



MONASH University

FIT5225 Assignment3 2024 S1 Individual Report

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1. My role and contribution:

As a key member of the project, I independently implemented the entire authentication and authorization system using AWS Cognito. I set up user pools, configured client applications, and ensured that only authenticated users could access protected resources and services. I implemented the user registration process, including sending verification emails, and added third-party login capabilities. During the image upload process, I made significant contributions by integrating an S3 bucket for image storage, setting up a Lambda function to create thumbnails upon upload to another S3 bucket, and another Lambda function to detect objects using YOLO and store the detected tags and image/thumbnail URLs in the database. I also participated in implementing the add/remove image tag functionality, designing and implementing relevant Lambda functions, API endpoints, REST methods, and JSON message formats to allow batch operations and database updates. Additionally, I contributed to the notification system, direct image deletion, front-end page design and implementation, and the written report.

2. Personal reflection on teamwork:

Our team division of labor: Our team took two weeks to develop. In the early preparation stage, we held several meetings to discuss and test possible problems, such as IAM configuration. When we encountered uncertain situations, we would consult teachers for guidance. After that, we started to write a preliminary version, during which I needed to configure Dockerfile. At the beginning, Qihang encountered a problem with the OpenCV image when trying to write, and I spent two days to solve this problem. Next, I modified some YOLO code and started testing the functions of uploading and identifying pictures, checking the logs using the cat watch log command. Meanwhile, other teammates configured Lambda and Cognito in their respective

environments and needed to configure SNS. When configuring Cognito, I needed to coordinate with Beichen and conduct multiple tests. Initially, the subscription program would send emails to everyone, but later we kept adjusting it, added usernames, and turned it into a private subscription. Similarly, Cognito also needed to add a private subscription function, which required modifications in my recognition trigger Lambda.

After completing the above work, I initially added S3 buckets and DynamoDB, storing the identified pictures in the bucket and the related information in DynamoDB. Next, I configured the functions written by my teammates on my computer and connected them to the API Gateway. At this time, we started working offline, and my teammates sent me their code for testing. When I encountered problems, I would check the logs and make modifications. In my AWS account, I configured a preliminary version, modifying the structure diagram and the previous front end. Then, each of us reconfigured the previous content using our own account. After the preliminary front-end interface was available and the production URL of the API Gateway was linked to the front-end, teammates began to modify the functions of each Lambda, such as deleting tags, adding tags, etc. Modifications were required due to the different ways of deleting images, calling thumbnails, and full-size images. During this period, I was dealing with the issue of Google authentication. Although OAuth could be called and the local host address of the callback had been passed, it still did not work. After consulting the AWS documentation, I found that Google Cloud Functions needed to be added to the authorization permissions, so that Google authentication was finally implemented.

3. Answer three questions:

3.1. Design changes to reduce application failures: In order to reduce the chance of application failures, I will implement robust error handling and logging mechanisms. This will involve capturing and logging errors at various stages of the application, making it easier to troubleshoot and debug. In addition, I will also consider implementing retry and backup strategies for critical operations such as uploading images or querying databases. This will improve the resilience of the application and ensure graceful degradation in the event of temporary failures or service interruptions.

3.2. Design changes to improve application performance: To improve the performance of the application, I will consider implementing a caching mechanism for frequently accessed data (such as image thumbnails or query results) to reduce the load on the database and improve response time. In addition, I will explore optimization strategies for image processing and resizing operations, possibly leveraging GPU-accelerated libraries or serverless functions with higher computing power. In addition, I will implement paging or lazy loading for the image library to improve initial loading time and enhance user experience.

3.3. Application updates for global users: To support users from all over the world, I will implement multi-region deployment for the application. This will involve deploying components of the application (e.g., S3 buckets, Lambda functions, API Gateways) across multiple AWS regions, ensuring low-latency access and improving performance for users in different

geographical locations. In addition, I will consider implementing a content delivery network (CDN) for static assets (such as images and front-end resources) to further improve the responsiveness of the application worldwide. Finally, I will explore internationalization and localization features to allow users to access the application in their preferred language and format.