Google Cloud

Harnessing the Power of Cloud Functions

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MasterClass
Session 2024

Harnessing the Power of Cloud Functions

- Architect at Google
- 14+ years of Industry Experience working with Various Product Organisation
- Expertise in Application Development & Modernisation
- Tech Speaker
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- Mentor

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What is Cloud Function?

- Cloud Run functions offer a serverless environment for developing and integrating cloud services.
- Developers can create single-purpose functions that respond to events from their cloud infrastructure and services.
- The functions execute in a fully managed environment within Cloud Run, eliminating the need for infrastructure provisioning or server management.
- Cloud Run functions support multiple programming languages and can run in any standard runtime environment for those languages, enabling portability and local testing.
    - Node.js
    - Python
    - Go
    - Java
    - Ruby
    - .NetCore
    - PHP

Architecture Overview

- Core Components:
  - Trigger Sources: HTTP requests, database changes, file uploads, and messaging queues.
  - Execution Environment: Stateless, ephemeral containers that handle requests in isolation.
  - Resource Management: Automated resource allocation based on traffic patterns.
- Google Cloud Integration:
  - Works seamlessly with GCP Cloud Database(Cloud SQL , Spanner, BigQuery, BigTable , Memory Store & FireStore)
  - Event Arc,PubSub, Cloud IAM , Logging , Monitoring etc
  - Cloud Storage also Known as GCS.
  - Serves for Deep Learning Model using Tensor flow

Features

- Unique HTTPS endpoint for every service.
- Fast request-based auto scaling
- Built-in traffic management
- Private and public services
- Scale to zero and minimum instances
- Pay-per-use pricing for services
- A disposable container filesystem

When to use Cloud Functions

- Lightweight API's
- ETL & Data Processing
- WebHooks & Events
- Mobile Backend
- IOT

Use Cases for Serverless Functions

- Real-time Data Processing:
  - Example: Uber processes millions of ride requests daily using serverless platforms.
- Automation and Orchestration:
  - Example: Airbnb automates booking confirmations and payment processing.
- Webhooks for APIs:
  - Stripe handles billions of transactions using serverless APIs.
- AI and ML Pipelines:
  - Google Photos processes billions of images monthly with serverless AI models.
- IoT Data Streams:
  - Sensor data processing for real-time monitoring in industries such as manufacturing and agriculture.

Workflow Example

Scenario: Image Upload Processing

- **Trigger**: Image uploaded to Cloud Storage.
- **Execution**: Cloud Function resizes the image using Python Pillow library.
- **Notification**: Sends an email confirmation via SMTP.
- **Metrics**: Processes 10,000 images in under 2 minutes with scalability.
- **Enhanced Pipeline**: Logs processed data into BigQuery for analysis and dashboards.

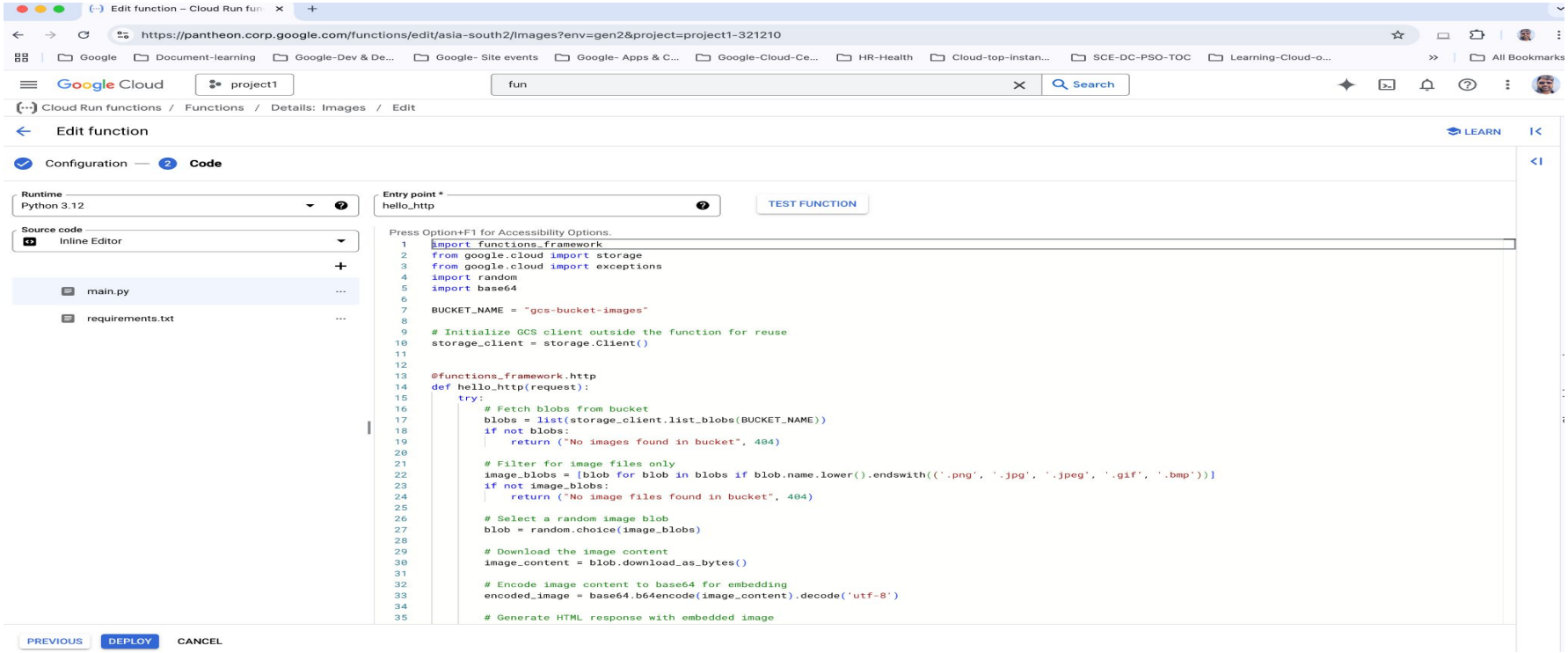
Security & Monitoring

- Security Framework:
  - IAM roles, VPC Service Controls, and secret management.
  - Compliance with GDPR, HIPAA, and SOC 2 standards.
  - Authentication with IDP , OIDC & SAML
- Monitoring Tools:
  - Google Cloud Logging and Monitoring dashboards.
  - 99.9% uptime SLA with real-time alerts for error detection.
  - Error Reporting: Automatically detects and logs exceptions for analysis.

Comparison with Different Compute Models

Feature	Cloud Functions	Virtual Machines	Containers
Setup Time	Seconds	Hours	Minutes
Scaling	Auto	Manual	Semi-auto
Cost Model	Pay-per-use	Fixed pricing	Flexible pricing
Maintenance	Minimal	High	Moderate
Deployment Speed	Instant	Slower	Moderate
Integration Support	High	Medium	High

Getting Started with Cloud Functions Development



Demo

Thanks Everyone !

https://tinyurl.com/devfest-patna-2024

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Questions?