

CSE 546: Cloud Computing (2023 Spring)

Project 3 MCS Portfolio Report - Hybrid Cloud

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Abstract— This document details the contribution of Anurag Banerjee to Project 3 of the course Cloud Computing offered in Spring 2023. The project was to be done in a group of 3. The main idea of the assignment was to create an elastic application that could scale out and in based on the demand cost-efficiently with minimal human intervention with the help of the PaaS cloud. This application was to be built using AWS (Amazon Web Services) Lambda and other tools and services offered by AWS. Parts of the project were deployed on AWS and other parts were deployed on a private cloud created with the help of OpenStack (Devstack).

Keywords— Paas, Amazon Web Services (AWS), OpenStack, Devstack, Simple Storage Service (S3), AWS Lambda, Python, Cloud Computing, Face Recognition, Hybrid Cloud

I. CONTRIBUTION

The project aimed to implement a smart classroom assistant for educators. The application's purpose was to collect videos from the educator's classroom, perform face recognition on the collected videos, look up the recognized students in the database, and return the relevant academic information to the educator. The application workflow consisted of uploading a video to an upload bucket in S3. This S3 bucket would be monitored by a script running in the OpenStack Cloud, which would then trigger the lambda function. The lambda function would then download the video from S3, separate it into its frames, recognize the faces, fetch the students' academic information from DynamoDB, and write it to the output bucket in S3. The output bucket would again be monitored by a script running in the OpenStack VM created which would then print the results from the S3 bucket into the OpenStack console.

The project was divided into four major parts: setting up the private cloud using OpenStack and creation of VM with required dependencies like

python, developing the Python script for the handler that would be running inside the lambda function in AWS, creating the scripts that were to be run inside the VM on OpenStack, and setting up services in AWS and seed data in AWS and project documentation. Within the group, I was responsible for setting up OpenStack with the help of the Devstack stack git repository. I was also responsible for the Python script for the handler, which was invoked as soon as a video was uploaded into the upload bucket in S3. The handler received an event argument containing the necessary details of the uploaded image.

To create an OpenStack cloud, I started a t2.xlarge ec2 instance in AWS. Then I set up the required dependencies for the Devstack script like python 3.9 and did the installation of OpenStack. After the installation, I modified the network rules and added keys via the horizon dashboard. Then I uploaded a CentOS 7 image which was to be the operating system for the VM running via OpenStack cloud. Then I launched the instance. After launching the instance, I did an SSH into the instance and added the nameservers. Then, I updated the packages and installed python3. Then, I added the Python scripts that were created by my other teammates to monitor the S3 buckets and invoke the lambda function.

For the handler that was running inside the lambda function, I used the same script that was created by me for Project 2 with minor modifications to the event parameter that was used for fetching the video name uploaded to S3.