Google Cloud Functions

Group 5

Introduction

"Google Cloud Functions is a lightweight compute solution for developers to create single-purpose, stand-alone functions that respond to Cloud events without the need to manage a server or runtime environment."

Google Cloud Functions is a Function as a Service (FaaS) computing platform similar to AWS Lambda.

History: Who

Google is one of the largest internet-based companies with many innovations under its belt, including:

1. PageRank, algorithm for meaningful web search
2. Translate, help people communicate
3. Maps, help people find their way
4. AutoComplete web search, only need to remember about half of what you're looking for

History: Why

Competition: Amazon has been the leader in Enterprise cloud solutions and Google is attempting to gain market share.

Internet of Things: provide simple event-based computations for connected devices with minimal power output.

Mobile Apps: provides scalable backend-support with optimization for Android applications using Google Firebase.

History: How

- Beta released March 2017 to compete against Amazon Lambda.
- General release was in July 2018.

The service evolved to support:

- Google Cloud storage Triggers
- Python (Originally only Node.js)
- Cloud SQL

Feature Summary

Google Cloud Functions is a FaaS platform.

FaaS provides a number of benefits over more traditional IaaS platforms:

- Allows you to easily deploy your code as single functions.
- Infrastructure scaling is done automatically depending on demand.
- No need to manage server software or virtual machines.
- You are only charged when your functions are being used.

Other Features

- Run functions in response to events
  - Cloud Store: object creation, deletion, archiving and metadata updates.
  - Firebase: DB, Storage, Analytics, Auth.
  - Cloud Pub/Sub: Real time analytics and event processing.
  - StackDriver Logging: Changes to logs can trigger functions.
- Deploy function from Docker container with arbitrary runtime environment, dependencies and Linux distribution.
- Metrics for your functions can be viewed:
  - In the GPC (General Compute Cluster) Console.
  - Using StackDriver Monitoring.
  - API Overview Page (basic call metrics).
- StackDriver Debugger allows to inspect the state of a function.

Example Use Cases

Some use cases for Google Cloud Functions are:

- Transform and aggregate data in response to storage events
- Processing stream data with automatically scaling infrastructure
- Batch jobs benefit from concurrent execution.
- Use for backend services for mobile applications
- Monitor Database changes to ensure quality standards
- Tradition REST APIs

Other Example Use Cases

Some more use cases for Google Cloud Functions include:

- Sending notifications to users in your app without a server.
- You can use to Google Cloud Functions in response to any Firebase events which include: Databases, Messaging, and Crash Reporting.
- IOT sensors capable of sending events to a Google Cloud Function that sends a text message to a homeowner if:
  - The basement floods.
  - A window is broken or a door is forced open.
  - The smoke alarm goes off.

Technology Advantages

- Google Cloud Platform has a very well designed portal, this makes creating and deploying functions easy.
- Integration with Firebase which is a popular web app and mobile deployment platform.
- The Node.js Emulator allows developers to run, debug and deploy their functions locally.

Technology Disadvantages

- Late to market in March, 2017
  - Compare this with November 2014 for Lambda and March 2016 for Azure Functions.
- Only supporting NodeJS and Python.
- Competitors offer support for many other languages.

Usability

- We all had very good first impressions.
  - Creating and deploying a function was very easy.
    - Creating “Hello World” takes only a few clicks.
  - Google’s Cloud Console has an intuitive layout that looks good.
  - No need to change the default permissions or create an API Gateway to use REST.
- Compared to using Java with AWS Lambda. Node.js is significantly simpler and has fewer steps to get a function deployed and running.

Pricing Policy

Invocation

2 million free invocations.
$0.40 per million afterwards.

Memory Provision

400,000 GB-seconds free.
$0.0000025 per GB-s afterwards.

CPU Provision

200,000 GHz-seconds free.
$0.0000100 per GHz-s afterwards.

Provisioning Schemes	
Memory	CPU
128MB	200 MHz
256MB	400 MHz
512MB	800 MHz
1024MB	1.4 GHz
2048MB	2.4 GHz

Cost Example

Two instances running continuously for 30 days with a function execution time of 100ms.

Calls: 51.84 million
Wall clock: 5,184,000 s

CPU: 0.8 GHz
Memory: 0.512 GB

CPU Consumption:	4,147,200 GHz-s
CPU Cost:	$ 39.47
Memory Use:	2,654,208 GB-s
Memory Cost:	$ 5.64
Invocations:	51,840,000 calls
Invocations Cost:	$ 19.94
Total Cost:	$ 65.04

Cost Comparison

Google Cloud Functions: 2 continuous threads for 30 days = $ 65.04

Google VM: 2-core VM continuous for 30 days = $ 47.88

- If your demand is sequential or continuous then the VM is cheaper.
- Cloud functions offer the benefit of horizontal scaling and no server maintenance or downtime.

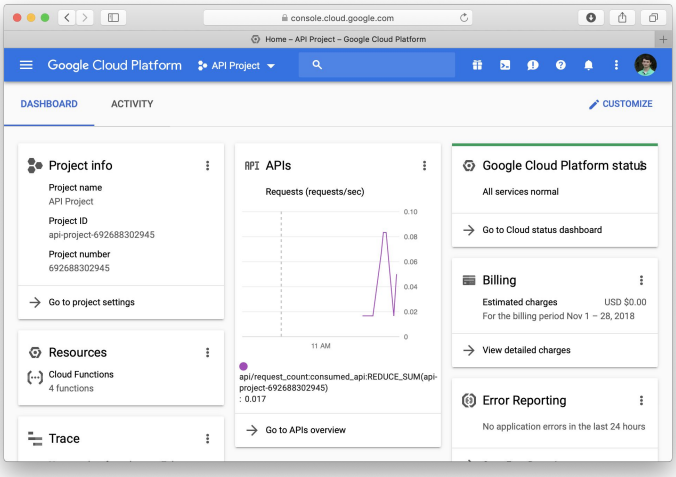
Conclusions

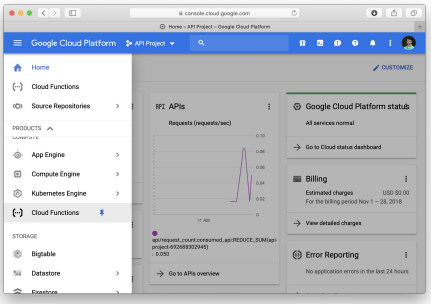
Google offers a very similar FaaS platform to AWS Lambda.

We found it to be easier to use compared to Lambda.

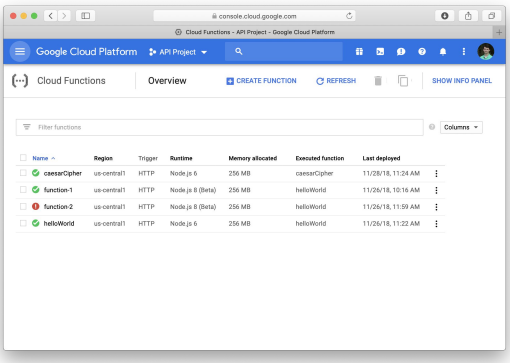
They give out $300 worth of credits to anyone who signs up so give it a try!

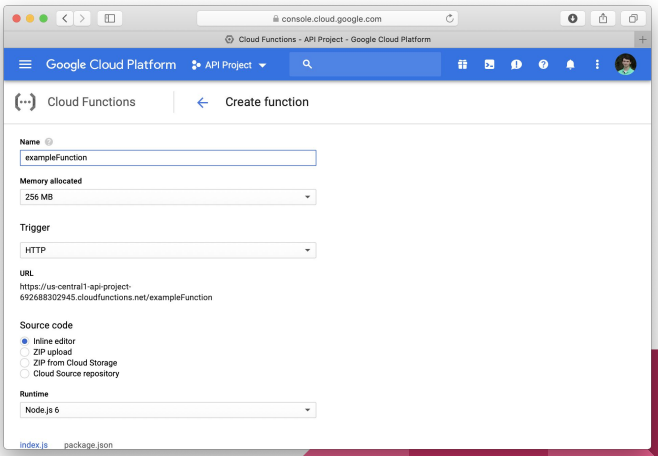
Demonstration: Google Cloud Console



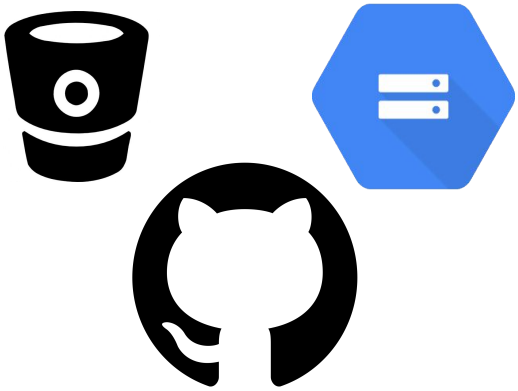


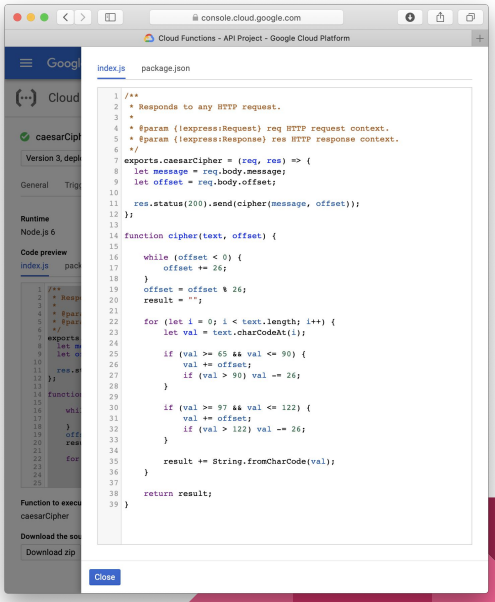
Creating a Google Cloud Function



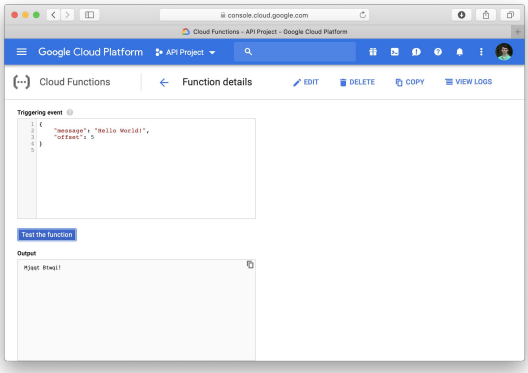


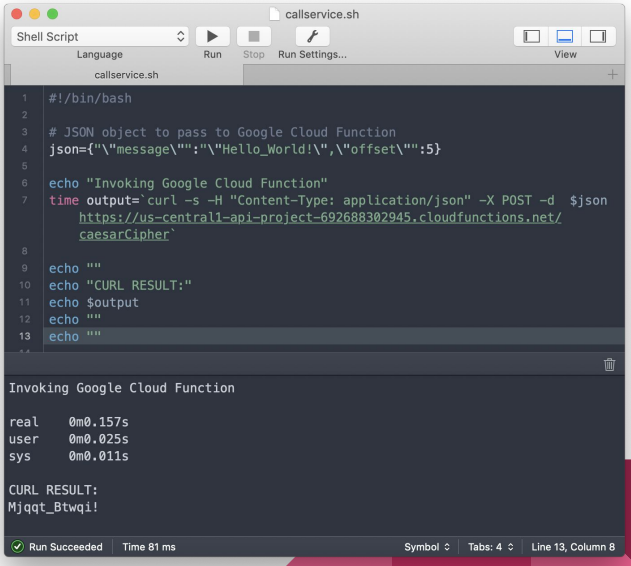
Writing and Deploying your Function



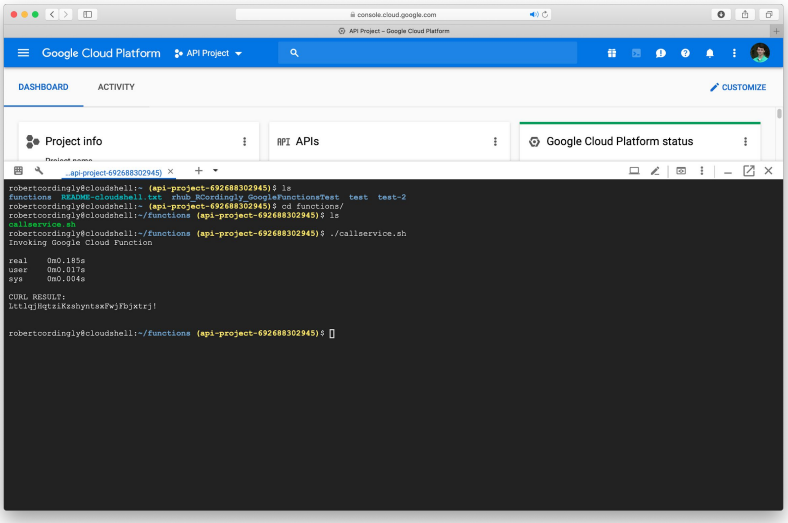


Calling your Function





Google Cloud Shell



The Google Cloud Shell can be used to work with your functions.

Any Questions?