directory:

```
ln -s
~/training-data-analyst/courses/developingapps/v1.3/nodejs/cloudfunctions
~/cloudfunctions
```

Configure and run the case study application

1. To change the working directory, enter the following command:

```
cd ~/cloudfunctions/start
```

2. To configure the Quiz application, enter the following command:

```
. prepare_environment.sh
```

Note: This script file:

- Creates an App Engine application.
- Exports the environment variables `GCLOUD_PROJECT` and `GCLOUD_BUCKET`.
- Runs `npm install.`
- Creates entities in Cloud Datastore.
- Creates a Cloud Pub/Sub topic.
- Creates a Cloud Spanner Instance, Database, and Table.
- Prints out the Google Cloud Project ID.

3. To run the web application, enter the following command:

```
npm start
```

Task 2. Working with Cloud Functions

In this section, you create a Cloud Function in your Google Cloud project that is triggered by publishing a message to Cloud Pub/Sub, runs the application, and monitors the Cloud Function invocation.

Create a Cloud Function

1. Return to the **Cloud Platform Console**.
2. On the **Navigation menu**, select **Cloud Functions**.
3. If necessary, click **Enable API**.

Note: It might take a minute or two to enable the Cloud Functions API.

4. Click **Create function**.

In the Create function dialog , set the following properties and leave the remaining settings as their defaults:

Property	Value
Function name	**process-feedback**
Trigger type	**Cloud Pub/Sub**
Topic	Select **projects/[PROJECT_ID]/topics/feedback**

5. Click **Save**, and then click **Next**.
6. Review the provided function implementation, and then click **Deploy**.

Note: It might take a minute or two to create the Cloud Function.

Run the web application

1. Return to the **Cloud Shell** window.
2. Preview the web application by clicking on the Web Preview button and selecting **Preview on port 8080**.

3. Click **Take Test**.
4. Click **Places**.
5. Complete the question.
6. Rate the quiz, enter some feedback, and then click **Send Feedback**.

View Cloud Function monitoring and logs

1. Return to the **Cloud Platform Console**, on the **Cloud Functions** page.
2. Click **process-feedback**.

Note: You should see a monitoring graph for Cloud Function invocations. It takes a few minutes for the graph to show the invocation of your function.

3. Click the **Logs** tab to view your logs.
4. You can view your logs in the logs explorer by clicking the link on the upper right of the page.
5. If your Cloud Pub/Sub message isn't displayed, click **Jump to now**.

Note: You should see the log entries collected from the Cloud Function. It takes a few minutes for the logs to show the invocation of your function.

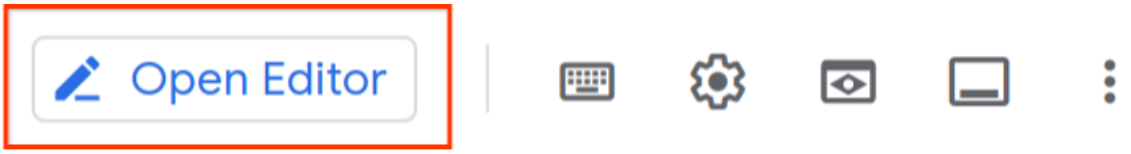
6. Go to Cloud Shell to also see your feedback.

Task 3. Examining the case study application code

In this section, you use the Cloud Shell text editor to review the case study application code.

Launch the Cloud Shell Editor

1. In the **Cloud Platform Console**, click **Open Editor**.



Review the Cloud Function application code structure

1. Navigate to **cloudfunctions/start**.
2. Select the **index.js** file in the **...function** folder.

Note: This file contains the same code as the sample from the Cloud Functions window in the Cloud Console, with one change: because the function you will write returns a Promise, the callback argument has been omitted.

3. Select the **package.json** file.

Note: This file contains the list of dependencies that this function needs to run. Cloud Functions automatically install the dependencies.

4. Select the **languageapi.js** file.

Note: This file contains code to process feedback text and return the Natural Language ML API sentiment score.

5. Select the **spanner.js** file.

Note: This file contains code to insert a record into a Cloud Spanner database.

Task 4. Coding a Cloud Function

In this section you write the code to create a Cloud Function that retrieves the Cloud Pub/Sub message data, invokes the Natural Language ML API to perform sentiment detection, and inserts a record into Cloud Spanner.

Note: Update code within the sections marked as follows:

```
// TODO
```

```
// END TODO
```

To maximize your learning, review the code, inline comments, and related API documentation.

Write code to modify a Cloud Function

1. Return to the `...function/index.js` file.
2. Load the `languageapi` and `spanner` modules. These modules are in the same folder as the `index.js` file.
3. In the `subscribe()` method, after the existing code that loads the Cloud Pub/Sub message into a buffer, convert the PubSub message into a feedback object by parsing it as JSON data.
4. Return a promise that invokes the `languageapi` module's `analyze` method to analyze the feedback text.
5. Chain a `.then(...)` method to the end of the return statement.
6. Supply an arrow function as the value of the callback.
7. In the body of the arrow function, log the Natural Language API sentiment score to the console.
8. Add a new property called score to the feedback object.
9. Complete the arrow function body by returning the feedback object.
10. Chain a second `.then(...)` method to the end of the first one. This one uses the `spanner` module to save the feedback.
11. Write a third `.then(...)` chained method, including an arrow function with no arguments and an empty body as the value of the callback.
12. In the body of this callback, log a message to indicate that the feedback has been saved, and return a success message.

13. Attach a `.catch(...)` handler to the end of the chain, which logs the error message to the console.

Note: Here's how your function should look when you're done.

function/index.js

```
// TODO: Load the ./languageapi module

const languageAPI = require('./languageapi');

// END TODO

// TODO: Load the ./spanner module

const feedbackStorage = require('./spanner');

// END TODO

exports.subscribe = function subscribe(event) {

  // The Cloud Pub/Sub Message object.

  // TODO: Decode the Cloud Pub/Sub message

  // extracting the feedbackObject data

  // The message received from Pub/Sub is base64 encoded, and

  // the data submitted by students is in a data property

  const pubsubMessage = Buffer.from(event.data, 'base64').toString();
```

```
  let feedbackObject = JSON.parse(pubsubMessage);

  console.log('Feedback object data before Language API:' +
JSON.stringify(feedbackObject));

  // END TODO

  // TODO: Run Natural Language API sentiment analysis

  // The analyze(...) method expects to be passed the

  // feedback text from the feedbackObject as an argument,

  // and returns a Promise.

  return languageAPI.analyze(feedbackObject.feedback).then(score => {

    // TODO: Log the sentiment score

      console.log(`Score: ${score}`);

    // END TODO

    // TODO: Add new score property to feedbackObject

      feedbackObject.score = score;

    // END TODO

    // TODO: Pass feedback object to the next handler

      return feedbackObject;
```

```
    // END TODO
  })
  // TODO: insert record
  .then(feedbackStorage.saveFeedback).then(() => {
    // TODO: Log and return success
    console.log('feedback saved...');
    return 'success';
    // END TODO
  })
  // END TODO
  // TODO: Catch and Log error
  .catch(console.error);
  // End TODO
};
```

14. Save the file.

Package and deploy the Cloud Function code

1. Return to **Cloud Shell** and stop the web application by pressing **Ctrl+C**.
2. To change the working directory to the Cloud Function code, enter the following command:

```
cd function
```

3. To zip up the files needed to deploy the function, enter the following command:

```
zip cf.zip *.js*
```

Note: This generates a zip archive named `cf.zip` that includes all the JavaScript and JSON files in the folder.

4. To stage the zip file into Cloud Storage, enter the following command:

```
gsutil cp cf.zip gs://$GCLOUD_BUCKET/
```

Note: This copies the zip archive into the Cloud Storage bucket named after your project ID with a `-media` suffix.

5. Return to the **Cloud Platform Console** and navigate to **Cloud Functions**.
6. Select the **process-feedback** function.
7. Click **Edit**.
8. Click **Next**.
9. Under **Source code**, select **ZIP from Cloud Storage**.
10. For **Cloud Storage location**, click **Browse**.
11. Select the **cf.zip** file in the bucket named after your project ID with the `-media` suffix, and click **Select**.
12. In the **Entry point** field, type **subscribe**.
13. Click **Deploy**.

Note: It may take a minute or two to update the **process-feedback** function with your new code that performs sentiment analysis with the Cloud Natural Language Machine Learning API and inserts data into Cloud Spanner.

Task 5. Testing the case study application

Run the web application

1. Return to the **Cloud Shell** window.
2. Change the working folder back to the `start` folder for the **cloudfunctions** lab:

```
cd ..
```

3. To start the web application, execute the following command:

```
npm start
```

4. Preview the web application.
5. Click **Take Test**.
6. Click **Places**.
7. Complete the question.
8. Enter some feedback, and click **Send Feedback**.

View Cloud Function monitoring and logs

1. Return to the **Cloud Functions** section of the **Cloud Platform Console**.
2. Click the function name, **process-feedback**.

Note: You should see a monitoring graph for Cloud Function invocations. It takes a few minutes for the graph to show the invocation of your function.

3. Click the **Logs** tab to view your logs.
4. You can view your logs in the logs explorer by clicking the link on the upper right of the page.
5. If your Cloud Pub/Sub message isn't displayed, click **Jump to now**.
6. Refresh the logs every few minutes until the log entries show that your function executed.

Note: You should see the log entries collected from the Cloud Function. You should now see a score from the Language API in the logs. It may takes a few minutes for the logs to show the invocation of your function.

View Cloud Spanner data

1. On the **Navigation menu**, click **Spanner**.
2. Click **Quiz instance**, Under the Databeses click **quiz-database** and then on the left pane select **Query**.
3. Run the following query:

```
SELECT * FROM Feedback
```

Note: You should see that a new record has been added to the Feedback table.

Task 6. Bonus: Storing student answers using a Cloud Function

When a student completes a quiz, their answers are submitted in an API call back to the server. Your job is to capture the student-submitted answers and the correct answers and save them into Cloud Spanner. You should see that a new record has been added to the Feedback table.

To do this:

1. Create a Cloud Pub/Sub topic called answers.
2. Create a Cloud Spanner table called Answers with appropriate column names and data types.
3. Post the answer data to the answers topic.
4. Subscribe to the answers topic in the console application and insert the answer data into the Answers table.

The details are left up to you! You can find the solution to the bonus in the lab's **bonus** folder.

Review:
Which triggers can be used with Cloud Functions?

- Cloud Pub/Sub
- Cloud Spanner
- Cloud Storage
- HTTP

With a Cloud Function triggered by Cloud Pub/Sub, how is the message delivered?

- Base64 encoded

- CSV encoded
- Tarred and Gzipped
- Zipped

What is the maximum execution time for a Cloud Function?

- 60 seconds
- 540 seconds
- Unlimited