Assignment: Exploring Serverless Computing and Cron Jobs in Azure, GCP, and GitHub

Objective

The objective of this assignment is to introduce you to serverless computing and the use of cron jobs in cloud environments. You will deploy serverless functions on both Azure and Google Cloud Platform (GCP), and create a scheduled task using GitHub Actions.

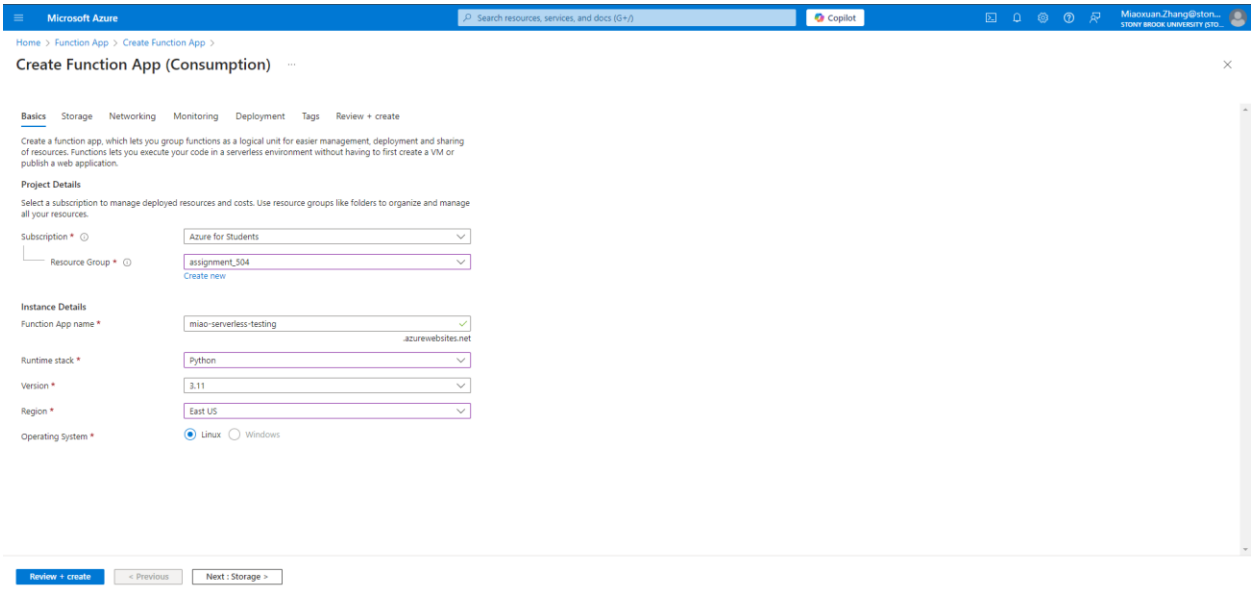
Instructions

1. Deploy a Serverless Function

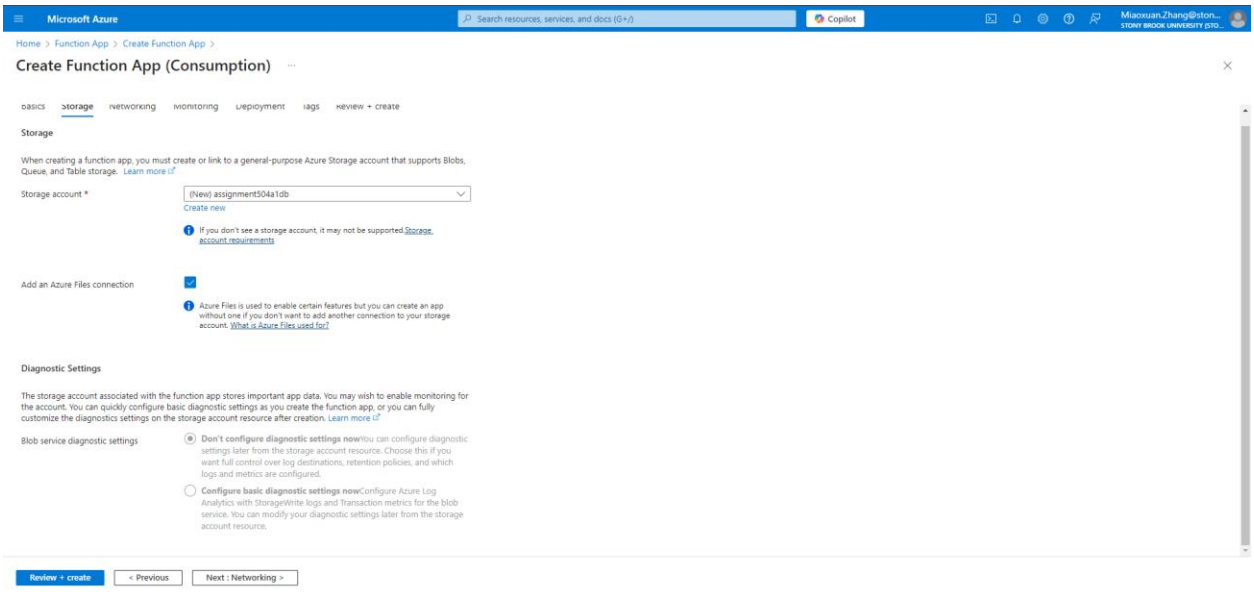
- **Azure:**
    - Navigate to the Azure portal and create an Azure Function.
    - Choose a simple trigger (e.g., HTTP trigger) and deploy a basic function (e.g., "Hello, World").
- **GCP:**
    - Access the Google Cloud Console and create a Google Cloud Function.
    - Deploy a similar function with an HTTP trigger in GCP.

Create Function in Microsoft Azure

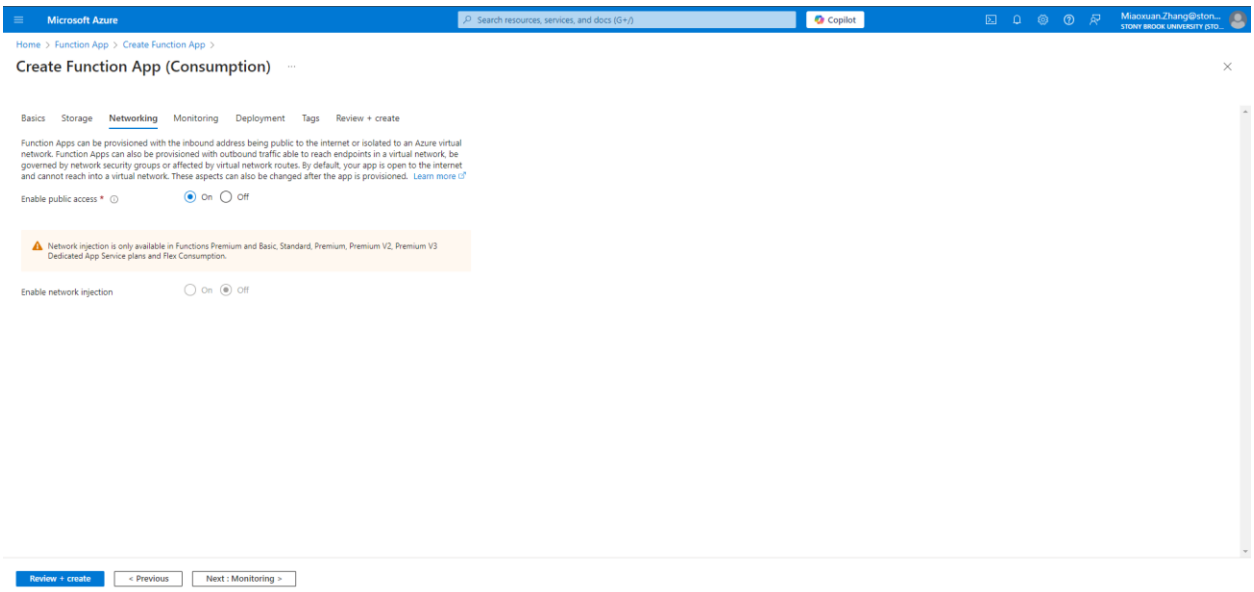
Set up Basics



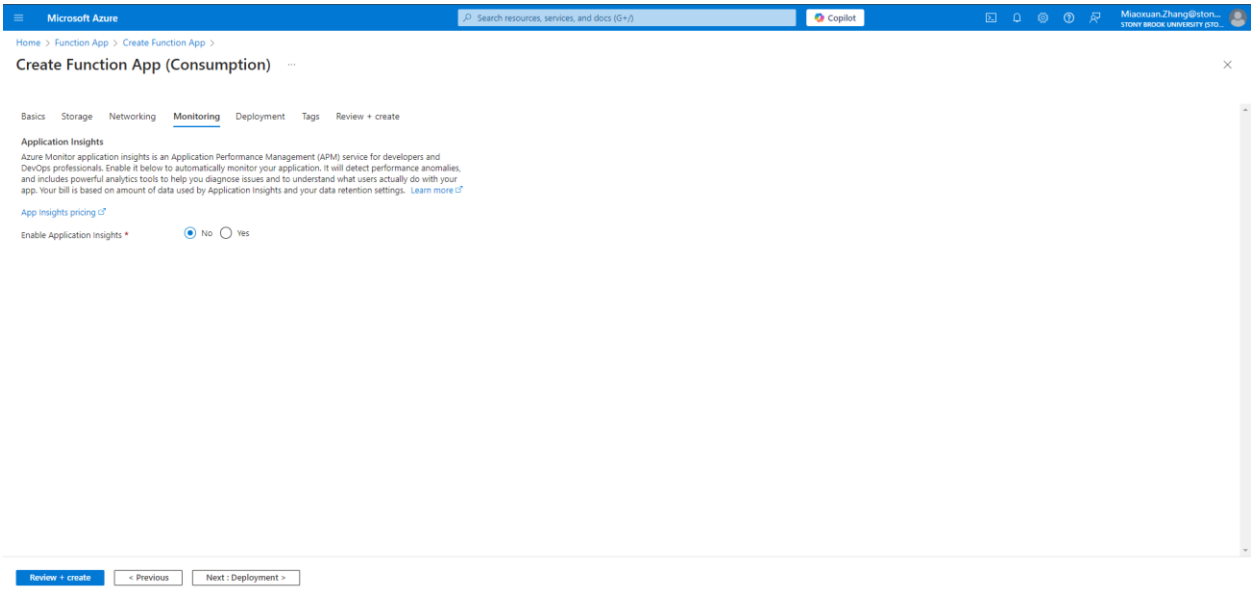
Storage



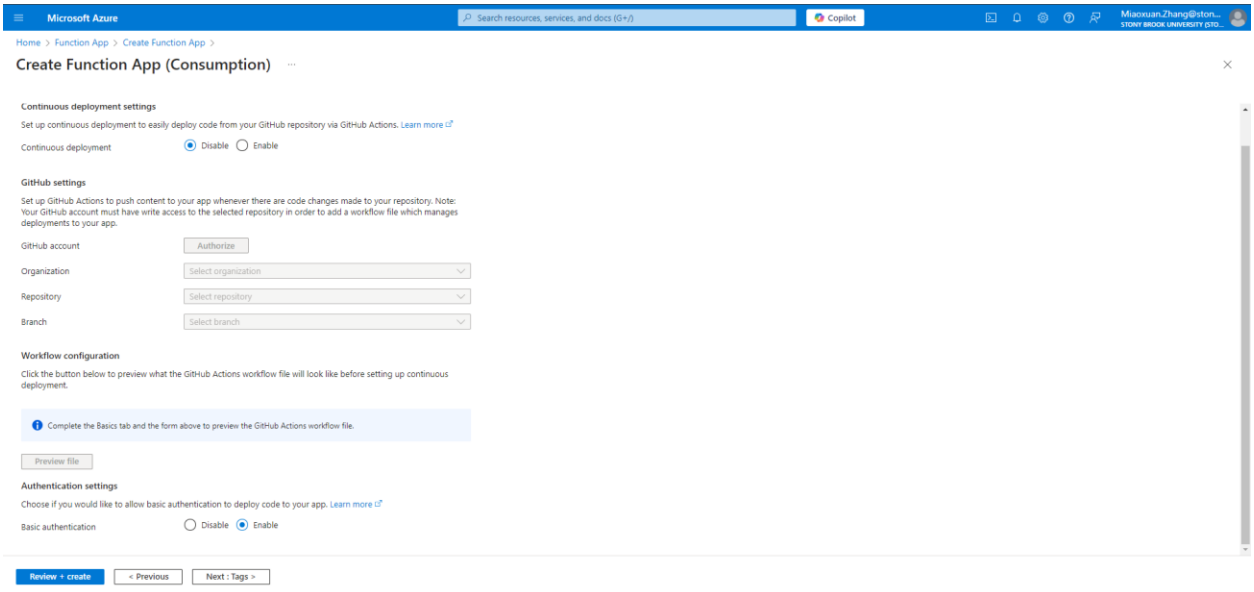
Networking



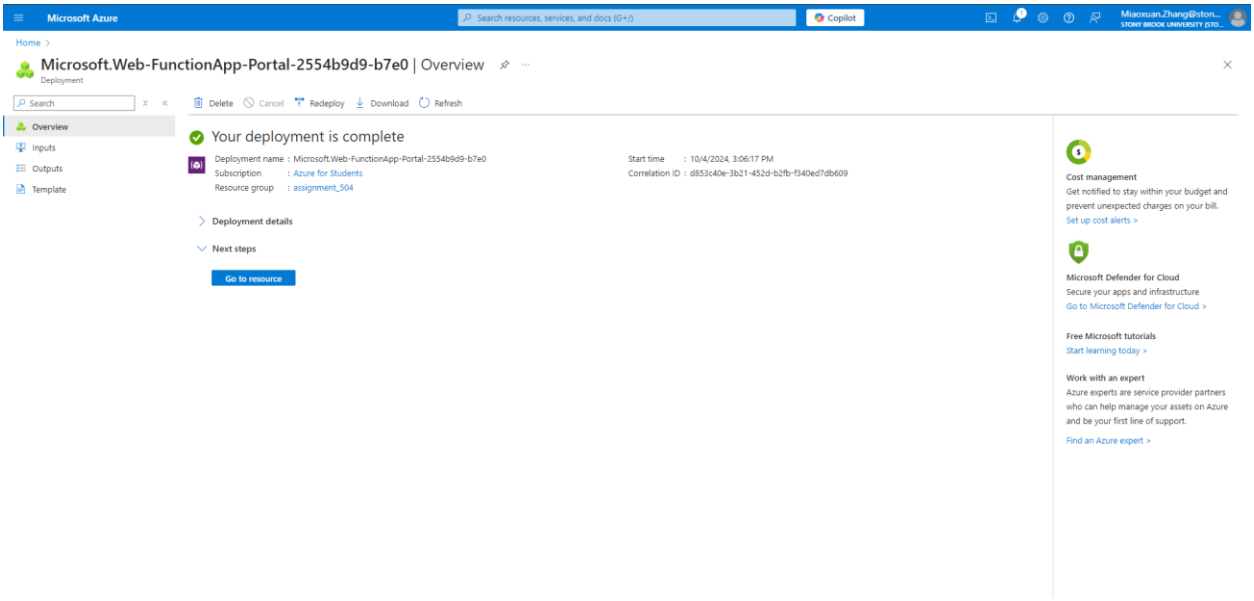
Monitoring



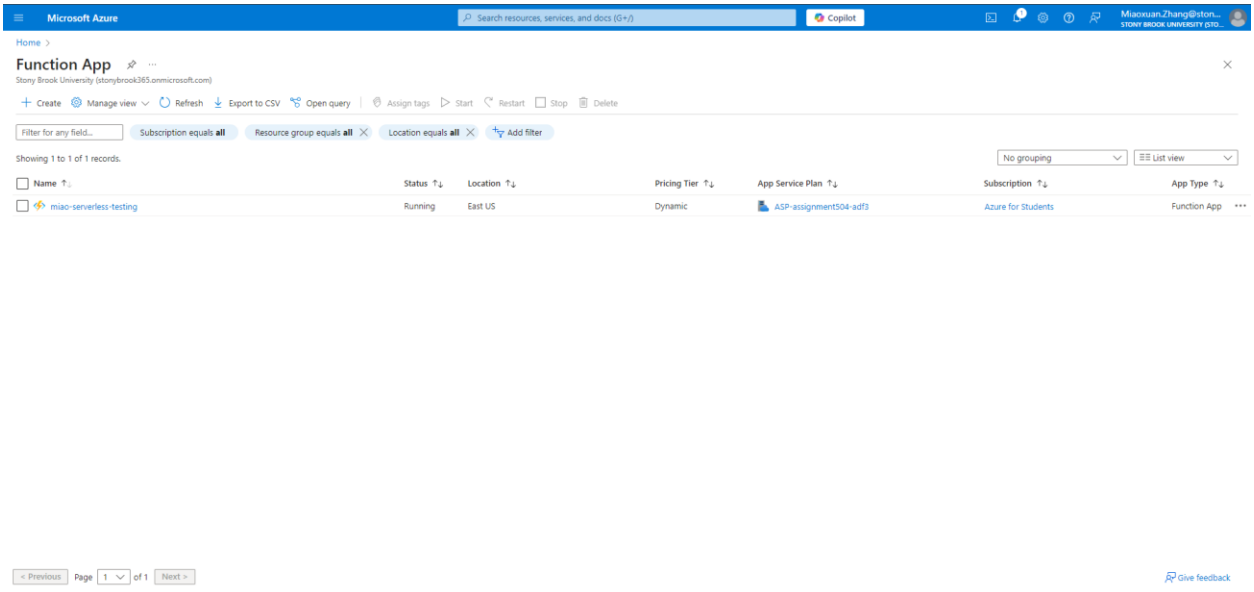
Deployment



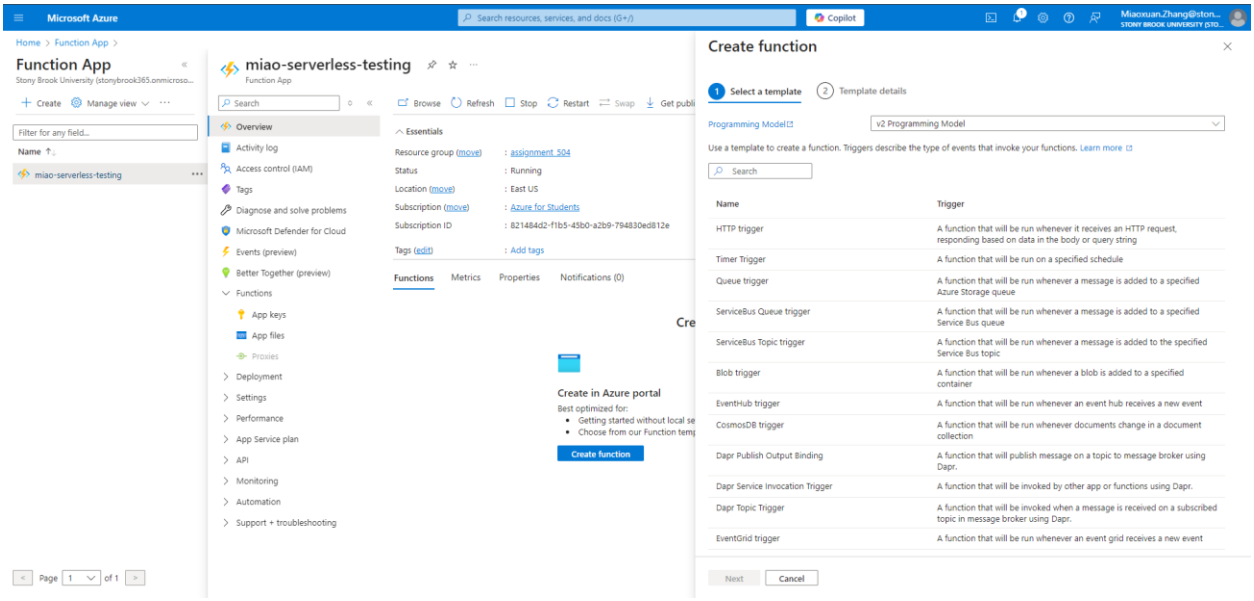
Create



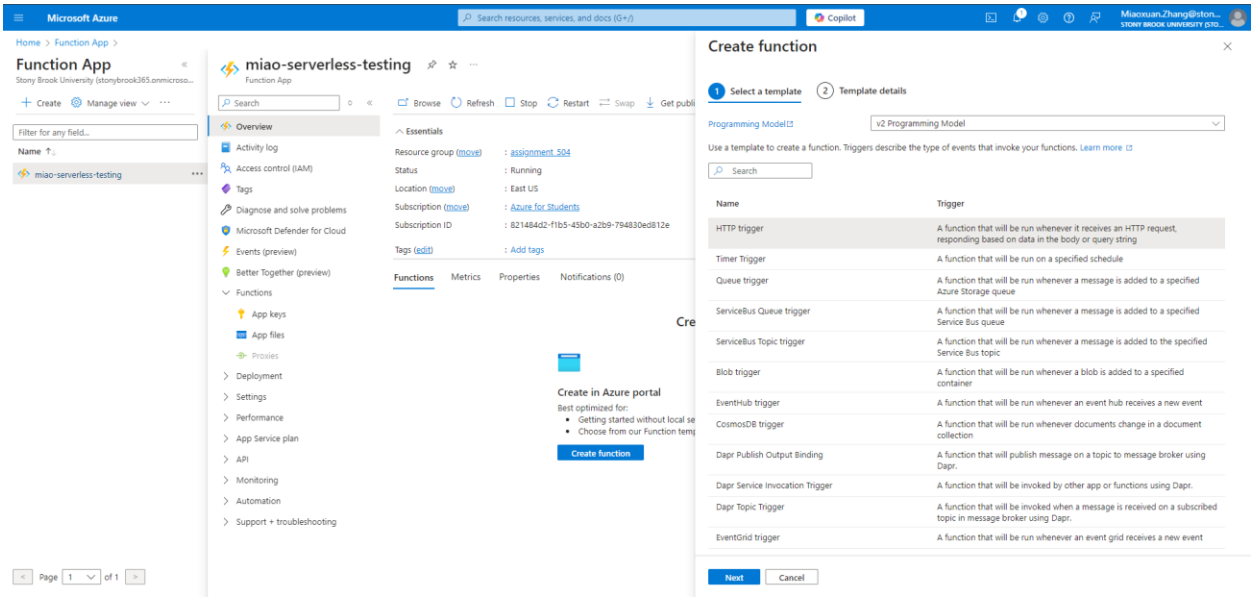
Function APP



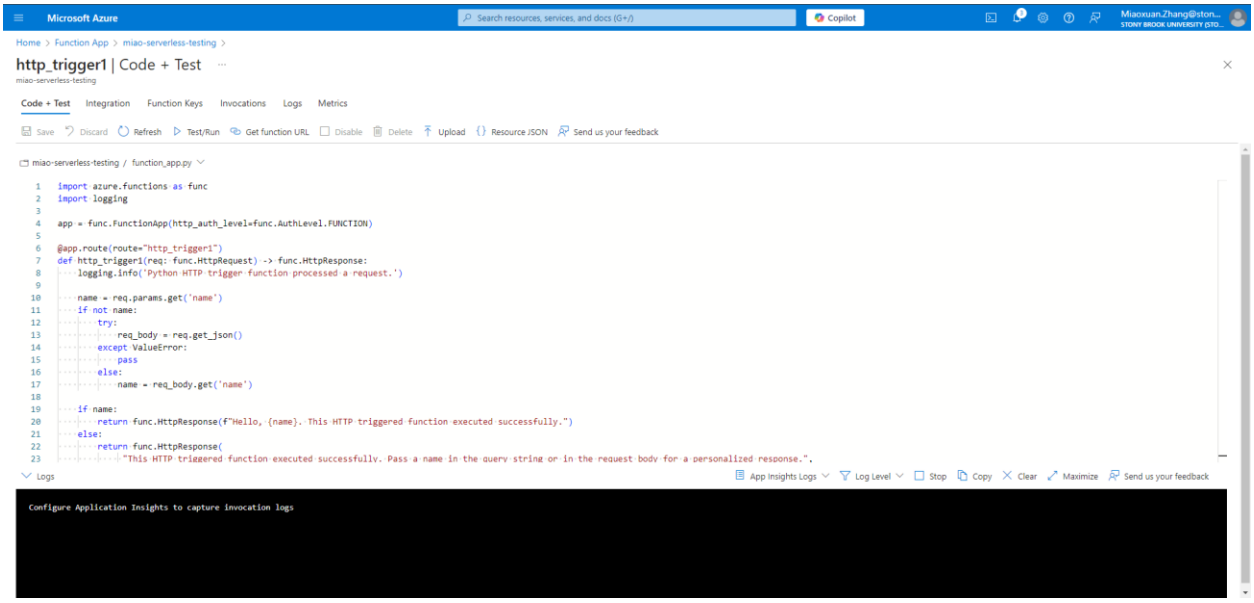
Create Function

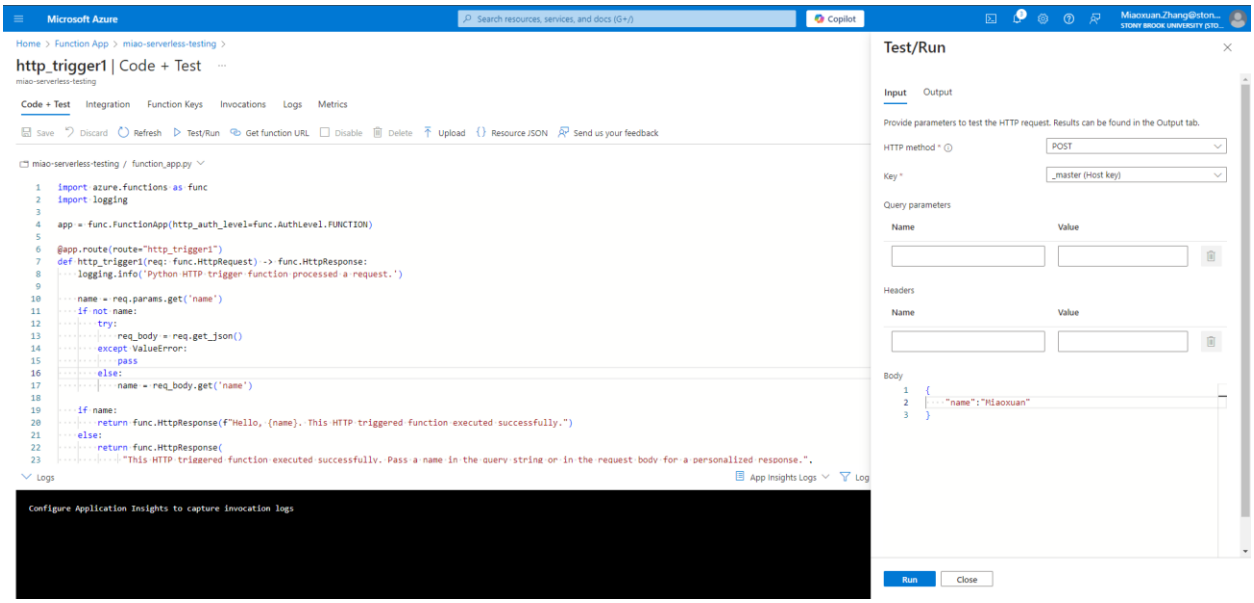


Select HTTP trigger

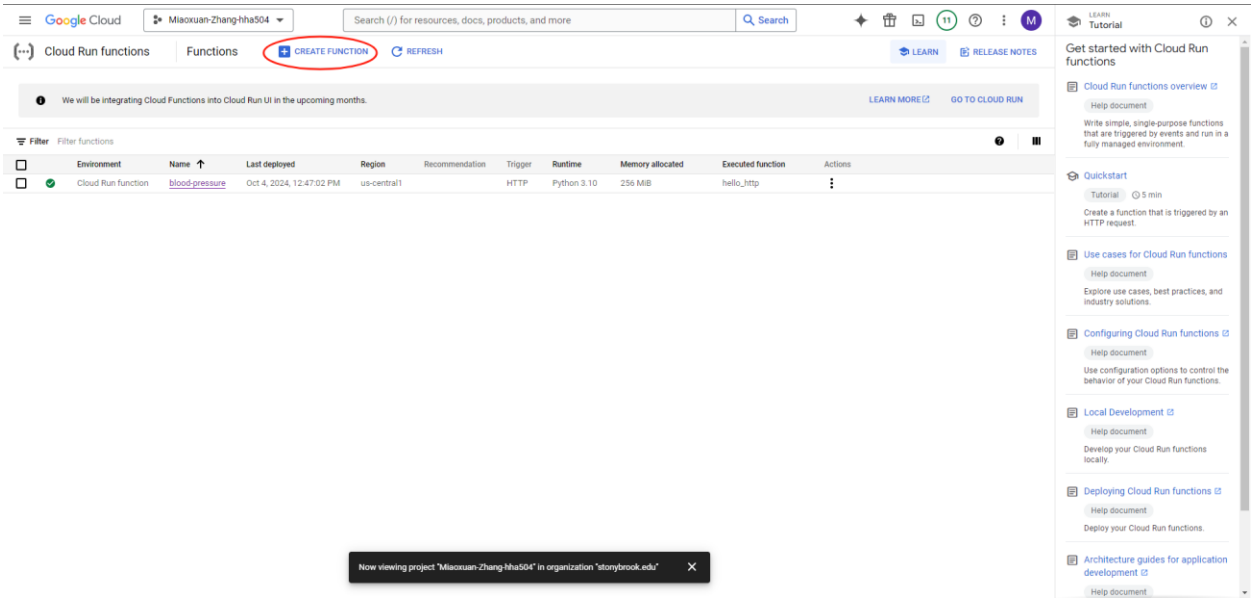


Create





Create a Function in GCP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Cloud Run functions
Functions
CREATE FUNCTION
REFRESH
LEARN
RELEASE NOTES
We will be integrating Cloud Functions into Cloud Run UI in the upcoming months.
LEARN MORE
GO TO CLOUD RUN
Filter
Filter functions
Environment
Name
Last deployed
Region
Recommendation
Trigger
Runtime
Memory allocated
Executed function
Actions
Cloud Run function
blood-pressure
Oct 4, 2024, 12:47:02 PM
us-central1
HTTP
Python 3.10
256 MiB
hello_http
Now viewing project "Miaoxuan-Zhang-hha504" in organization "stonybrook.edu"
Tutorial
Get started with Cloud Run functions
Cloud Run functions overview
Help document
Write simple, single-purpose functions that are triggered by events and run in a fully managed environment.
Quickstart
Tutorial
5 min
Create a function that is triggered by an HTTP request.
Use cases for Cloud Run functions
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Explore use cases, best practices, and industry solutions.
Configuring Cloud Run functions
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Use configuration options to control the behavior of your Cloud Run functions.
Local Development
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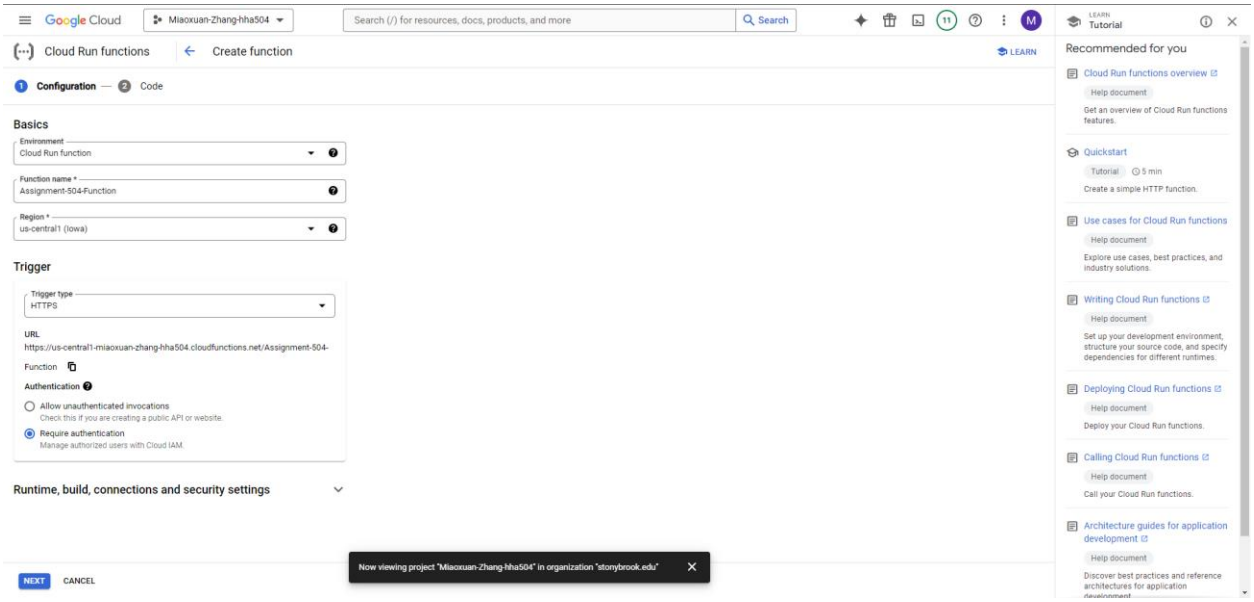
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Create function
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Configuration
Code
Basics
Environment
Cloud Run function
Function name *
Assignment-504-Function
Region *
us-central1 (Iowa)
Trigger
Trigger type
HTTPS
URL
https://us-central1-miaoxuan-zhang-hha504.cloudfunctions.net/Assignment-504-
Function
Authentication
Allow unauthenticated invocations
Check this if you are creating a public API or website.
Require authentication
Manage authorized users with Cloud IAM.
Runtime, build, connections and security settings
NEXT
CANCEL
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Help document
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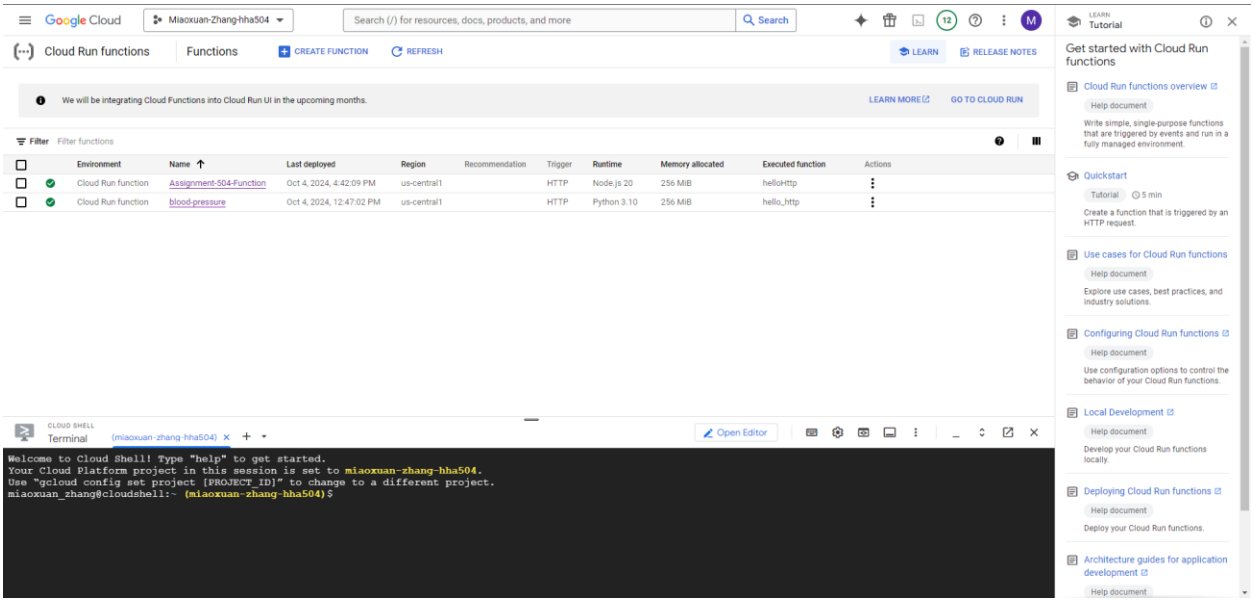
Architecture guides for application development
Help document
Discover best practices and reference architectures for application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Cloud Run function
Assignment-504-Function
Oct 4, 2024, 4:42:09 PM
us-central1
HTTP
Node.js 20
256 MiB
helloHttp
Cloud Run function
blood-pressure
Oct 4, 2024, 12:47:02 PM
us-central1
HTTP
Python 3.10
256 MiB
hello_http
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
Open Editor
Welcome to Cloud Shell! Type "help" to get started.
Your Cloud Platform project in this session is set to miaoxuan-zhang-hha504.
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miaoxuan_zhang@cloudshell:~ (miaoxuan-zhang-hha504)$
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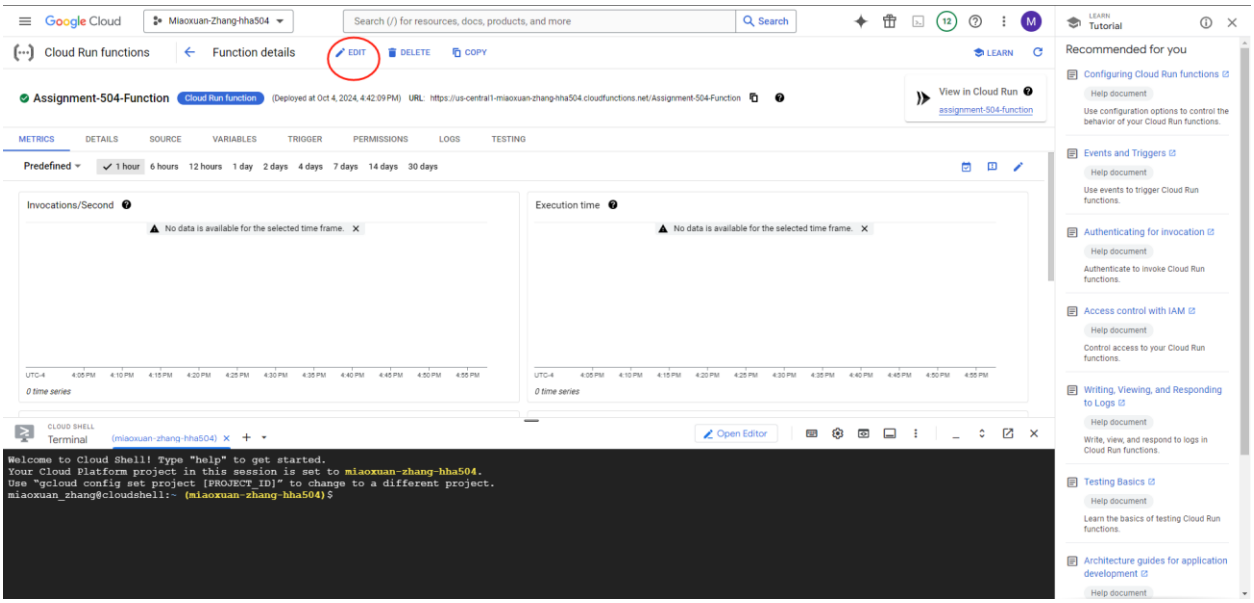
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Function details
EDIT
DELETE
COPY
LEARN
Assignment-504-Function
Cloud Run function
(Deployed at Oct 4, 2024, 4:42:09 PM)
URL: https://us-central1-miaoxuan-zhang-hha504.cloudfunctions.net/Assignment-504-Function
View in Cloud Run
assignment-504-function
METRICS
DETAILS
SOURCE
VARIABLES
TRIGGER
PERMISSIONS
LOGS
TESTING
Predefined
1 hour
6 hours
12 hours
1 day
2 days
4 days
7 days
14 days
30 days
Invocations/Second
No data is available for the selected time frame.
Execution time
No data is available for the selected time frame.
0 time series
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Terminal
(miaoxuan-zhang-hha504)
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Events and Triggers
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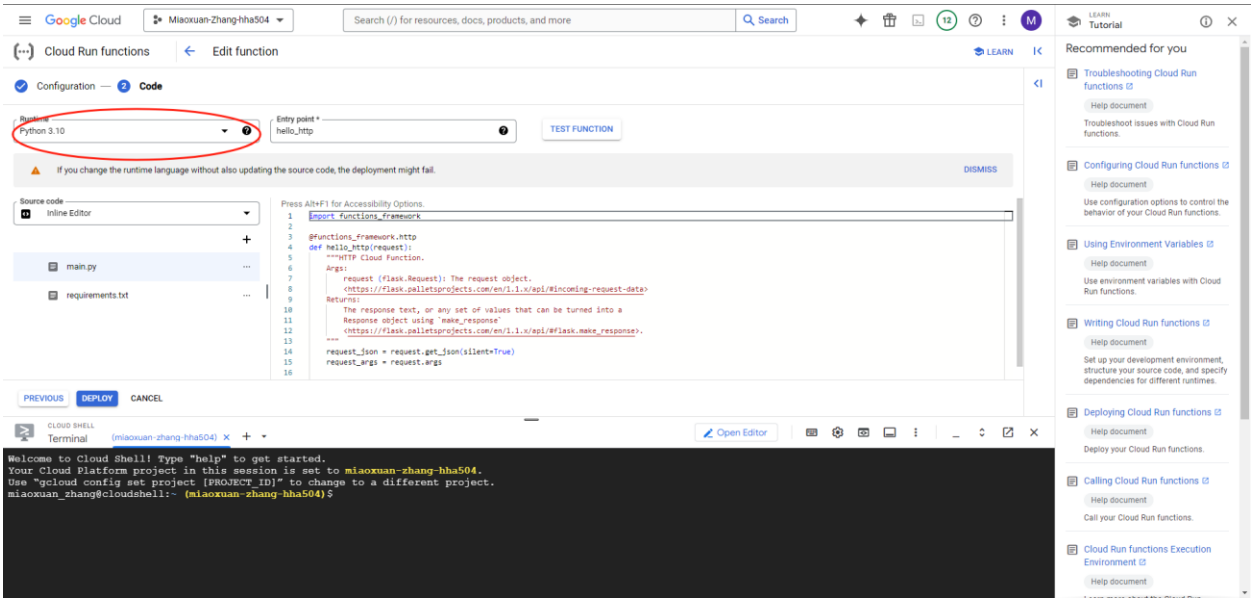
Use events to trigger Cloud Run functions.
Authenticating for invocation
Help document
Authenticate to invoke Cloud Run functions.
Access control with IAM
Help document
Control access to your Cloud Run functions.
Writing, Viewing, and Responding to Logs
Help document
Write, view, and respond to logs in Cloud Run functions.
Testing Basics
Help document
Learn the basics of testing Cloud Run functions.
Architecture guides for application development
Help document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Cloud Run functions
Edit function
LEARN
Configuration
2 Code
Runtime
Python 3.10
Entry point *
hello_http
TEST FUNCTION
If you change the runtime language without also updating the source code, the deployment might fail.
DISMISS
Source code
Inline Editor
Press Alt+F1 for Accessibility Options.
main.py
requirements.txt
import functions_framework
@functions_framework.http
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Args:
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<https://flask.palletsprojects.com/en/1.1.x/api/#incoming-request-data>
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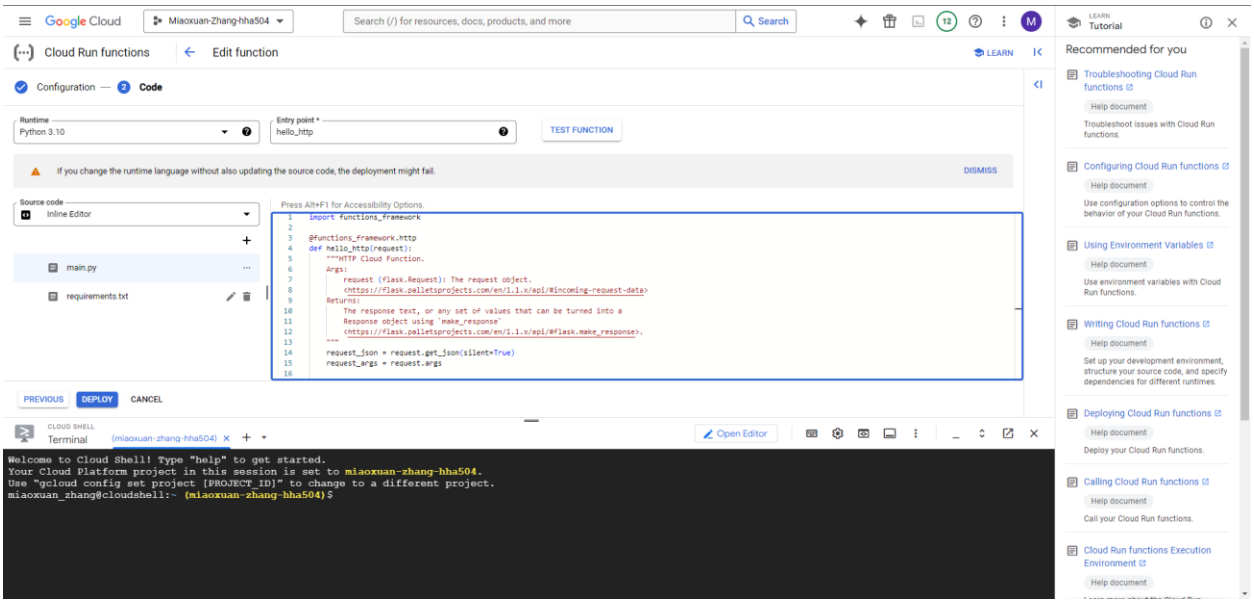
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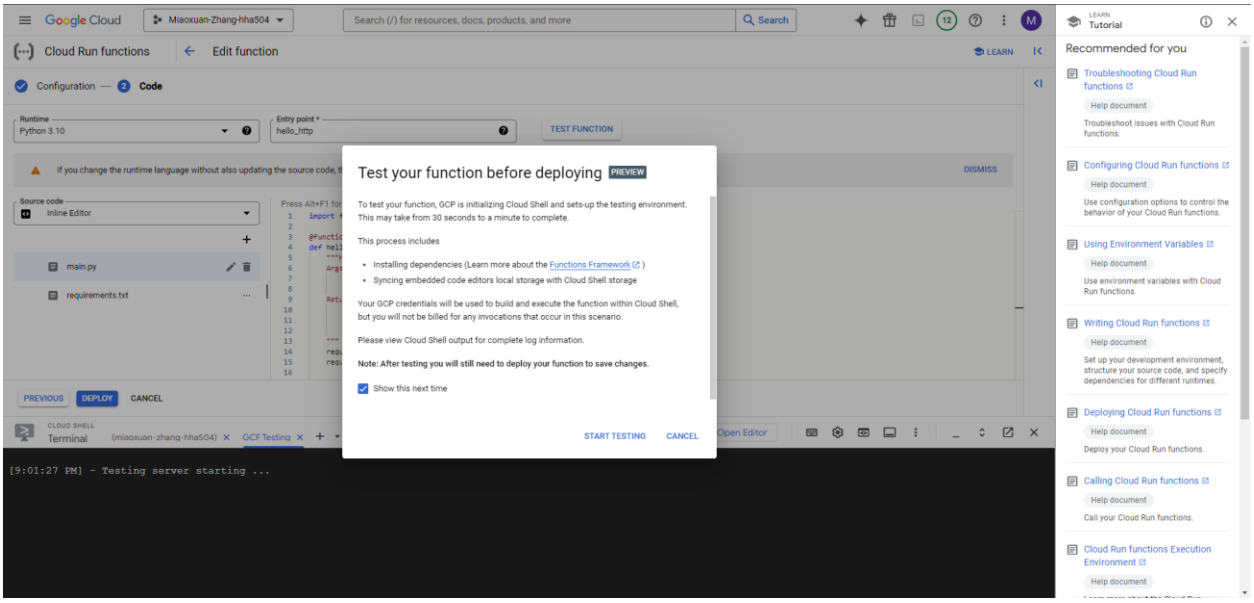
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Configuration
Code
Runtime
Python 3.10
Entry point *
hello_http
TEST FUNCTION
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DISMISS
Source code
Inline Editor
main.py
requirements.txt
Press Alt+F1 for
PREVIOUS
DEPLOY
CANCEL
Test your function before deploying
PREVIEW
To test your function, GCP is initializing Cloud Shell and sets-up the testing environment. This may take from 30 seconds to a minute to complete.
This process includes
Installing dependencies (Learn more about the Functions Framework)
Syncing embedded code editors local storage with Cloud Shell storage
Your GCP credentials will be used to build and execute the function within Cloud Shell, but you will not be billed for any invocations that occur in this scenario.
Please view Cloud Shell output for complete log information.
Note: After testing you will still need to deploy your function to save changes.
Show this next time
START TESTING
CANCEL
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
Open Editor
[9:01:27 PM] - Testing server starting ...
LEARN
Tutorial
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Troubleshooting Cloud Run functions
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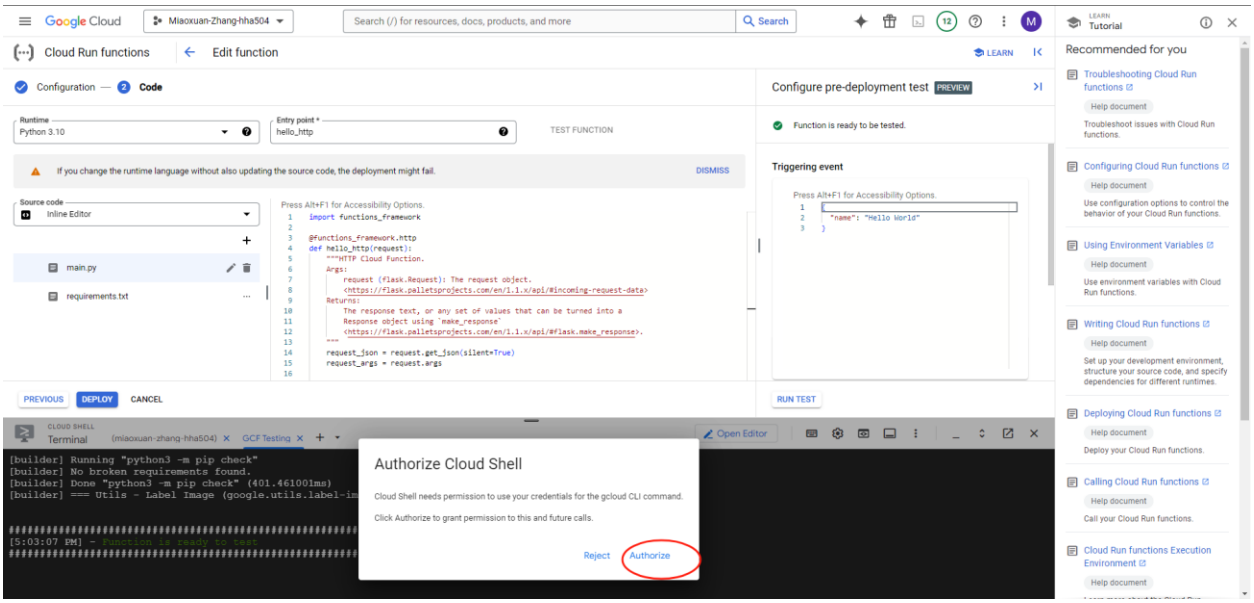
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Edit function
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Configuration
Code
Runtime
Python 3.10
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"""
request_json = request.get_json(silent=True)
request_args = request.args
PREVIOUS
DEPLOY
CANCEL
Configure pre-deployment test
PREVIEW
Function is ready to be tested.
Triggering event
Press Alt+F1 for Accessibility Options.
{
"name": "Hello World"
}
RUN TEST
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
Open Editor
[builder] Running "python3 -m pip check"
[builder] No broken requirements found.
[builder] Done "python3 -m pip check" (401.461001ms)
[builder] === Utils - Label Image (google.utils.label-im
[5:03:07 PM] - Function is ready to test.
Authorize Cloud Shell
Cloud Shell needs permission to use your credentials for the gcloud CLI command.
Click Authorize to grant permission to this and future calls.
Reject
Authorize
LEARN
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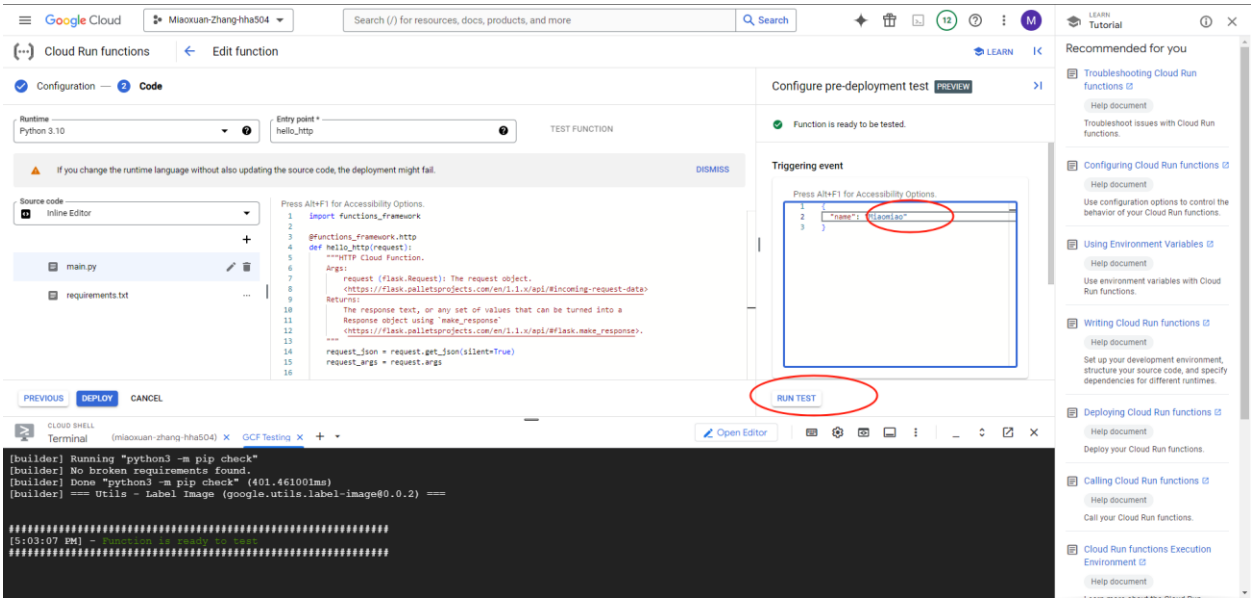
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Function is ready to be tested.
Triggering event
Press Alt+F1 for Accessibility Options.
{
"name": "Miaomiao"
}
RUN TEST
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
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[builder] === Utils - Label Image (google.utils.label-image@0.0.2) ===
[5:03:07 PM] - Function is ready to test
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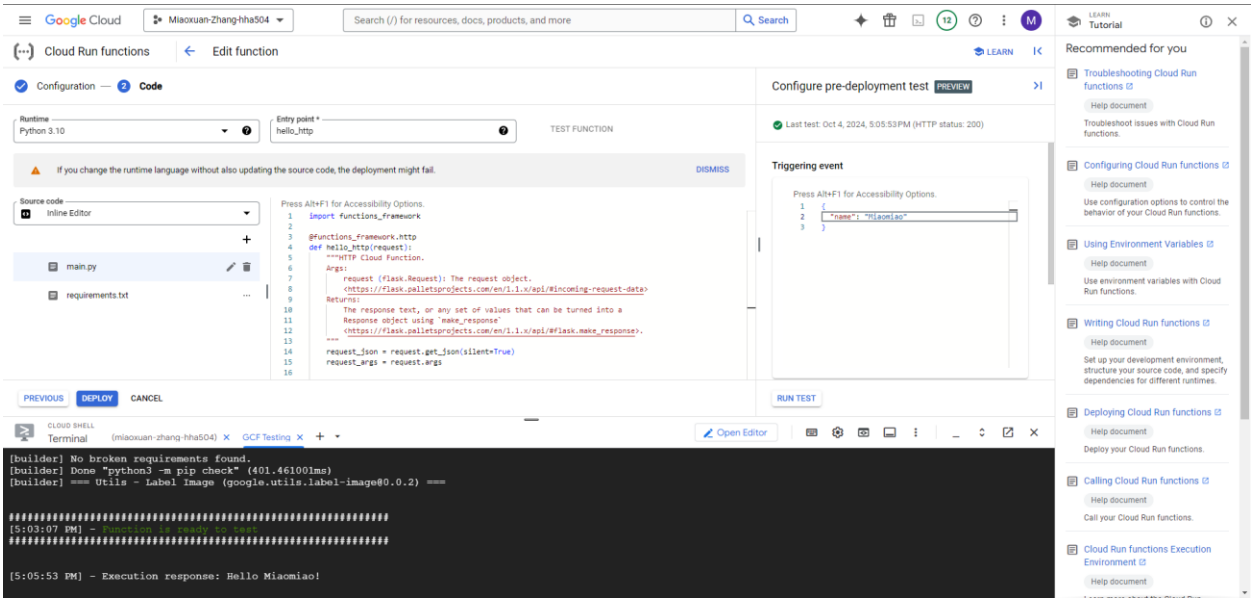
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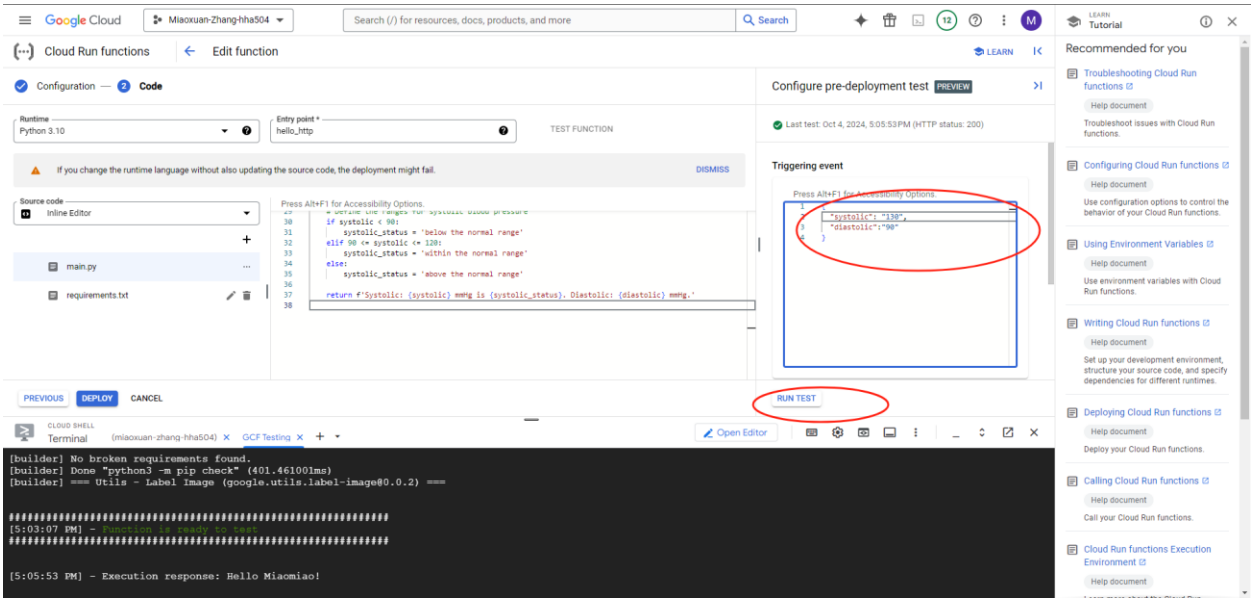
CANCEL
Configure pre-deployment test
PREVIEW
Last test: Oct 4, 2024, 5:05:53 PM (HTTP status: 200)
Triggering event
Press Alt+F1 for Accessibility Options.
{
"name": "Miaomiao"
}
RUN TEST
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
Open Editor
[builder] No broken requirements found.
[builder] Done "python3 -m pip check" (401.461001ms)
[builder] === Utils - Label Image (google.utils.label-image@0.0.2) ===
[5:03:07 PM] - Function is ready to test
[5:05:53 PM] - Execution response: Hello Miaomiao!
Tutorial
Recommended for you
Troubleshooting Cloud Run functions
Help document
Troubleshoot issues with Cloud Run functions.
Configuring Cloud Run functions
Help document
Use configuration options to control the behavior of your Cloud Run functions.
Using Environment Variables
Help document
Use environment variables with Cloud Run functions.
Writing Cloud Run functions
Help document
Set up your development environment, structure your source code, and specify dependencies for different runtimes.
Deploying Cloud Run functions
Help document
Deploy your Cloud Run functions.
Calling Cloud Run functions
Help document
Call your Cloud Run functions.
Cloud Run functions Execution Environment
Help document


Google Cloud
Miaoxuan-Zhang-hha504
Search (/) for resources, docs, products, and more
Search
Cloud Run functions
Edit function
LEARN
Configuration
Code
Runtime
Python 3.10
Entry point *
hello_http
TEST FUNCTION
If you change the runtime language without also updating the source code, the deployment might fail.
DISMISS
Source code
Inline Editor
main.py
requirements.txt
Press Alt+F1 for Accessibility Options.
if systolic < 90:
systolic_status = 'below the normal range'
elif 90 <= systolic <= 120:
systolic_status = 'within the normal range'
else:
systolic_status = 'above the normal range'
return f'Systolic: {systolic} mmHg is {systolic_status}. Diastolic: {diastolic} mmHg.'
PREVIOUS
DEPLOY
CANCEL
Configure pre-deployment test
PREVIEW
Last test: Oct 4, 2024, 5:05:53 PM (HTTP status: 200)
Triggering event
Press Alt+F1 for Accessibility Options.
{
"systolic": "130",
"diastolic":"90"
}
RUN TEST
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
Open Editor
[builder] No broken requirements found.
[builder] Done "python3 -m pip check" (401.461001ms)
[builder] === Utils - Label Image (google.utils.label-image@0.0.2) ===
[5:03:07 PM] - Function is ready to test
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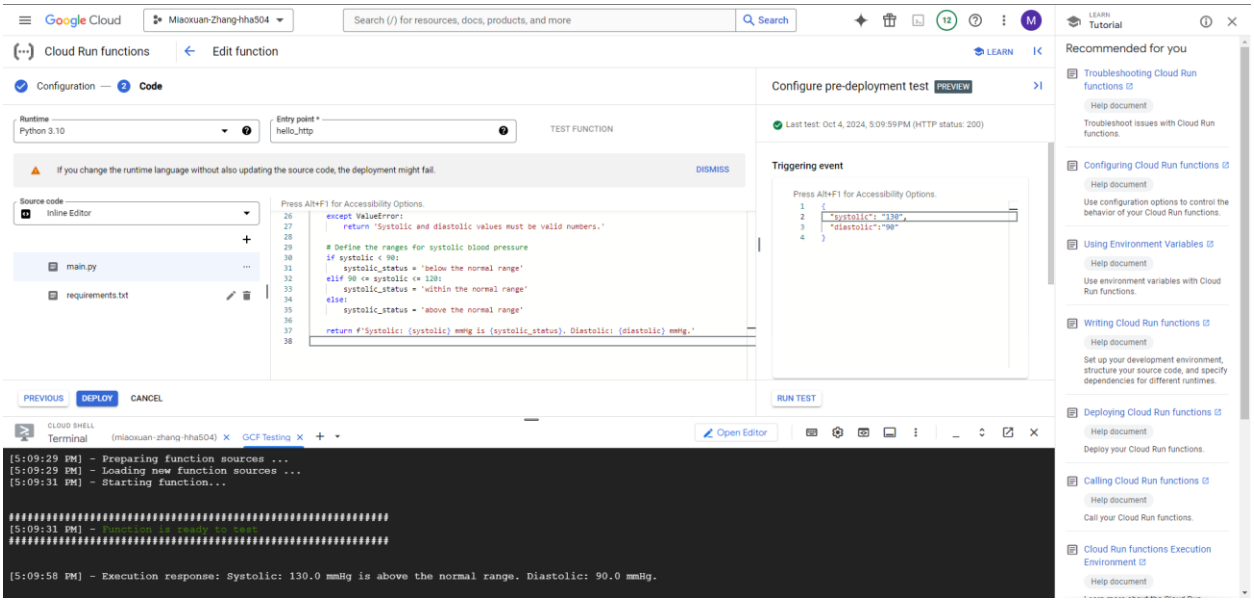
Google Cloud
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Search
Cloud Run functions
Edit function
LEARN
Configuration
Code
Runtime
Python 3.10
Entry point *
hello_http
TEST FUNCTION
If you change the runtime language without also updating the source code, the deployment might fail.
DISMISS
Source code
Inline Editor
main.py
requirements.txt
Press Alt+F1 for Accessibility Options.
except ValueError:
return 'Systolic and diastolic values must be valid numbers.'
# Define the ranges for systolic blood pressure
if systolic < 90:
systolic_status = 'below the normal range'
elif 90 <= systolic <= 120:
systolic_status = 'within the normal range'
else:
systolic_status = 'above the normal range'
return f'Systolic: {systolic} mmHg is {systolic_status}. Diastolic: {diastolic} mmHg.'
PREVIOUS
DEPLOY
CANCEL
Configure pre-deployment test
PREVIEW
Last test: Oct 4, 2024, 5:09:59 PM (HTTP status: 200)
Triggering event
Press Alt+F1 for Accessibility Options.
{
"systolic": "130",
"diastolic":"90"
}
RUN TEST
CLOUD SHELL
Terminal
(miaoxuan-zhang-hha504)
GCF Testing
Open Editor
[5:09:29 PM] - Preparing function sources ...
[5:09:29 PM] - Loading new function sources ...
[5:09:31 PM] - Starting function...
[5:09:31 PM] - Function is ready to test
[5:09:58 PM] - Execution response: Systolic: 130.0 mmHg is above the normal range. Diastolic: 90.0 mmHg.
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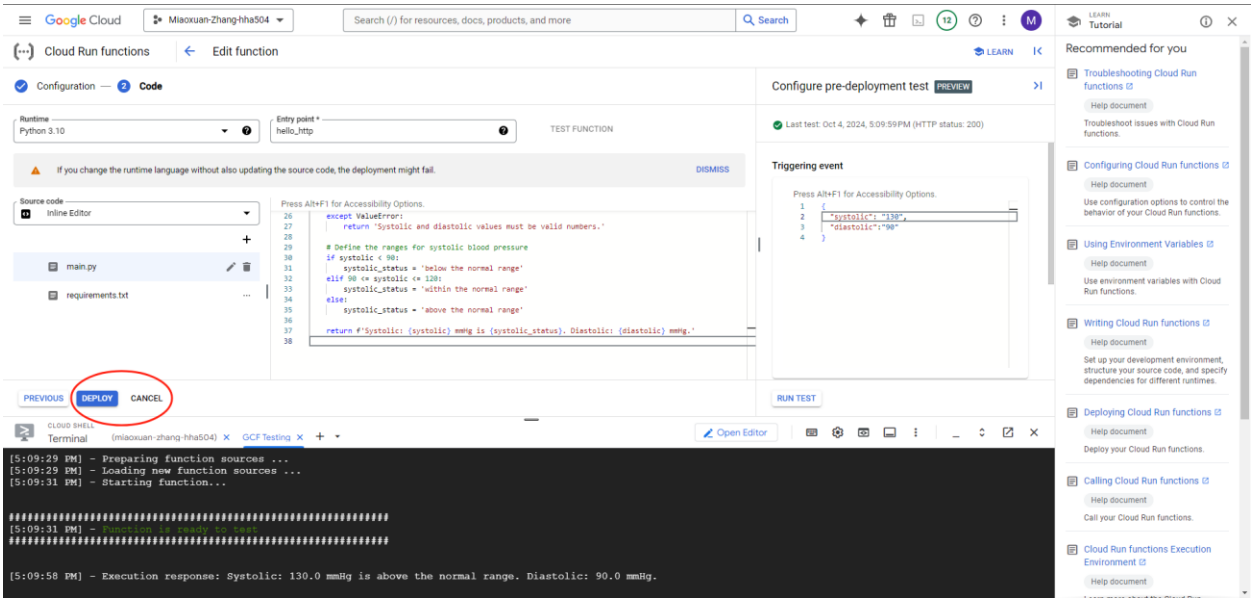

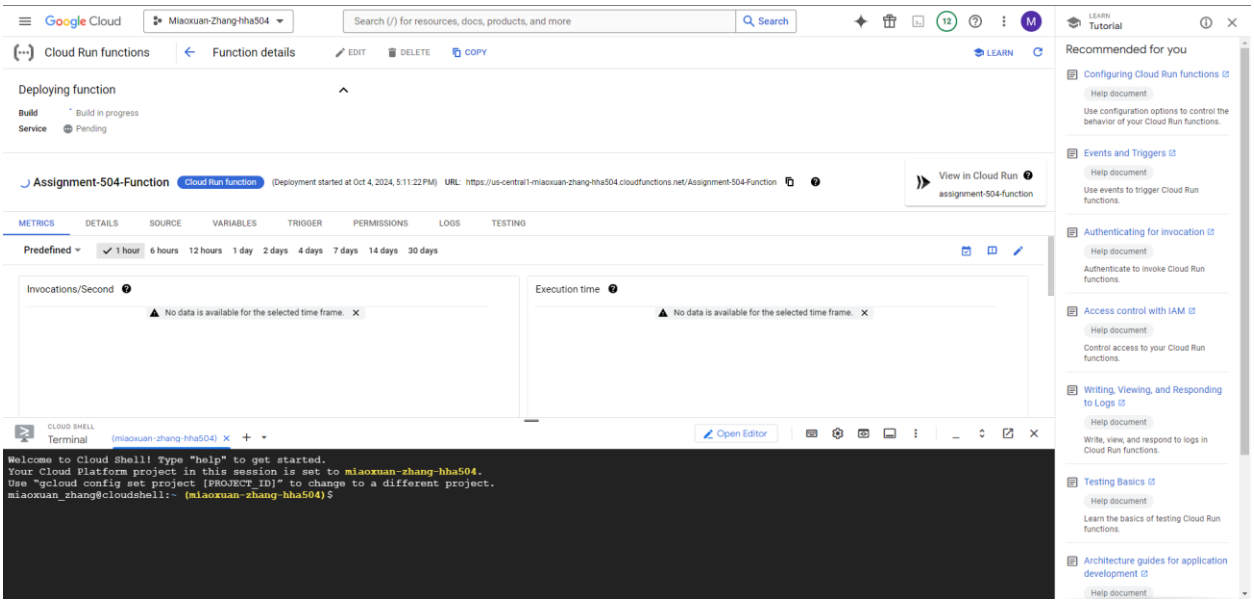

3. Explore Functions as a Service (FaaS)

- Reflect on the use cases for serverless functions in cloud environments. Consider the benefits and limitations of using Functions as a Service (FaaS) in both Azure and GCP.

Functions as a Service (FaaS) is a serverless computing model where developers can deploy and run individual functions without having to manage the underlying infrastructure. FaaS allows developers to focus solely on writing the business logic of a function, while the cloud provider handles server provisioning, scaling, and maintenance.

Advantage:

1. **No Server Management**: No need to manage or configure servers; the cloud provider handles everything.
2. **Cost-Efficient**: Only pay for the actual function execution time, which is great for unpredictable workloads.
3. **Fast Deployment**: Functions can be quickly deployed with minimal configuration, making development cycles faster.
4. **Auto-Scaling**: Functions can scale up automatically to meet demand without any intervention from developers.