AWS Lambda Functions Integrated with API Gateway to Run Command in EC2

Executive Summary

THE WORLD BANK owns thousands of donor-funded development projects worldwide, each project governed by countless demands, guidelines and procedures designed to protect the projects and ensure that aid gets to the poor. It's crucial to deliver accurate project information to all stakeholders worldwide in a timely manner. Due to the multi-location access requirements, utilization from end users continuously fluctuates. For this reason we recommended serverless architecture—as it's highly scalable and flexible—while users only pay per use.

THE WORLD BANK's Dilemma: Delayed Global Information Delivery or Idle Servers

THE WORLD BANK's website is located in the United States. Visitors from Europe, Asia and Africa were receiving a delayed response or a network error due to limited server end points. On the other hand, unlike a commercial website, THE WORLD BANK's traffic burden is not heavy—most of the time the server capacity is far below 20%. It would have been a waste of resources to deploy more servers in dedicated data centers in different regions around the world. This was the dilemma THE WORLD BANK was facing.

Why Use AWS Lambda

AWS Lambda is a serverless computing service that runs code in response to events and automatically manages the underlying computing resources. Developers can use AWS Lambda to extend other AWS services with custom logic. In this case, Lambda was integrated with the API Gateway, which played a similar role as RESTful API. Lambda can be distributed in AWS data centers all around the world, and visitors can reach the nearest server endpoint to get an immediate response. Also, users only pay for what they consume in serverless architecture. This feature makes Lambda one of the best, most cost effective options for websites which are not frequently accessed. Because of this, AWS Lambda was adopted to solve our client's dilemma.

Why Choose ASCENDING

ASCENDING team members are highly experienced in serverless architecture and AWS infrastructure automation. Prior to THE WORLD BANK, we have done similar projects for organizations and entities of differing scales. In addition to professionalism, previous clients have described our team members as "Responsive, friendly, and easy to communicate with."

For these reasons, THE WORLD BANK chose Ascending to perform the assignment.

About THE WORLD BANK

With 189 member countries, staff from more than 170 countries, and offices in over 130 locations, the World Bank Group is a unique global partnership: five institutions working for sustainable solutions that reduce poverty and build shared prosperity in developing countries.

The World Bank Group is one of the world's largest sources of funding and knowledge for developing countries. Its five institutions share a commitment to reducing poverty, increasing shared prosperity, and promoting sustainable development.

Event Driven Lambda Worked as a Bridge

Every time the API Gateway was visited; the integrated Lambda function would be invoked as a new thread. However, as a serverless service, Lambda's CPU, memory and storage capacity were designed for common business cases. Certain data process tasks or heavy CPU burdens such as machine learning require an alternative solution to leverage Lambda functions. In this case, it was AWS EC2 instance and AWS Machine Learning that performed calculation and analysis functions, while Lambda worked as a bridge between HTTP requests and Machine Learning algorithms.
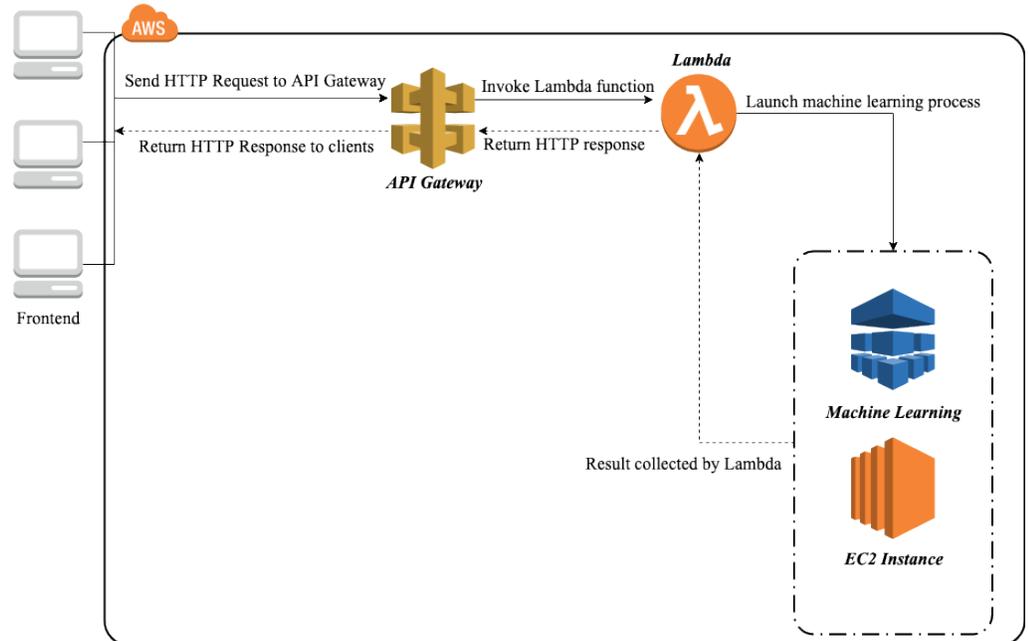
Challenges Driving AWS Lambda Adoption

We have encountered two major challenges in delivering serverless solutions to clients. One is Lambda's restriction on CPU, memory and storage capacity. Therefore, Machine Learning algorithms would not be able to directly run within the Lambda function. To overcome this challenge, we implemented AWS Machine Learning and AWS EC2 to do Machine Learning algorithm tasks. And Lambda worked as a bridge connecting the API Gateway and Machine Learning.

The second challenge we came across was meeting THE WORLD BANK's internal security principles. Some internal projects contain credential information which should not be accessed by outside visitors. As API Gateways are public by default, this system would be unsafe for some internal projects. To solve this potential security risk, we added employee authorization on API accessibility, and set IP restrictions and other security check methods in the Lambda function.

Lambda Deployment and Workload

Our solution contained several different Lambda functions, such as generating new projects, updating, deleting and looking up project information. In this case, Amazon Lambda played an essential role in receiving requests from the API gateway, sending corresponding commands to machine learning and collecting results and responses to API Gateway.

Result and Benefits
Immediate Worldwide Response with Less Cost

Our serverless architecture used 70% less time when remote clients visited THE WORLD BANK's main website and reduced network errors by 90%! In addition, ASCENDING also helped THE WORLD BANK to standardize application deployment processes and acquire more accurate information on its usage of cloud resources, traffic load and on its budget. THE WORLD BANK also benefitted from this well-designed architecture in enhanced security and cost-efficiency. According to their latest bill, The WORLD BANK has successfully lowered their cost on Lambda by 50%!

About ASCENDING LLC
ASCENDING is an AWS Select Consulting Partner. We provide AWS Cloud consulting services to enterprise customers and AWS certification training. Our main focus is on Java Spring application development, CI/CD of micro-service containers & serverless applications, DevOps maintenance and cost optimization etc.

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