1. Detail Document

Project Title: Smart Bus Pass System (Cloud-Based)
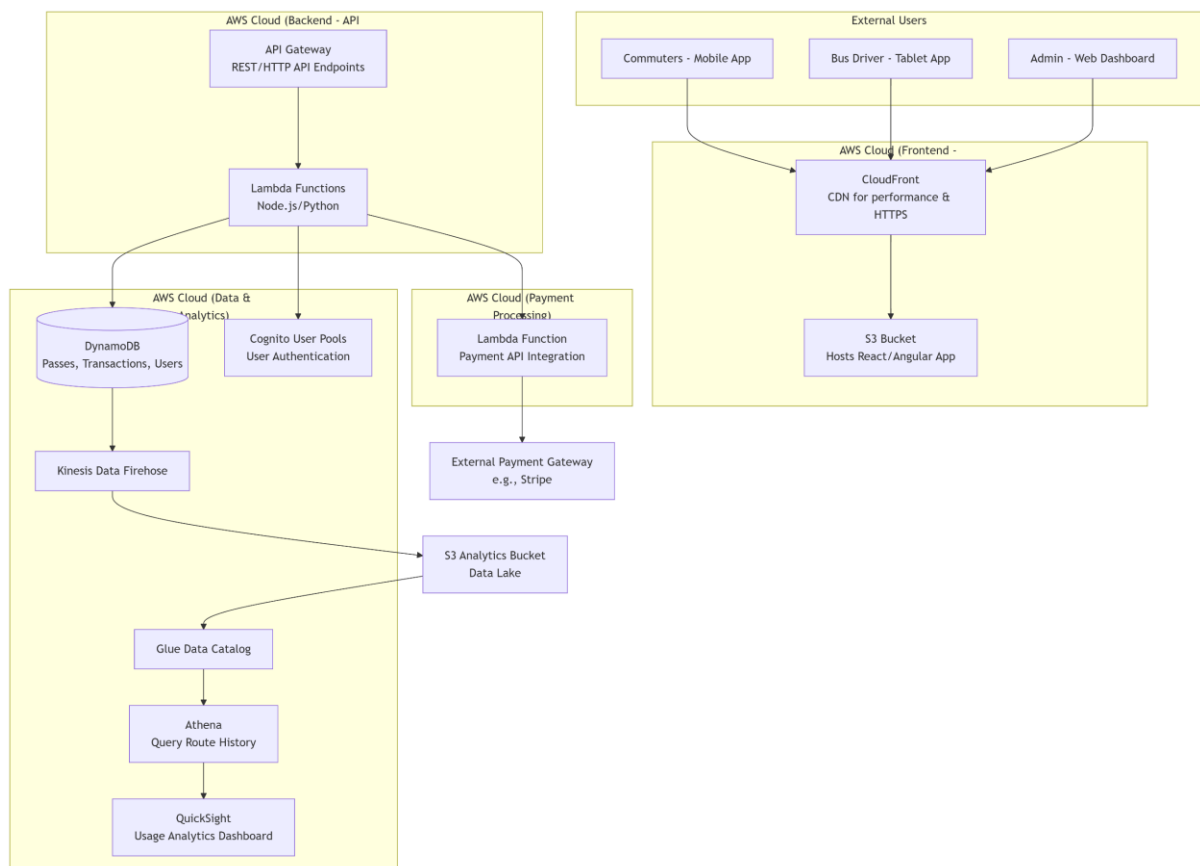
Abstract:
The Smart Bus Pass System is a cloud-based solution designed to digitize and streamline public transportation ticketing. It eliminates the need for physical passes by providing commuters with digital passes on their smartphones. The system allows users to purchase, top-up, and validate passes using QR codes. It also provides administrators with a dashboard to view route analytics, passenger counts, and revenue reports, enabling data-driven decisions to improve public transport efficiency.
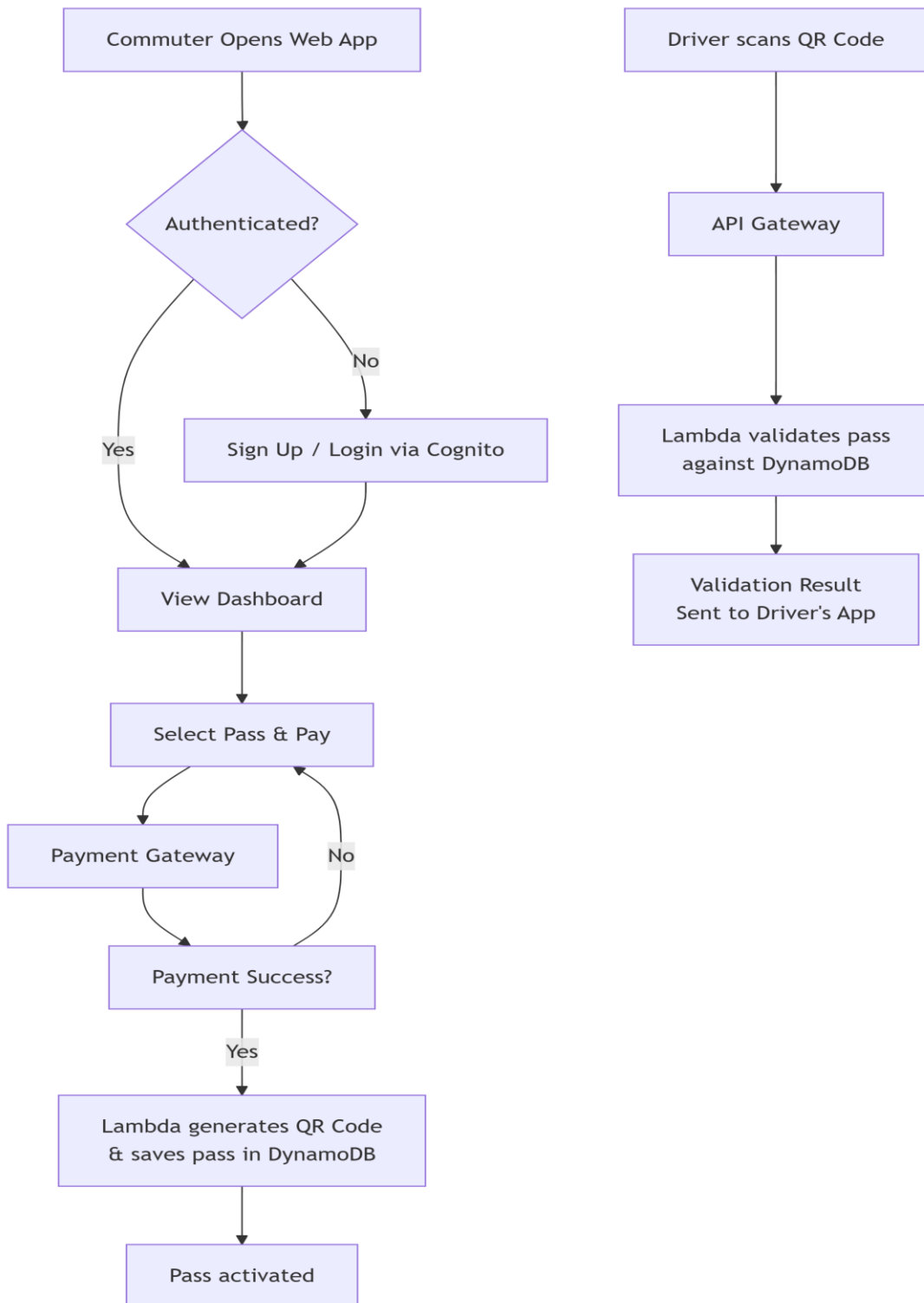
Introduction:
Traditional physical bus pass systems are prone to loss, damage, and fraud. They offer no real-time data for transit authorities to optimize routes and schedules. This project addresses these issues by leveraging cloud technology to create a secure, scalable, and intelligent bus pass system. The system enhances the commuter experience through convenience and provides valuable analytics to transit operators.
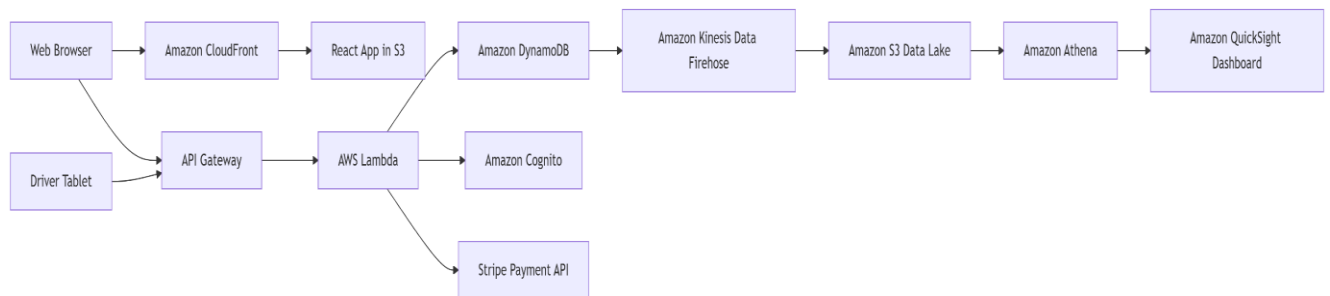
Purpose of Work:

- **For Commuters:** To provide a convenient, secure, and cashless method to purchase, renew, and validate bus passes using a mobile device.

- **For Transit Authorities:** To digitize the ticketing process, reduce operational costs, eliminate fraud, and gain insights into passenger travel patterns for better route planning and resource allocation.

Working Steps Diagram

```
Commuter Opens Web App                    Driver scans QR Code
          |                                       |
          v                                       v
     Authenticated?                          API Gateway
       /       \                                  |
     Yes       No                                 v
      |          |                        Lambda validates pass
      |    Sign Up / Login via Cognito     against DynamoDB
      |          |                                |
      v          v                                v
     View Dashboard                        Validation Result
          |                               Sent to Driver's App
          v
    Select Pass & Pay  <--- No
       /          \
 Payment Gateway   |
       \          /
     Payment Success?
          |
         Yes
          |
          v
 Lambda generates QR Code
 & saves pass in DynamoDB
          |
          v
     Pass activated
```

System Architecture

Hardware-Software Requirements:

- **Hardware:** Standard web server hosting (AWS S3, Lambda), no specific hardware required. Users need a smartphone or computer with a web browser. Bus conductors need a tablet with a camera and internet connection.

- **Software (Frontend):** React.js, HTML, CSS, JavaScript.

- **Backend & Cloud:** AWS API Gateway, AWS Lambda (Node.js/Python), Amazon DynamoDB, Amazon Cognito, Amazon S3, CloudFront.

- **Payment Integration:** Stripe or Razorpay API.

- **Development Tools:** Visual Studio Code, Git, AWS CLI, AWS SDK.

Conclusion:

The Smart Bus Pass System successfully demonstrates how cloud computing can transform public infrastructure. It provides a user-friendly, scalable, and cost-effective solution for managing public transportation fares. The system not only benefits commuters through convenience but also provides valuable data-driven insights to transportation authorities for future planning and optimization. This project serves as a foundational model that can be extended with features like NFC support, concession management, and real-time bus tracking.

Link of Code:

http://bus-pass-finallll.s3-website.ap-south-1.amazonaws.com