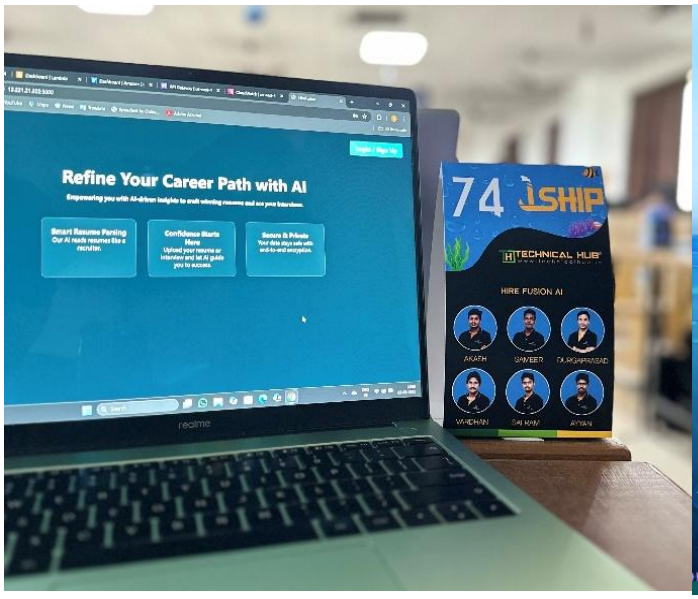
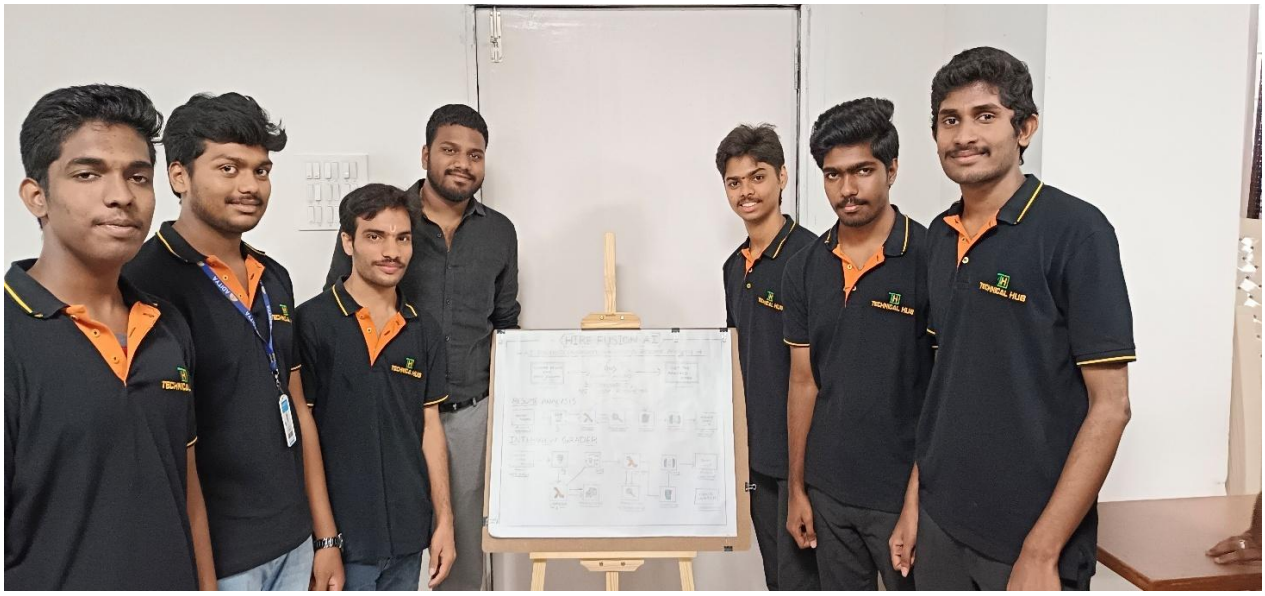
HIREFUSION-AI

AI POWERED CANDIDATE EVALUATION & RESUME ANALYSIS

Team Members:





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- Member 2 **(MURAMALLA AMBICA SAIRAM)**
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Organization:

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- **Aditya College Of Engineering and Technology, Surampalem**

Academic Year: 2023-2027

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Finally, we are grateful to **Technical Hub** and our institution for providing the necessary infrastructure, resources, and a collaborative environment that made the successful completion of this project possible.

ABSTRACT

The recruitment process in organizations often involves manual screening of resumes and interviews, which is time-consuming and prone to bias. HireFusion is an AI-powered automated recruitment tool built using AWS Serverless architecture to address this challenge.

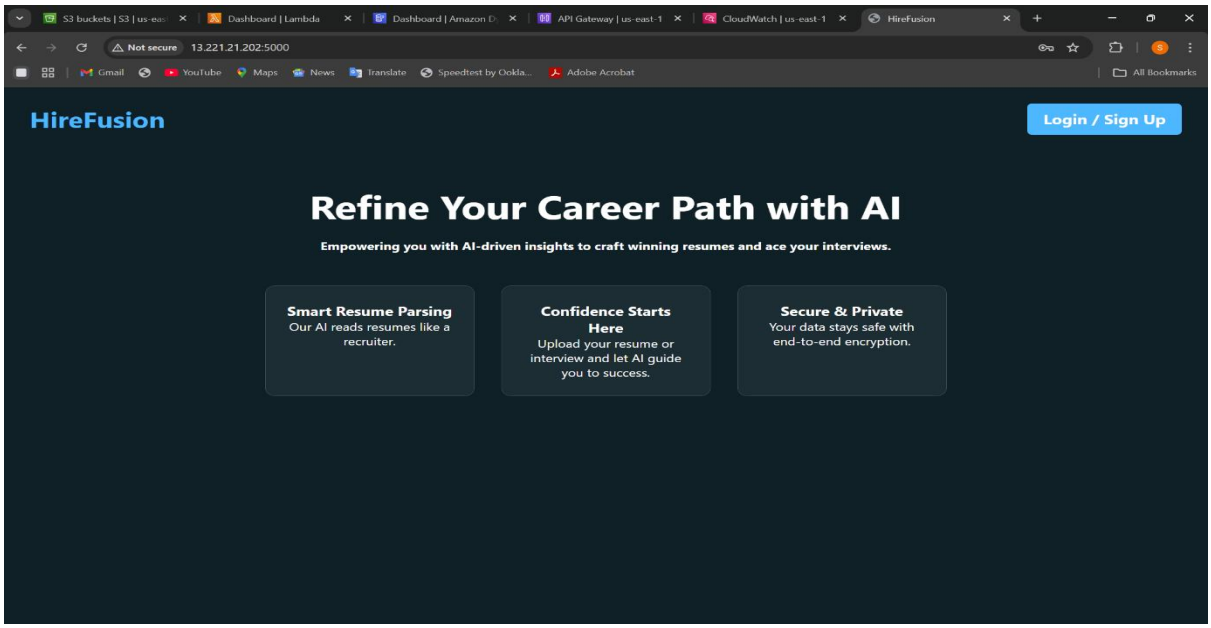
This project automates the analysis of resumes and interview videos using AI services like Amazon Textract, Rekognition, Comprehend, and Transcribe, with data stored securely in DynamoDB. The system provides real-time scoring and analytics through a web dashboard hosted on Amazon S3.

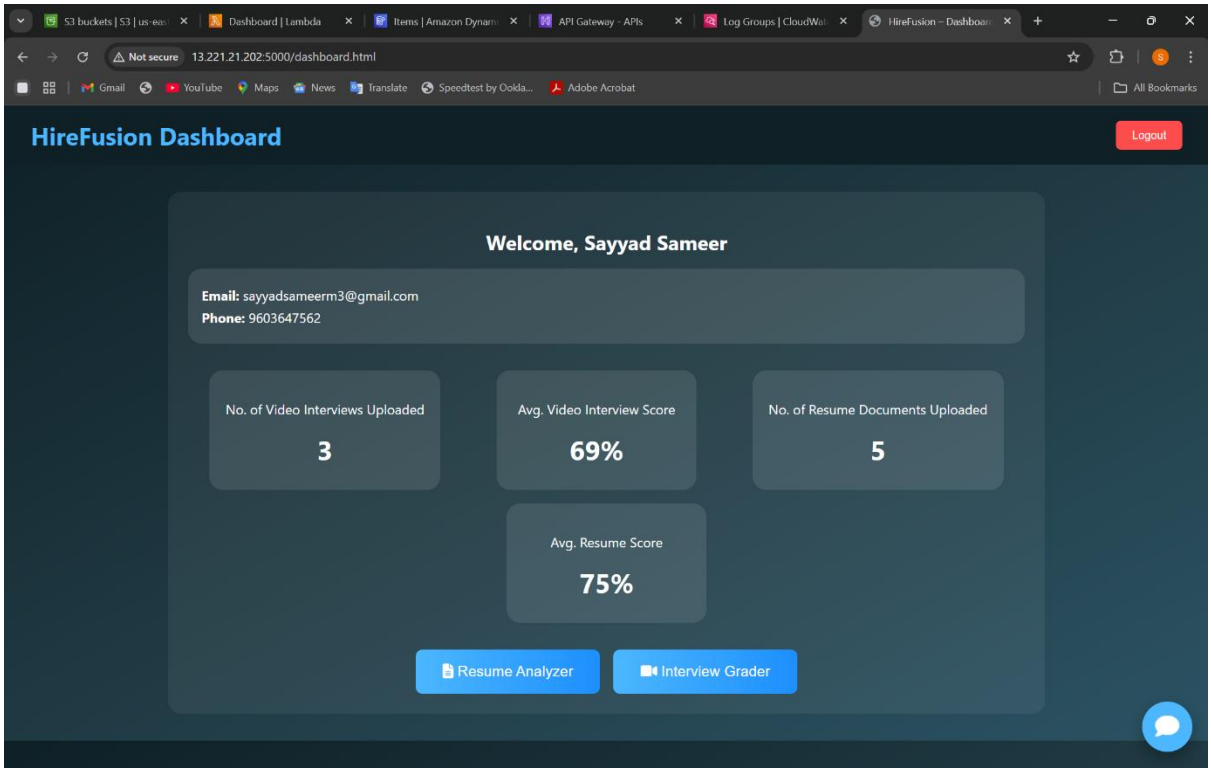
Key features:

- Automated Resume Analysis: Extracts skills and calculates a score using Textract and Comprehend.
- Interview Grader: Analyzes facial expressions, hand gestures, and speech confidence using Rekognition and Transcribe.
- Serverless & Scalable: Built on AWS with Lambda triggers, event notifications, and API Gateway for APIs.
- Secure Authentication: User login monitoring with CloudWatch.

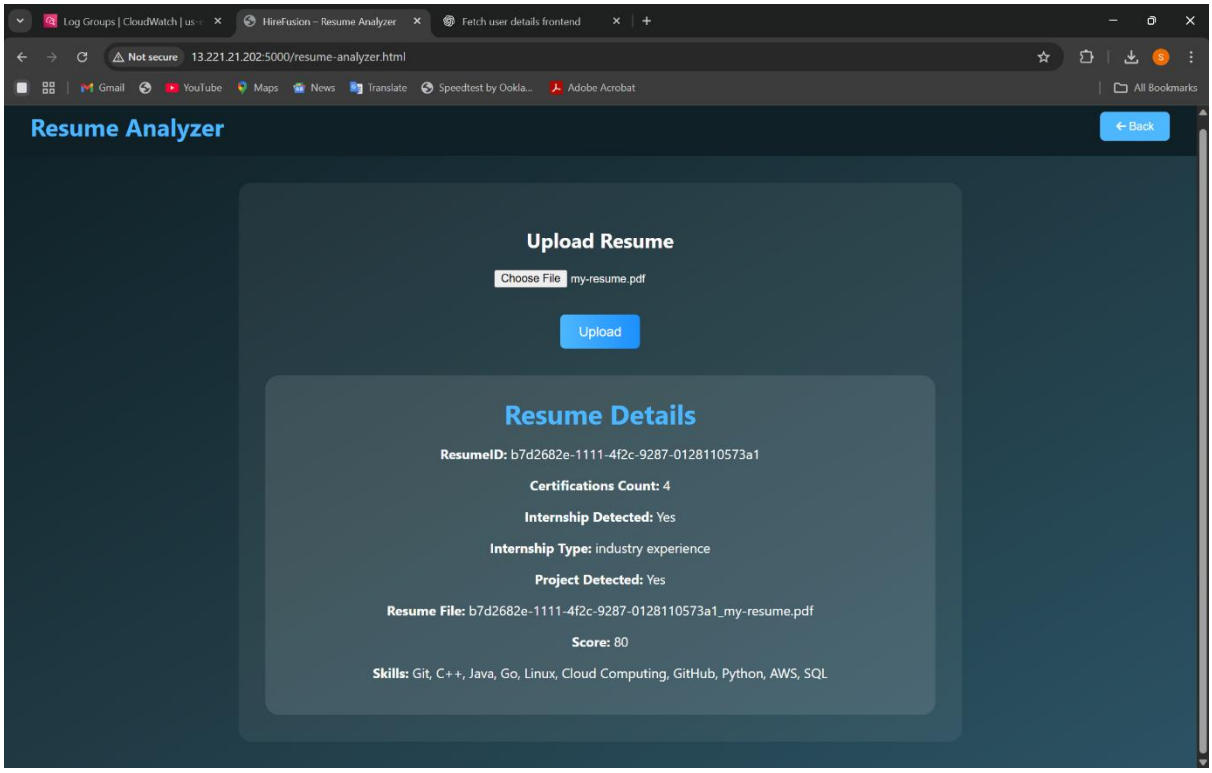
Project Overview

HireFusion is an AI-driven platform designed to automate and improve the hiring process by analyzing resumes and interview videos. The system leverages multiple AWS services to provide real-time analysis, detect skills in resumes, and assess candidate performance in interview videos.

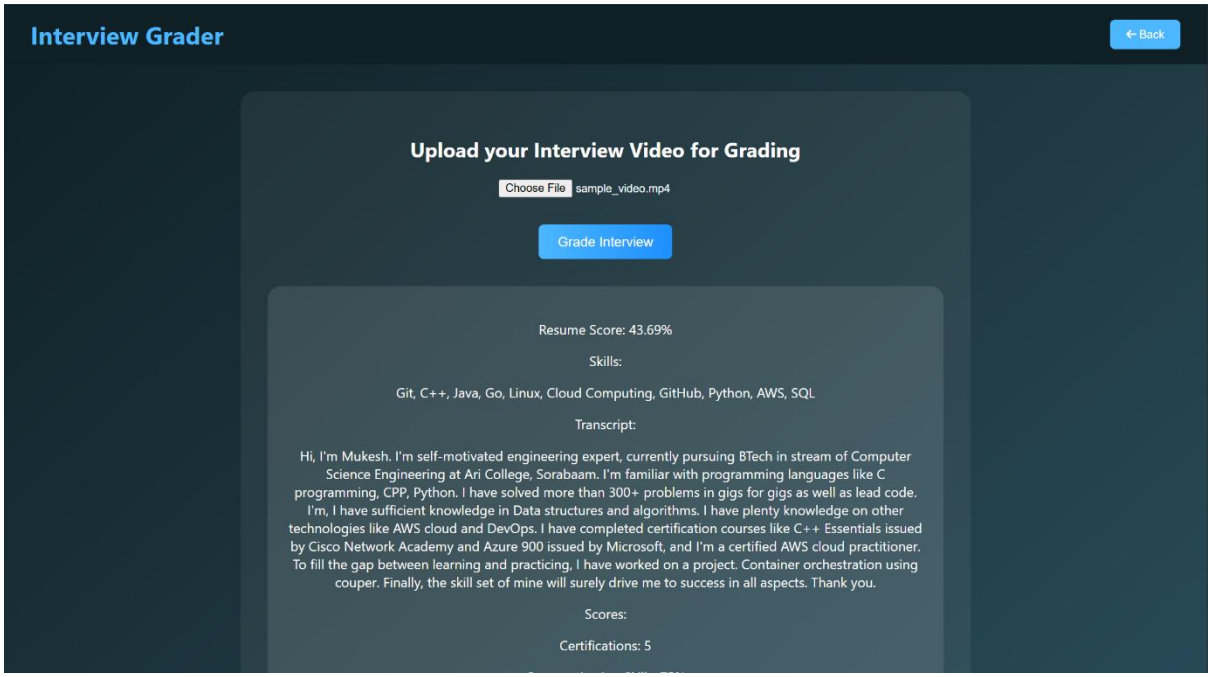




- **Resume Analyzer**: Automatically extracts and analyzes skills and relevant information from resumes.



- **Interview Grader**: Analyzes interview videos based on facial expressions, hand gestures, and transcribed text to grade candidate performance.



INTRODUCTION

Problem Statement

Hiring teams spend hours manually analyzing resumes and interview performance, resulting in delays and inconsistencies. Existing tools do not fully automate the process, and many require heavy infrastructure.

Purpose & Scope

The purpose of this project is to create an AI-powered recruitment assistant that automates resume analysis and interview grading, reducing manual effort and improving accuracy.

Scope:

- Candidate uploads resume/video → AI extracts data & scores → Real-time dashboard display
- Fully serverless architecture with zero infrastructure management
- Easy integration with corporate HR tools in the future

Objectives

- Build a web-based platform for resume & interview uploads
- Use AWS AI services for text, speech, and facial analysis
- Provide instant scores and analytics
- Implement serverless triggers to eliminate infrastructure overhead

Existing System vs Proposed System

Existing System:

- Manual screening, time-consuming
- High recruiter bias
- Requires large infrastructure for automation

Proposed System:

- Automated using AI & ML
- Reduces human error and time
- Scalable and cost-efficient with AWS Lambda

SYSTEM REQUIREMENTS

Functional Requirements

- Upload resumes (PDF/DOCX) and videos (MP4)
- Trigger Lambda functions via S3 Event Notifications
- Extract text and entities (skills) from resumes
- Analyze emotions, hand gestures, and speech from videos
- Store results in DynamoDB
- Display scores in the user dashboard

Non-Functional Requirements

- Security: Cognito-based user authentication
- Performance: Analysis completed in <5 seconds per file
- Scalability: Serverless services auto-scale based on load
- Reliability: CloudWatch monitoring and error handling

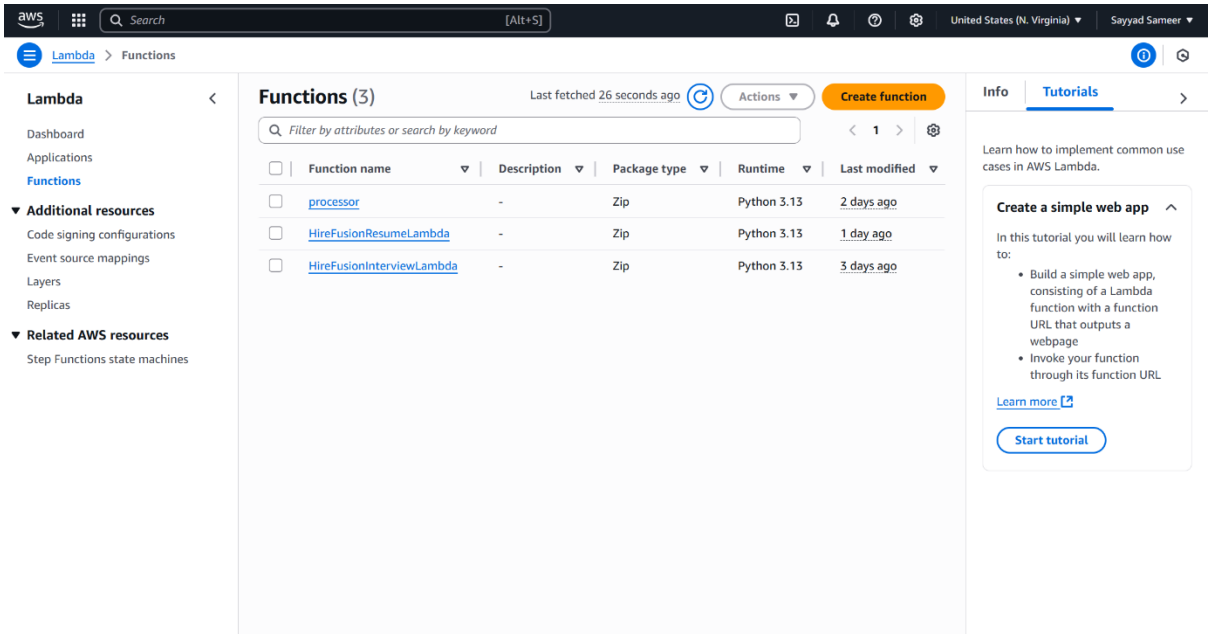
Software & Hardware Requirements

Category	Requirement
Programming Lang	Python (Lambda), JavaScript (Frontend)
AWS Services	S3, Lambda, DynamoDB, Textract, Rekognition, Transcribe, API Gateway, Cognito, CloudWatch, SNS
Frontend	HTML, CSS, JS
Hardware	AWS Cloud Infrastructure

Services and Technologies Used

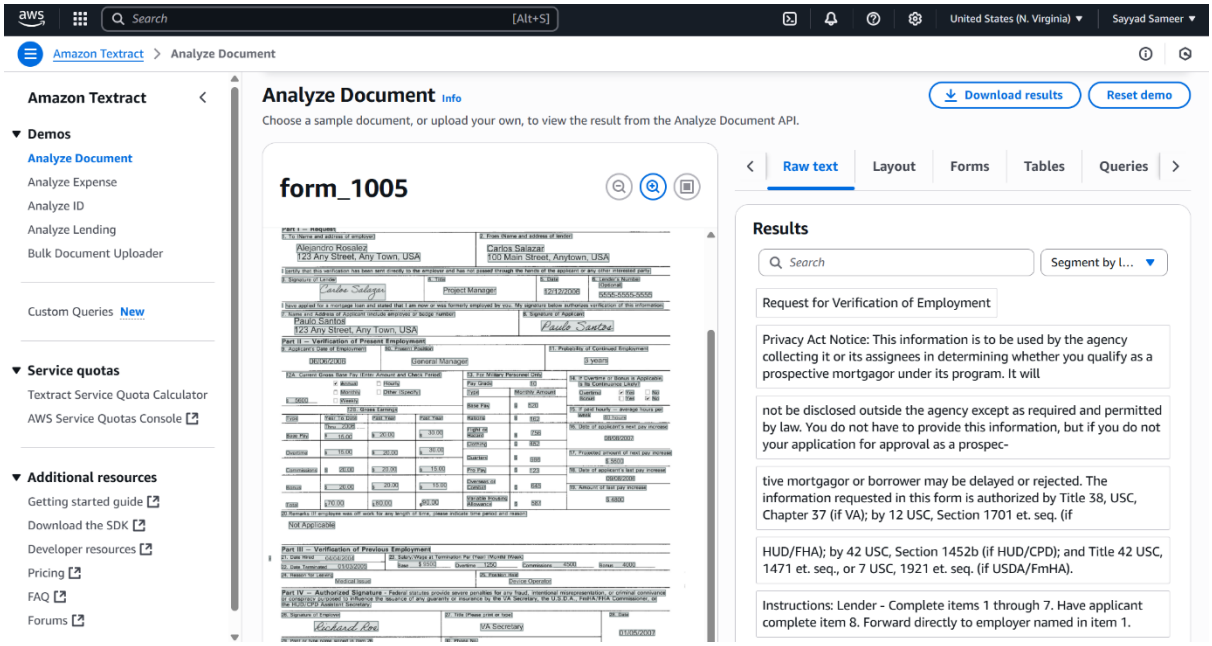
AWS Lambda

- **Purpose**: Host business logic for analyzing resumes and interview videos. It automatically scales based on file uploads.
- **Key Features**: Serverless, event-driven, cost-efficient.



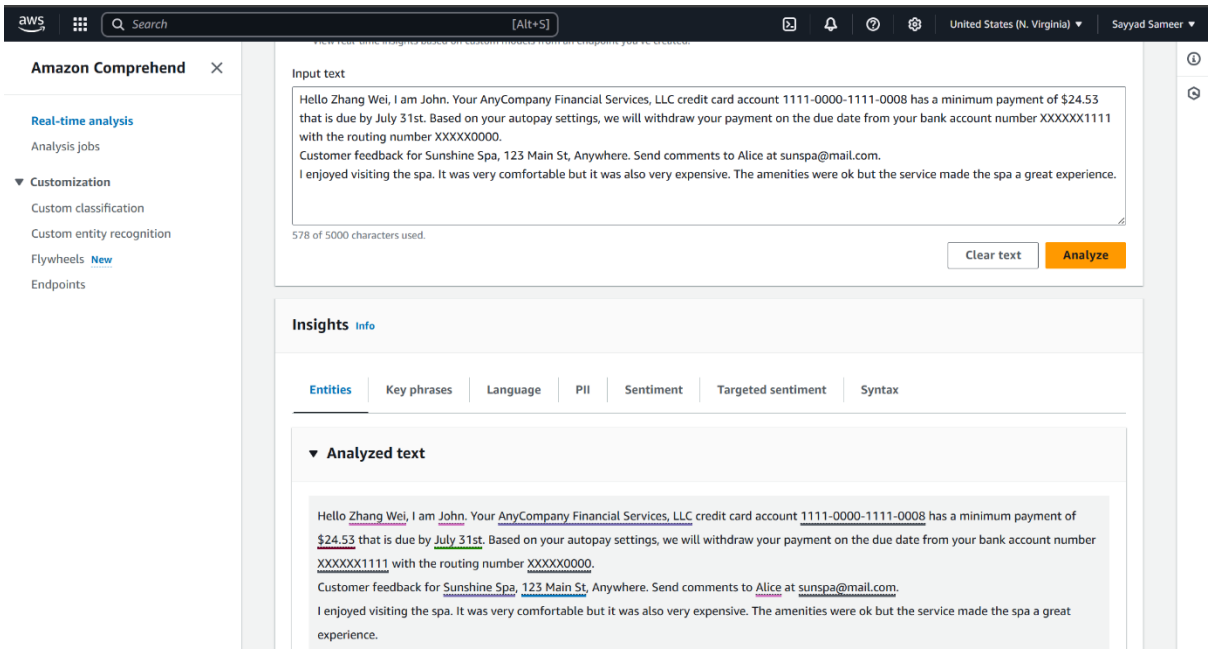
Amazon Textract

- **Purpose**: Automatically extracts text from resumes in PDF or DOCX formats.
- **Key Features**: Extracts text, tables, and forms for structured data.



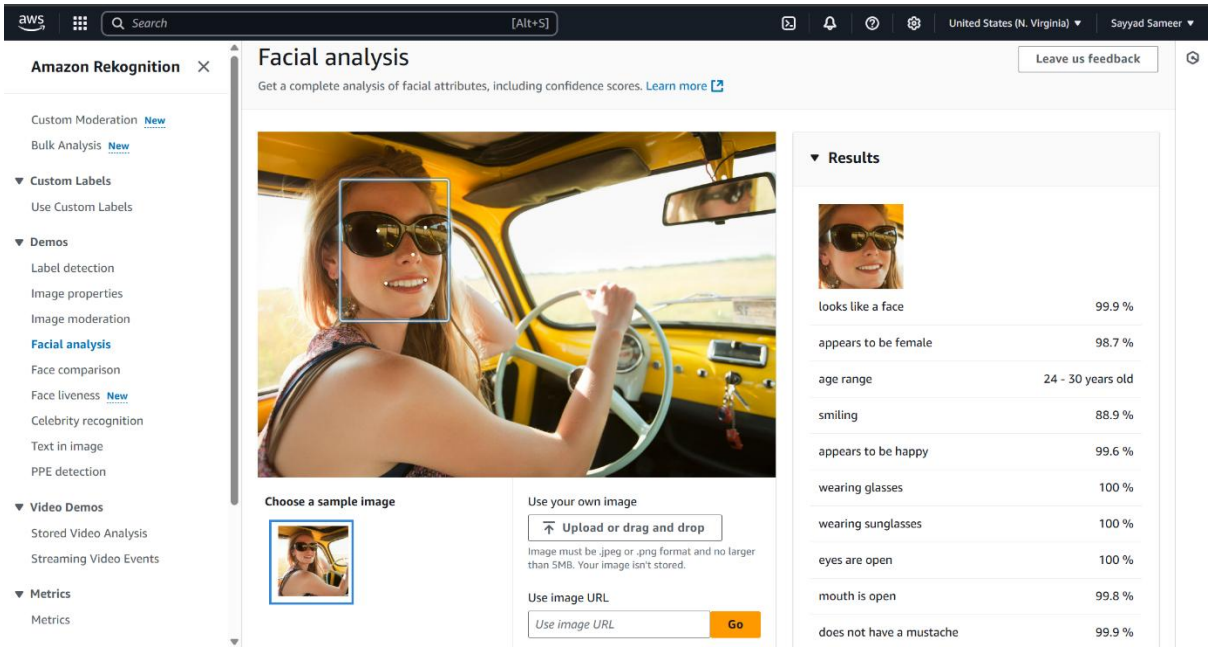
Amazon Comprehend

- **Purpose**: Extracts entities and skills from the extracted text.
- **Key Features**: Natural Language Processing (NLP) service to detect entities like "skills" in resumes.



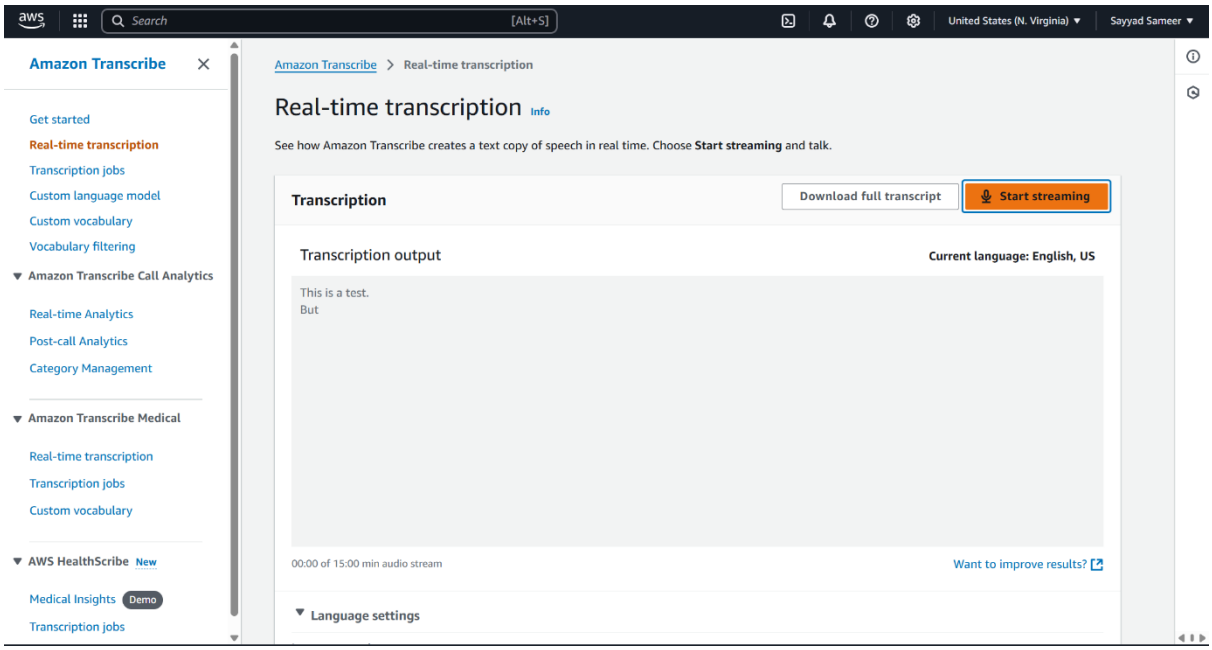
Amazon Rekognition

- **Purpose**: Analyzes interview videos to detect facial expressions and emotions.
- **Key Features**: Provides facial analysis, including sentiment detection (e.g., Happy, Sad, Angry).



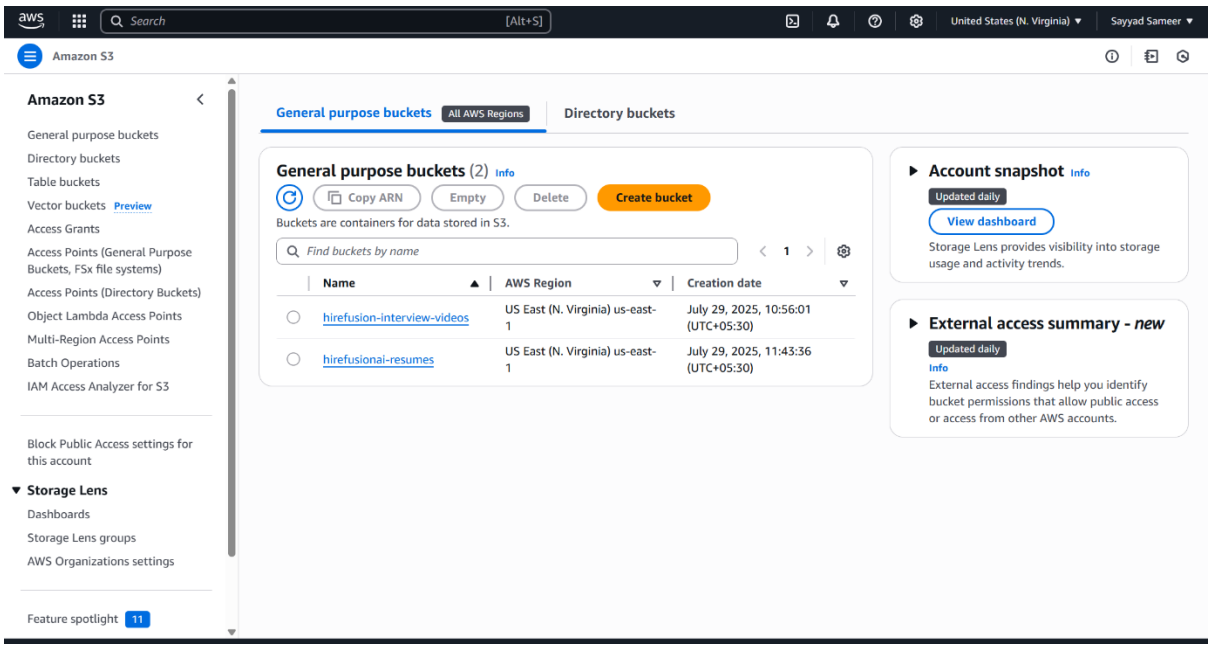
Amazon Transcribe

- **Purpose**: Converts speech from interview videos into text.
- **Key Features**: Real-time transcription, supports multiple languages.



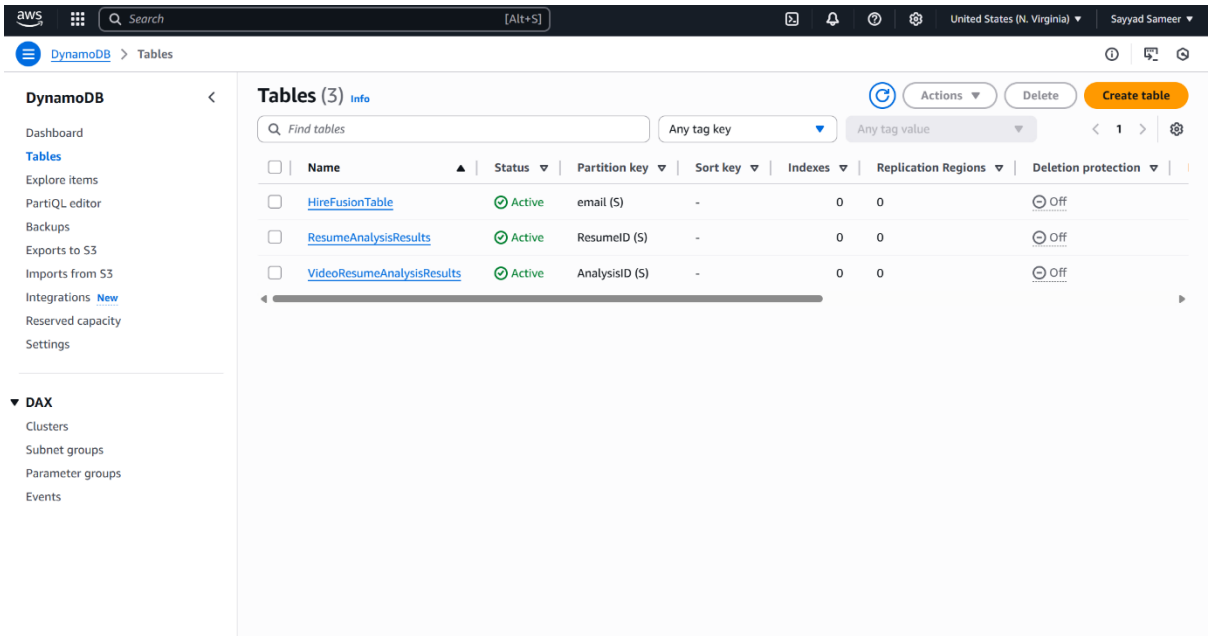
Amazon S3

- **Purpose**: Stores resume files and interview videos uploaded by users.
- **Key Features**: Secure and scalable storage for large files.



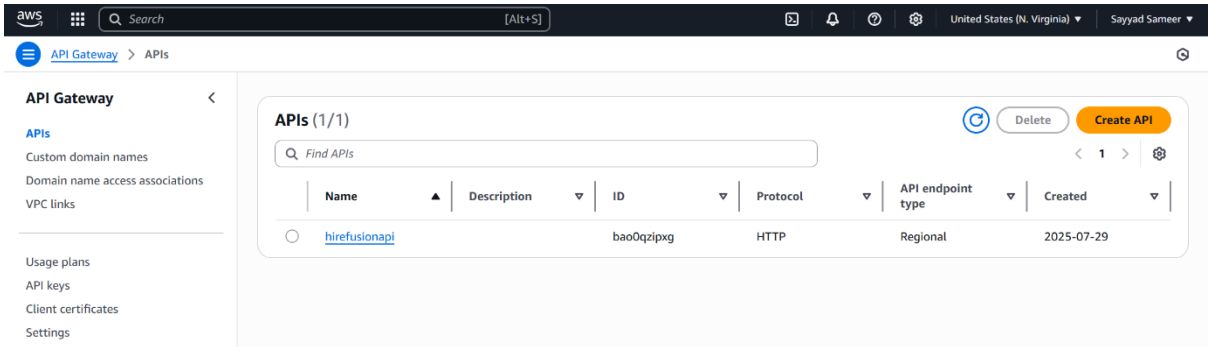
Amazon DynamoDB

- **Purpose**: Stores resume and video analysis results, including skills, scores, and facial analysis.
- **Key Features**: NoSQL database with high availability and low-latency access.



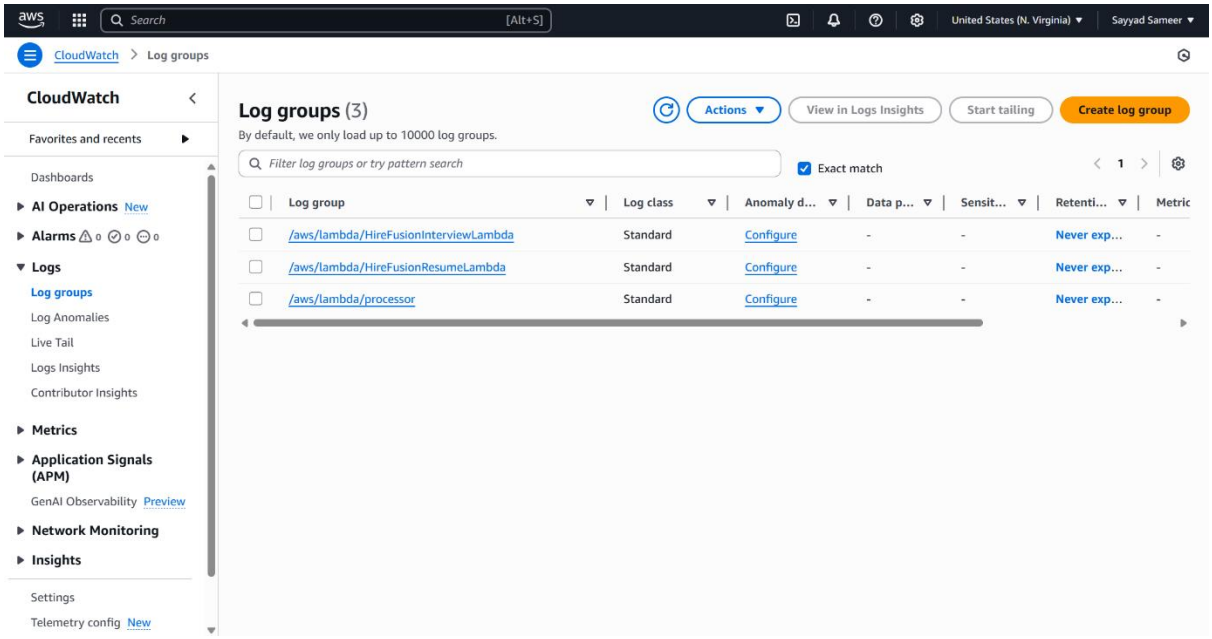
API Gateway

- **Purpose**: Exposes Lambda functions as HTTP APIs, making them accessible from the frontend.
- **Key Features**: API management, routing, and authorization.



Amazon CloudWatch

- **Purpose**: Monitors and logs application behavior, including Lambda function executions and AWS service performance.
- **Key Features**: Provides logs, metrics, and alarms to ensure smooth operation, helps track errors, performance, and optimize Lambda functions.

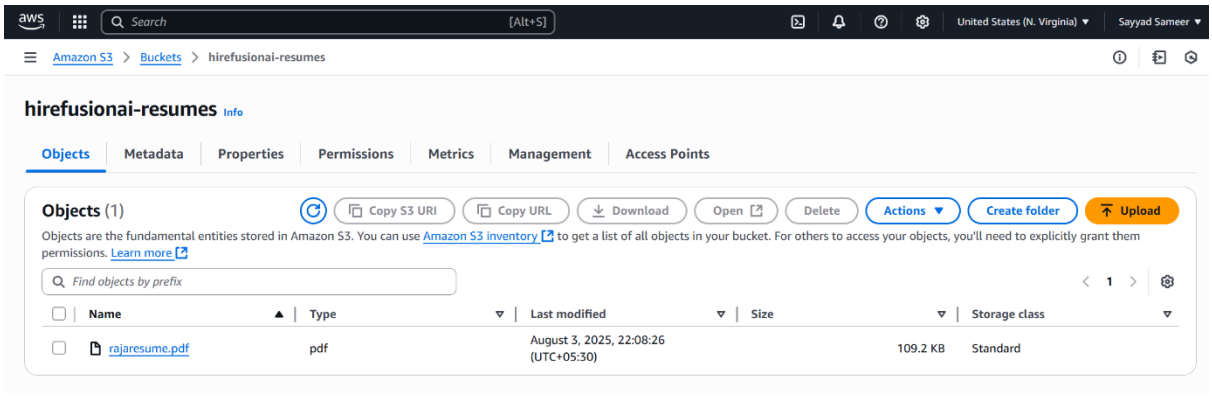


Architecture Overview

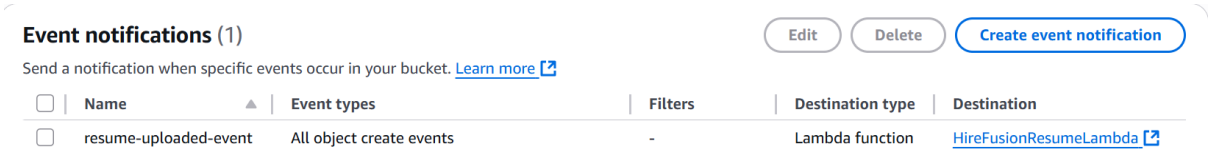
The architecture of HireFusion is designed for scalability, security, and efficiency. The system operates as follows:

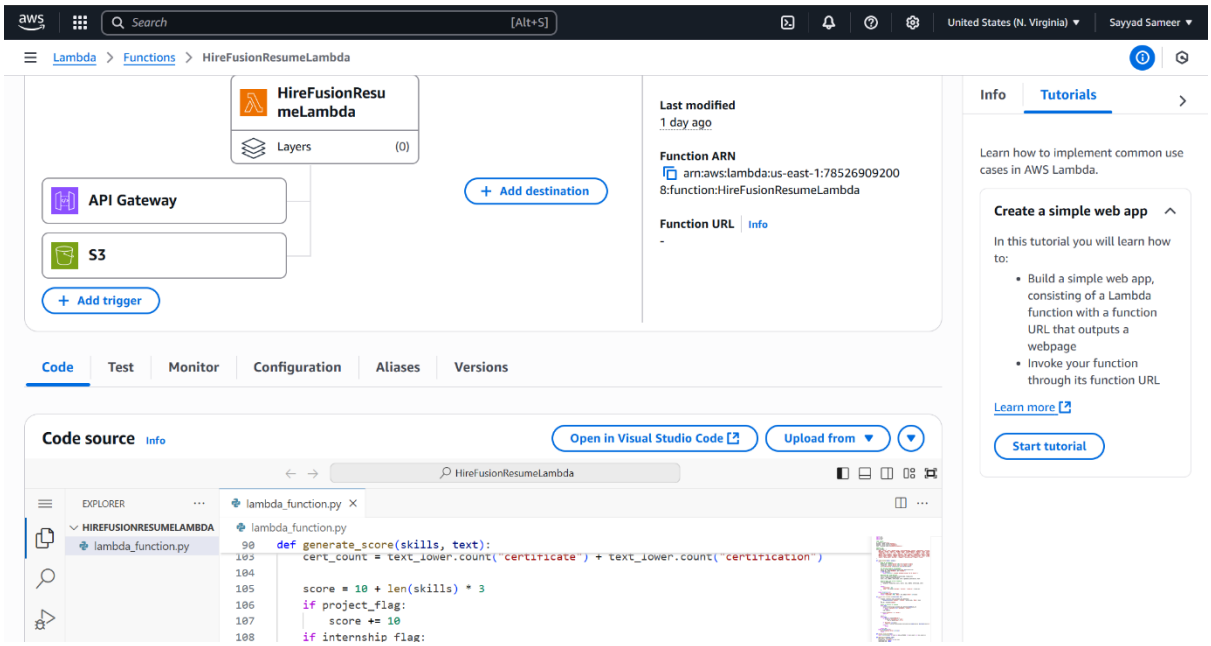
Resume Analyzer Flow:

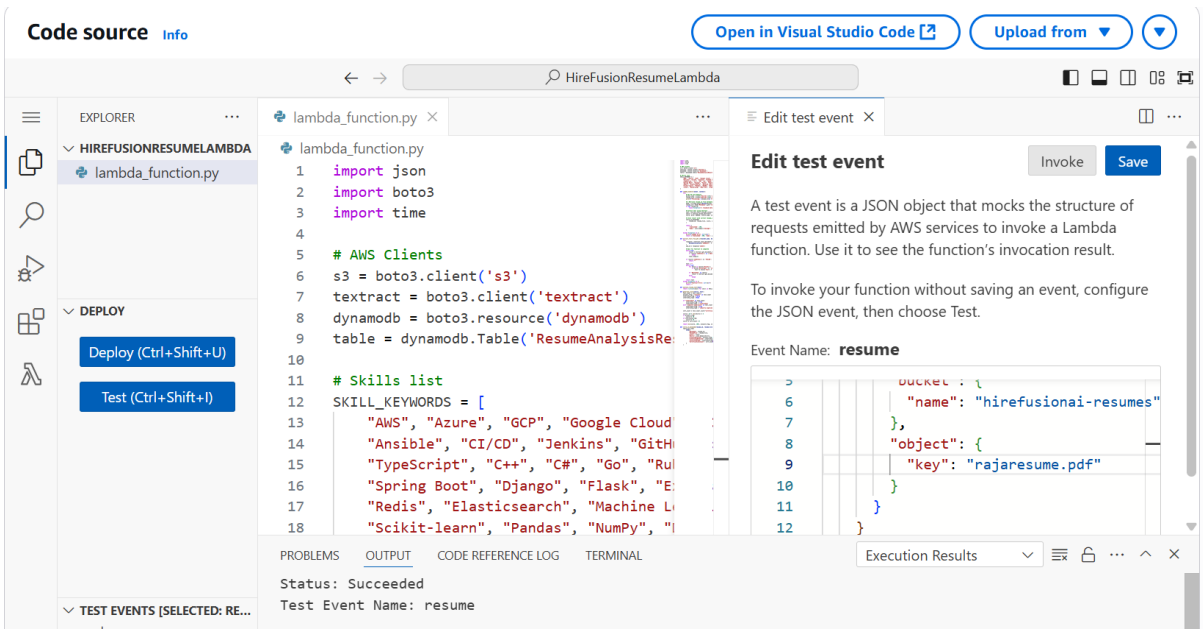
1. **User Uploads Resume**: The user uploads their resume to the S3 bucket hirefusion-resumes.



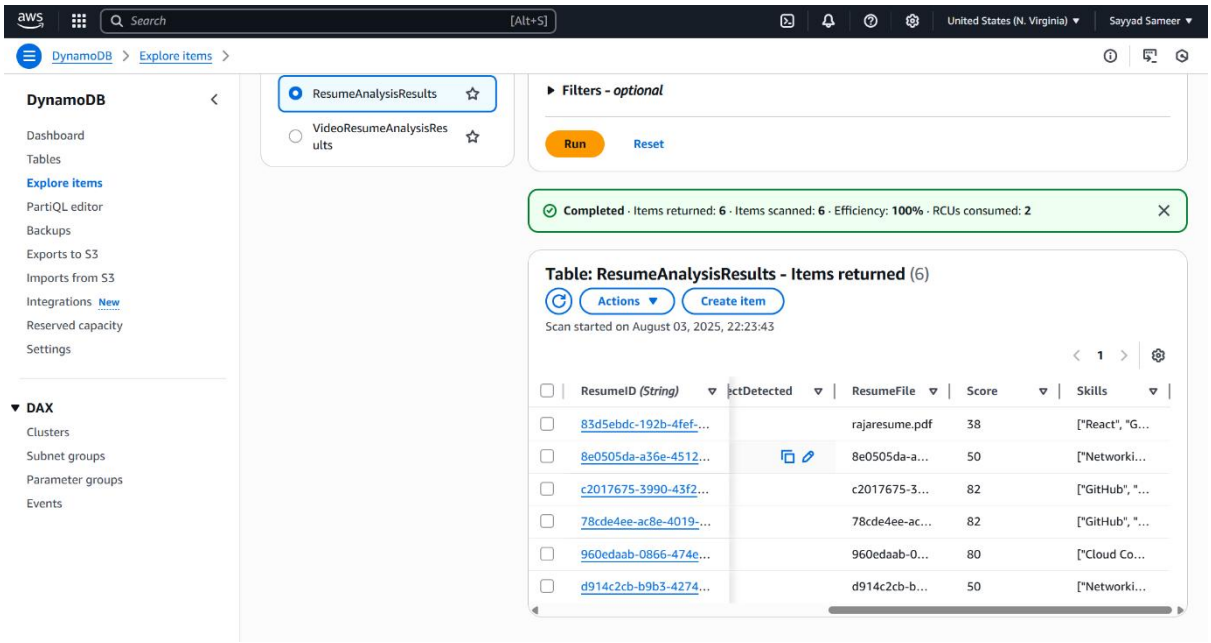
2. **Lambda Triggered**: The **S3 Event Notification** triggers the **Resume Analyzer Lambda**.

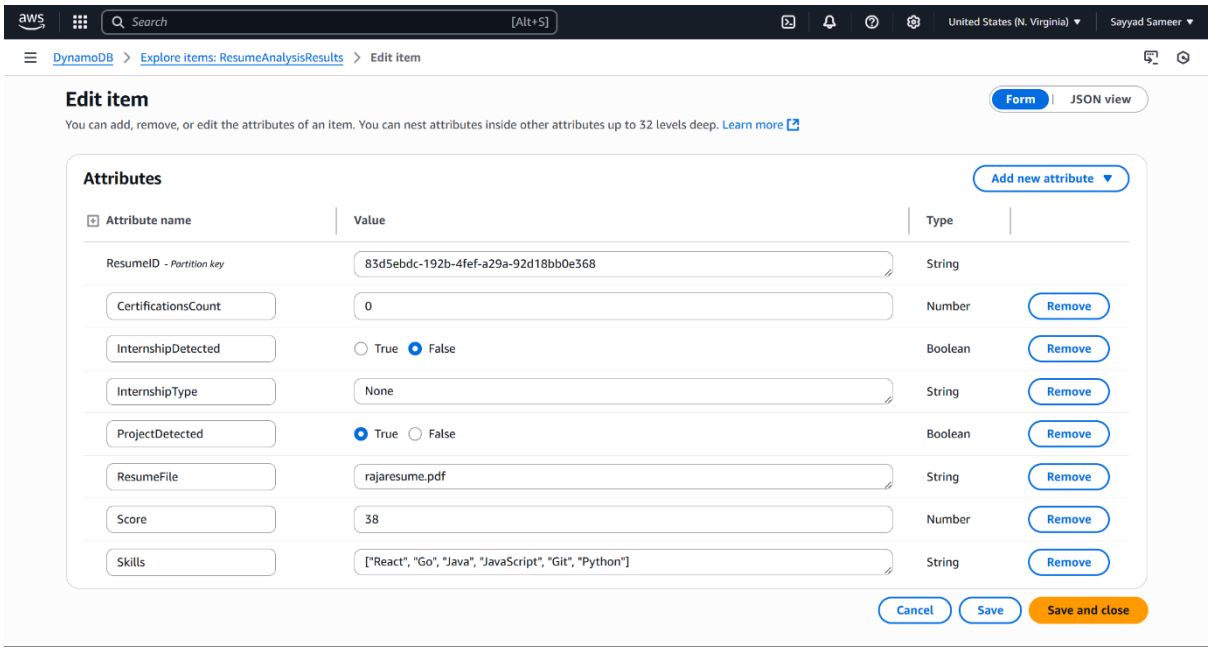


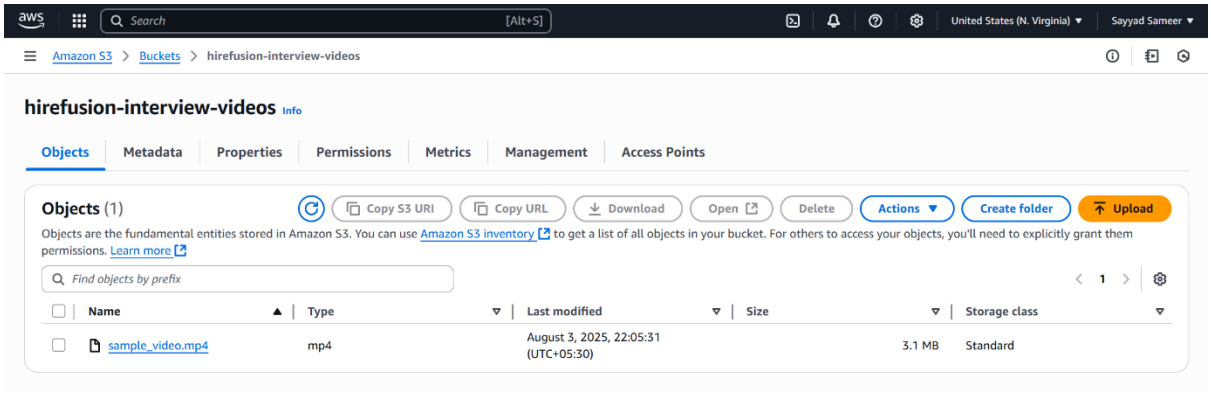




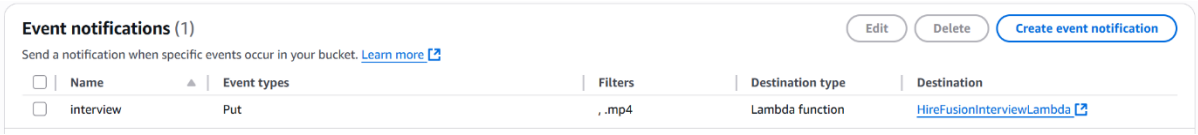
3. **Text Extraction**: The Lambda function uses **Textract** to extract text from the resume.
4. **Skills Extraction**: **Comprehend** detects skills and other entities from the extracted text.
5. **Score Generation**: A score is generated based on the number of skills detected in the resume.
6. **Data Storage**: The result, including skills and score, is stored in **DynamoDB**.

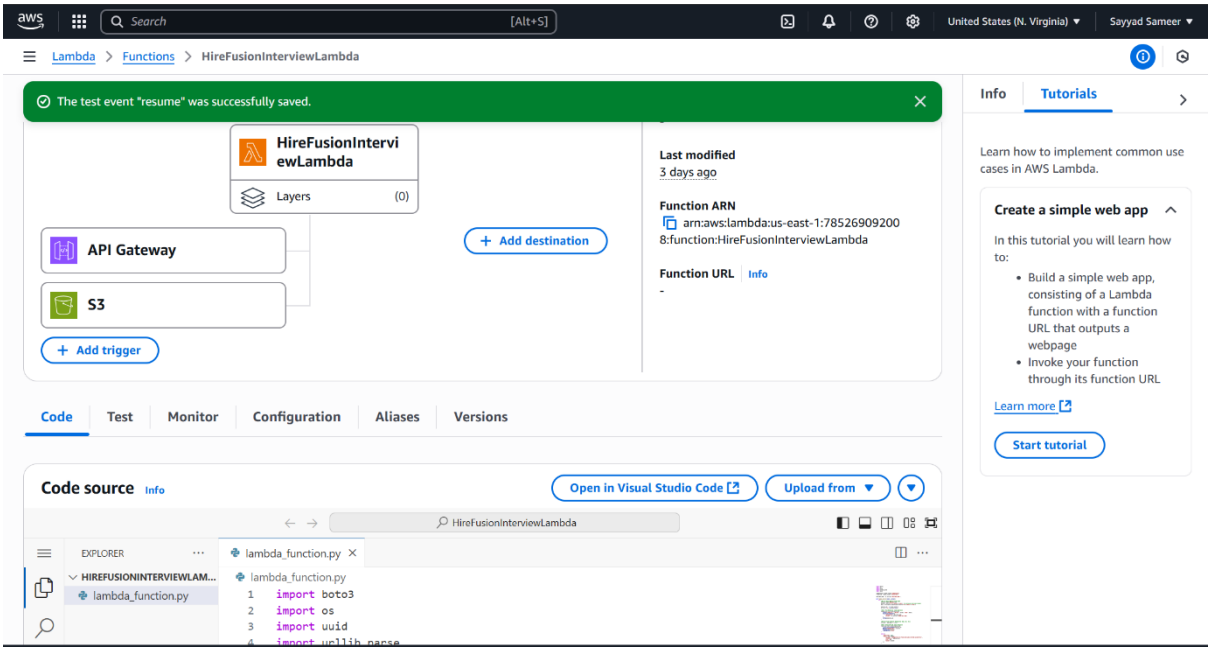


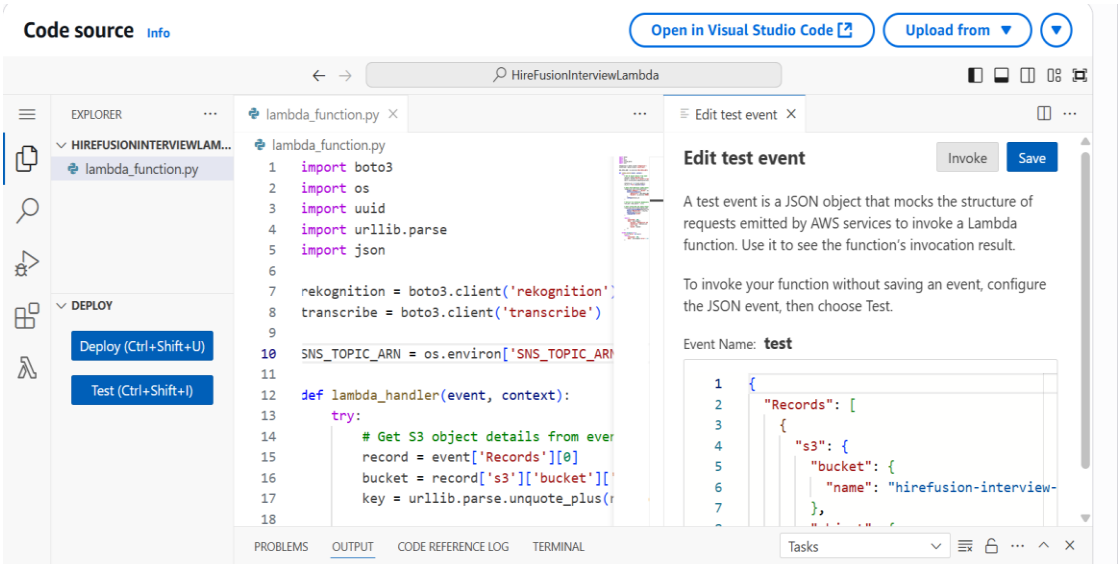




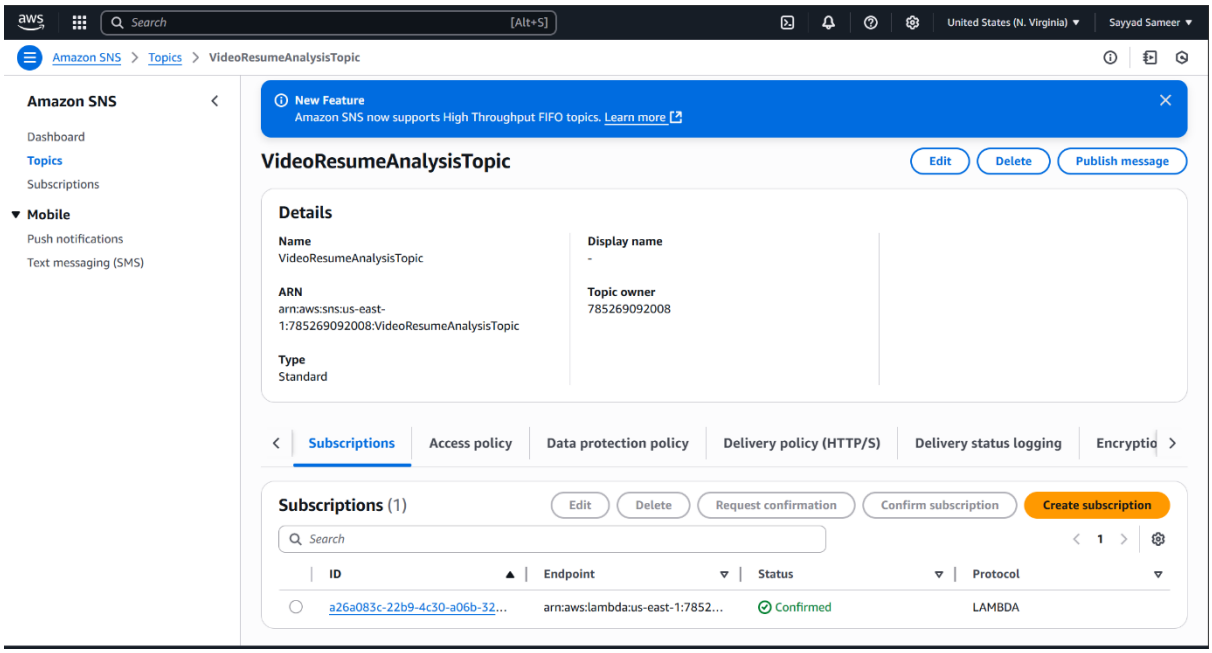
2. **Lambda Triggered**: The **S3 Event Notification** triggers the **Interview Grader Lambda**.

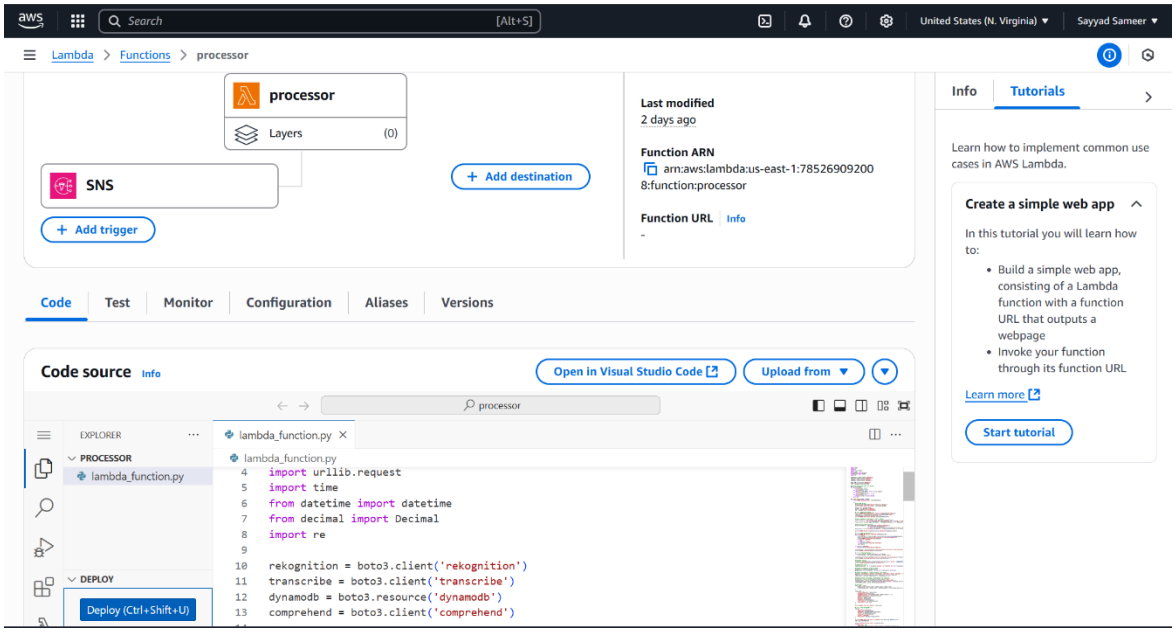






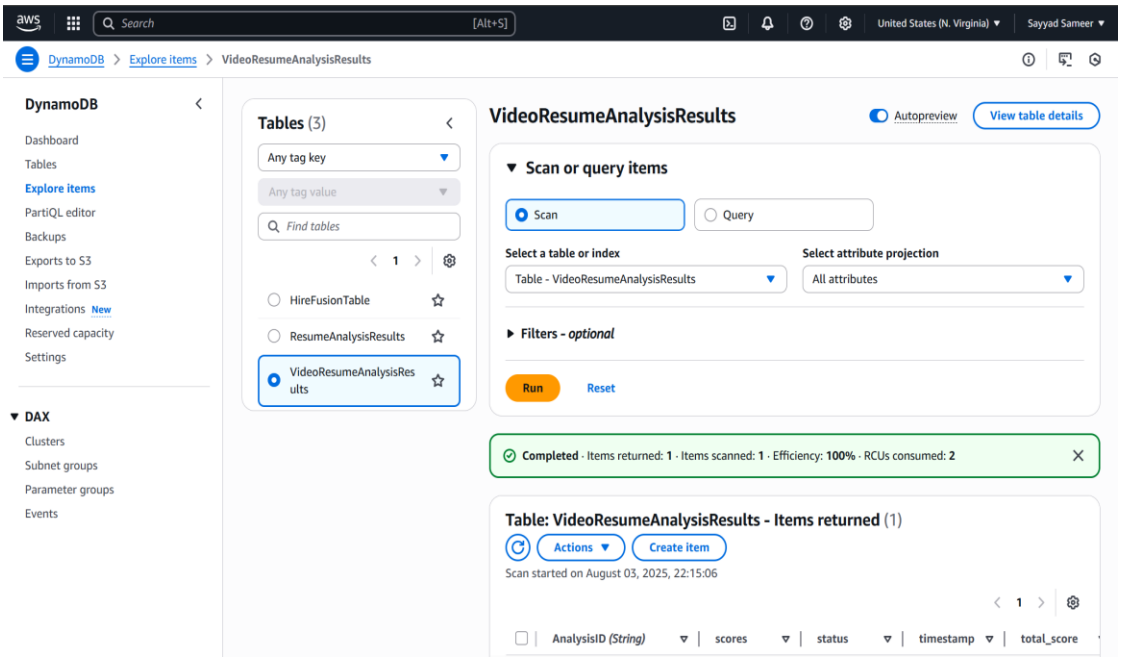
3. **Facial Expression and Gesture Analysis**: The Lambda function uses **Rekognition** to detect facial expressions and gestures.
4. **Speech Transcription**: The Lambda function uses **Transcribe** to convert speech from the video into text.
5. **Skill Detection**: **Comprehend** analyzes the transcribed text for skills or sentiment.

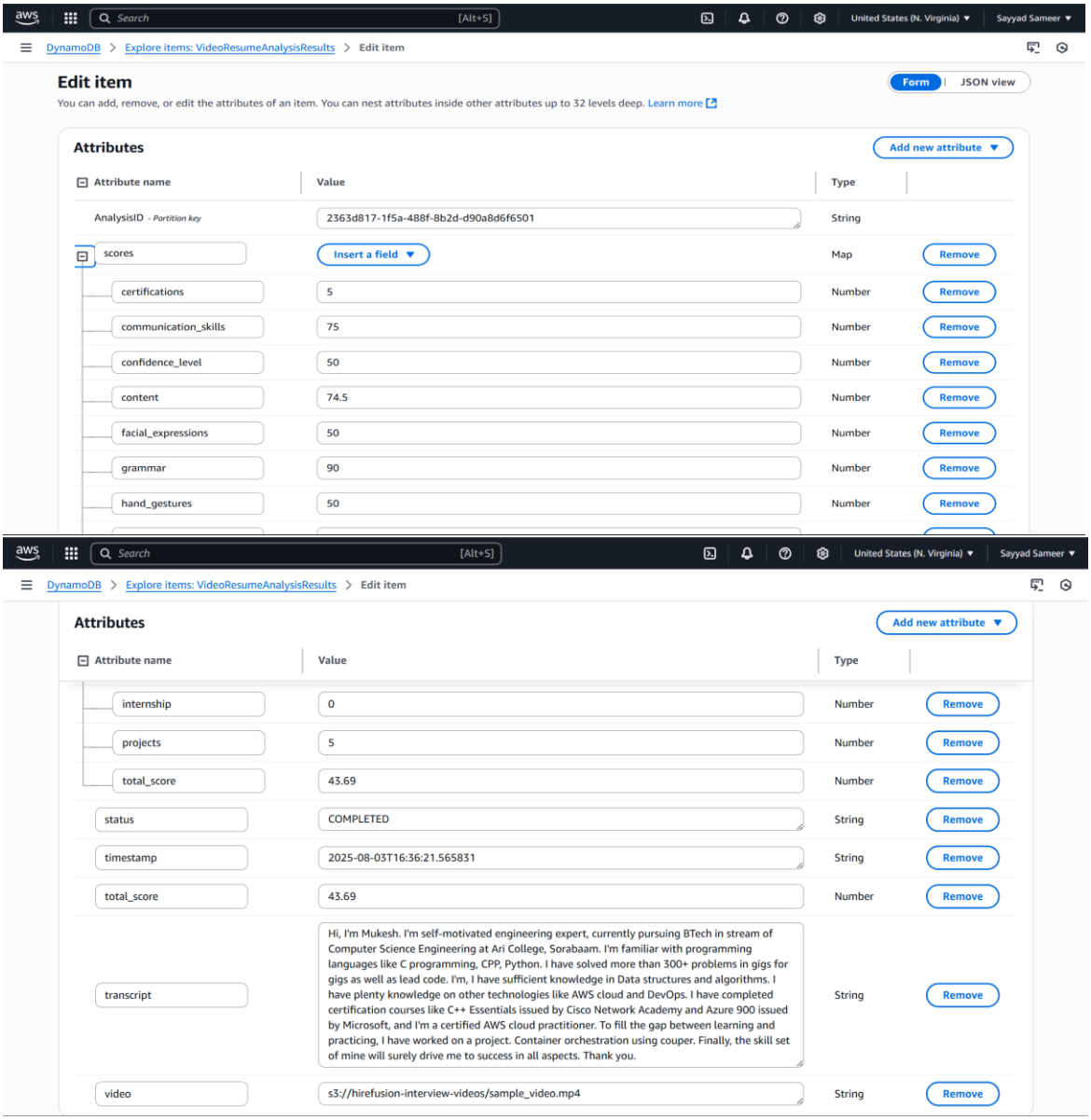




6. **Score Generation**: The final score is based on facial expression, gesture analysis, and the sentiment from the transcription.

7. **Data Storage**: The analysis results are stored in **DynamoDB**.





8. **API Response**: The score and analysis are returned to the frontend.

Testing

Testing Approach

The testing of **HireFusion-AI** focused on validating the functionality of Lambda triggers, AI service integrations, and the end-to-end flow using **CloudWatch Logs** and **DynamoDB records**. Since Postman or manual API testing tools were not used, the testing was primarily **event-driven** using S3 uploads.

Test Scenarios

1. **Resume Analyzer Flow**
    - **Test Case 1:** Upload a valid PDF/DOCX resume to the hirefusion-resumes S3 bucket.
        - **Expected Result:**
            - S3 event triggers Resume Analyzer Lambda.
            - Lambda uses Textract → Comprehend → generates skills and score.
            - DynamoDB table stores the record.
            - CloudWatch Logs show successful execution.
        - **Result:** Succeeded
    - **Test Case 2:** Upload a corrupted or unsupported resume file.
        - **Expected Result:** Lambda logs error in CloudWatch, record not stored in DynamoDB.
        - **Result:** Succeeded (Error captured in logs)

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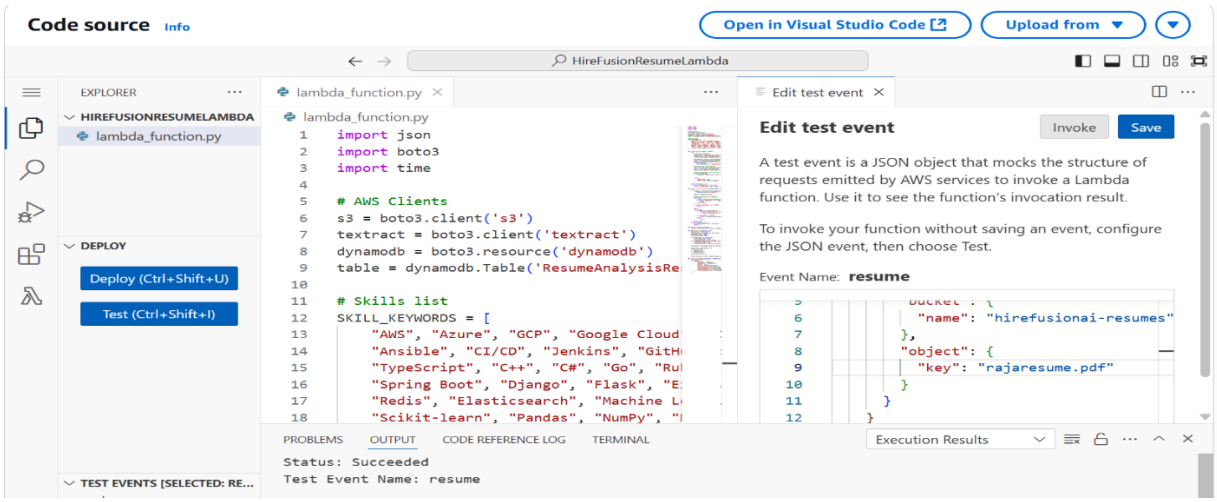
2. **Interview Grader Flow**
    - **Test Case 3:** Upload a valid MP4 video to the hirefusion-interview-videos S3 bucket.
        - **Expected Result:**
            - Lambda triggers Rekognition (facial analysis) and Transcribe (speech-to-text).
            - Generates score based on emotion confidence, speech sentiment.
            - Stores results in DynamoDB.

        - CloudWatch Logs confirm each step.
    - **Result:** Succeeded
- **Test Case 4:** Upload very large video (>100MB).
    - **Expected Result:** Lambda times out or fails gracefully; error logged in CloudWatch.
    - **Result:** Succeeded



CloudWatch Log Monitoring

- **CloudWatch Logs** were actively used to:
    - Verify **event triggers** from S3 notifications.
    - Check AI service responses from Textract, Comprehend, Rekognition, and Transcribe.
    - Identify **errors** like AccessDenied, timeout errors, or unsupported file formats.
    - Ensure DynamoDB put_item was successful.

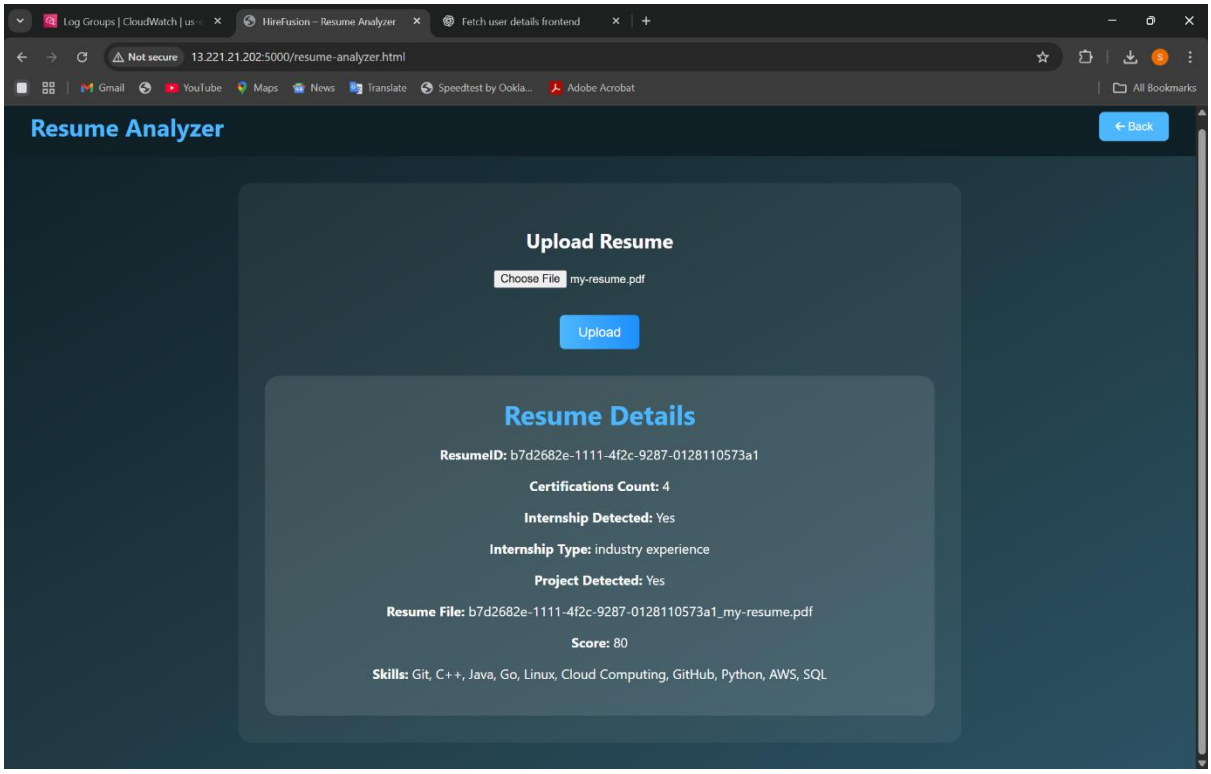
```
2025-07-31T14:51:36.896Z    START RequestId: 407a3d2c-e490-4773-acfe-24a5026814ac Version: $LATEST
2025-07-31T14:51:36.898Z    [DEBUG] Incoming Event: {"Records": [{"EventSource": "aws:sns", "EventVersion": "1.0", "EventSubscriptionArn": "arn:a…
2025-07-31T14:51:36.898Z    [DEBUG] Parsed SNS Message: {"JobId": "7c61ce1158480f254abfad596b0c90e5b325e163a3ac58f35fcbc4f031cfdd41", "Status": "…
2025-07-31T14:51:36.898Z    [DEBUG] Getting Rekognition results for JobId=7c61ce1158480f254abfad596b0c90e5b325e163a3ac58f35fcbc4f031cfdd41
2025-07-31T14:51:37.413Z    [DEBUG] Total Faces Detected: 131
2025-07-31T14:51:37.452Z    [DEBUG] Facial Score=75.0, Gesture Score=70.0
2025-07-31T14:51:37.452Z    [DEBUG] Waiting for Transcribe Job=b3fc4295-8d39-485e-8717-bdbc6bd94776
2025-07-31T14:51:37.721Z    [DEBUG] Transcribe Status=COMPLETED
2025-07-31T14:51:37.721Z    [DEBUG] Transcript URI=https://s3.us-east-1.amazonaws.com/aws-transcribe-us-east-1-prod/785269092008/b3fc4295-8d39-48…
2025-07-31T14:51:37.838Z    [DEBUG] Transcript Extracted: Hi, I'm Mukesh. I'm self-motivated engineering expert, currently pursuing BTech in stre…
2025-07-31T14:51:38.084Z    [DEBUG] Sentiment=NEUTRAL
2025-07-31T14:51:38.084Z    [DEBUG] Final Score Object: {'facial_expressions': 75.0, 'hand_gestures': 70.0, 'confidence_level': 72.5, 'communicat…
2025-07-31T14:51:38.112Z    [ERROR] An error occurred (ValidationException) when calling the PutItem operation: One or more parameter values were…
2025-07-31T14:51:38.133Z    END RequestId: 407a3d2c-e490-4773-acfe-24a5026814ac
2025-07-31T14:51:38.133Z    REPORT RequestId: 407a3d2c-e490-4773-acfe-24a5026814ac Duration: 1236.83 ms Billed Duration: 1237 ms Memory Size: 128…
```

Results & Outputs

The HireFusion-AI project was successfully implemented and validated using multiple test cases. The system performed resume analysis and interview video grading accurately and stored results in DynamoDB. Below are the outputs and proof of successful execution:

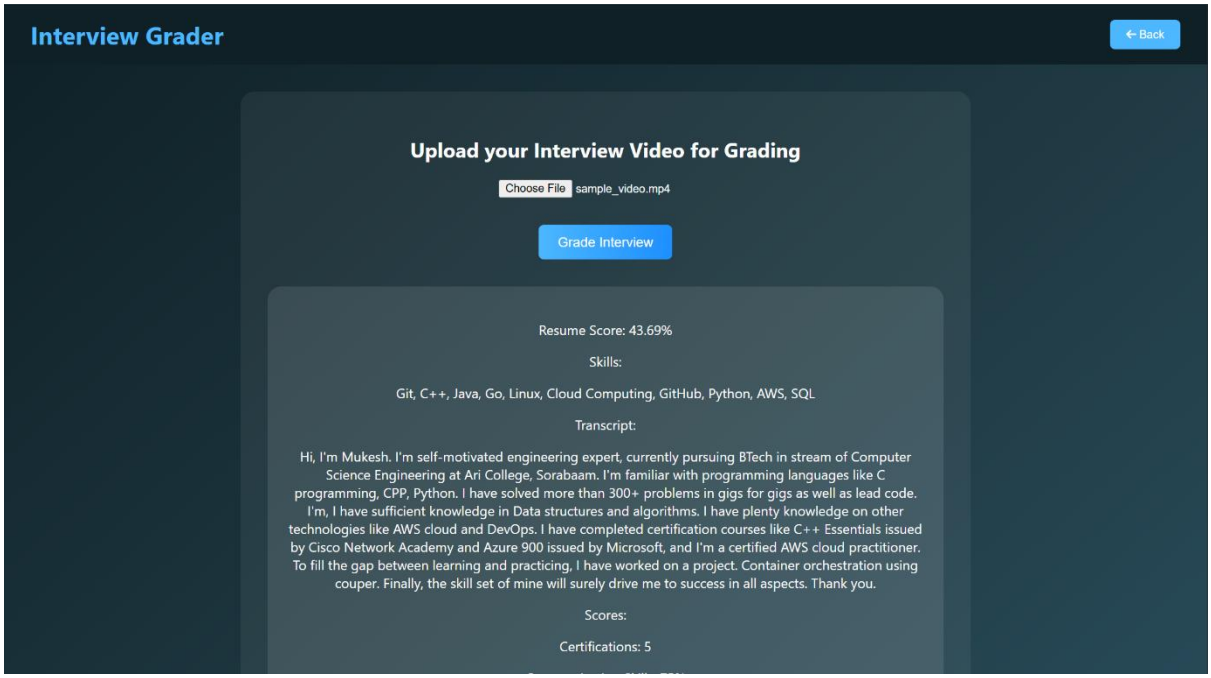
Resume Analyzer Output

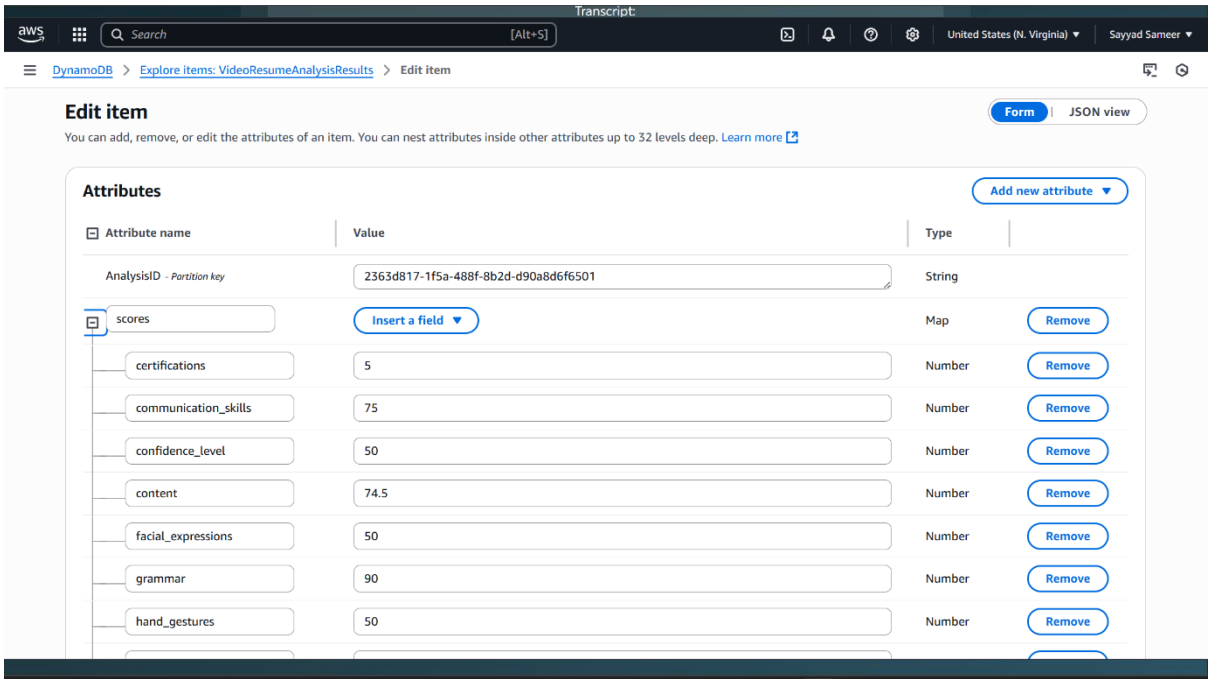
1. Users were able to upload resumes in PDF/DOCX format via the web UI.
2. The Resume Analyzer Lambda function extracted text using Amazon Textract, identified skills using Amazon Comprehend, and generated a score.
3. The final score was displayed on the web UI and stored in DynamoDB.



Interview Grader Output

1. Users uploaded interview videos (MP4) through the web interface.
2. The Interview Grader Lambda function analyzed facial expressions and gestures using Rekognition, converted audio to text using Transcribe, and extracted entities using Comprehend.
3. The final interview performance score was generated and displayed.




Transcript:
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Sayyad Sameer
DynamoDB
Explore items: VideoResumeAnalysisResults
Edit item
Edit item
Form
JSON view
You can add, remove, or edit the attributes of an item. You can nest attributes inside other attributes up to 32 levels deep. Learn more
Attributes
Add new attribute
Attribute name
Value
Type
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String
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confidence_level
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Number
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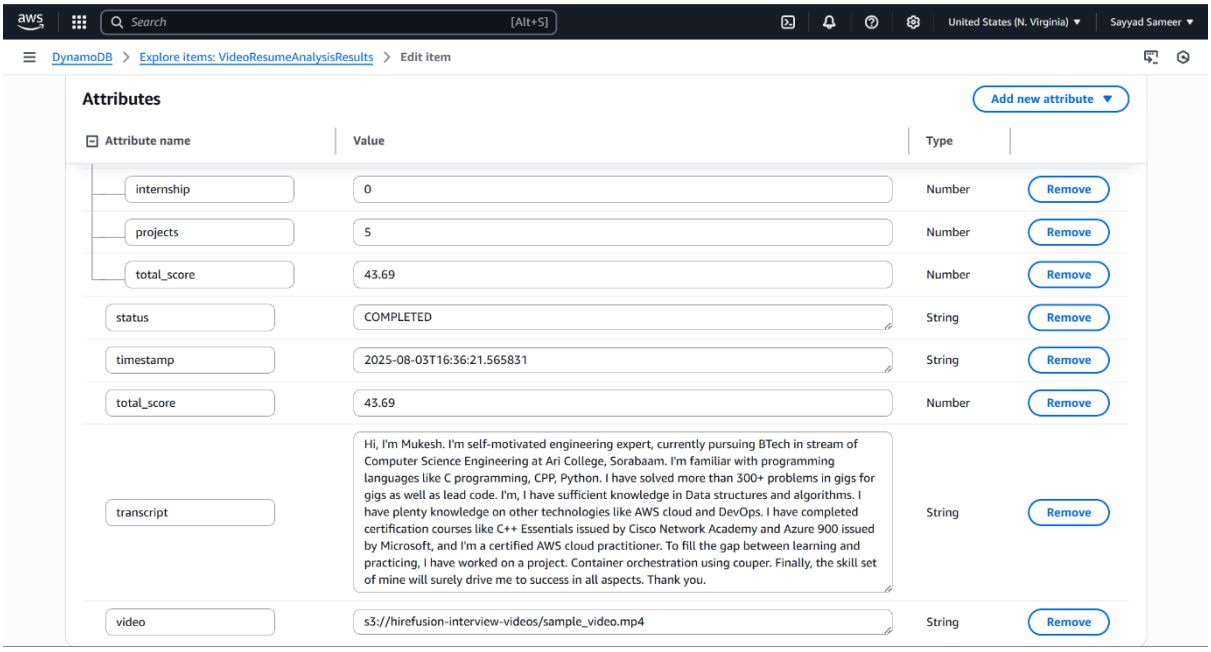
aws
Search
[Alt+S]
United States (N. Virginia)
Sayyad Sameer
DynamoDB
Explore items: VideoResumeAnalysisResults
Edit item
Attributes
Add new attribute
Attribute name
Value
Type
internship
0
Number
Remove
projects
5
Number
Remove
total_score
43.69
Number
Remove
status
COMPLETED
String
Remove
timestamp
2025-08-03T16:36:21.565831
String
Remove
total_score
43.69
Number
Remove
transcript
Hi, I'm Mukesh. I'm self-motivated engineering expert, currently pursuing BTech in stream of Computer Science Engineering at Ari College, Sorabaam. I'm familiar with programming languages like C programming, CPP, Python. I have solved more than 300+ problems in gigs for gigs as well as lead code. I'm, I have sufficient knowledge in Data structures and algorithms. I have plenty knowledge on other technologies like AWS cloud and DevOps. I have completed certification courses like C++ Essentials issued by Cisco Network Academy and Azure 900 issued by Microsoft, and I'm a certified AWS cloud practitioner. To fill the gap between learning and practicing, I have worked on a project. Container orchestration using couper. Finally, the skill set of mine will surely drive me to success in all aspects. Thank you.
String
Remove
video
s3://hirefusion-interview-videos/sample_video.mp4
String
Remove

Team Member Roles & Contributions

Member 1 (SAYYAD SAMEER)– AWS Lambda & Event-Driven Backend Developer

- Developed and deployed core AWS Lambda functions for Resume Analyzer and Interview Grader.
- Integrated event-driven architecture using S3 event notifications to automatically trigger Lambdas.
- Configured API Gateway endpoints for frontend-backend communication.
- Integrated all AWS services (Textract, Rekognition, Transcribe, Comprehend, DynamoDB).
- Managed CloudWatch logs, alarms, and error monitoring.
- Led cloud architecture design and AWS deployment.

Member 2 (BOGAVALLI AKASH) – Frontend Engineer

- Built the user interface for resume and video uploads using HTML, CSS, and JavaScript.
- Integrated API calls for fetching scores and results from Lambda via API Gateway.
- Developed responsive layouts and designed user-friendly components for the dashboard and results page.
- Integrated Cognito-based user authentication and session control.

Member 3 (KANTIPUDI VIVEK VARDHAN)– Cloud & IAM Configuration Specialist

- Set up and configured all AWS services including S3 buckets, and DynamoDB tables.
- Created and managed IAM roles and permissions for secure Lambda and API access.
- Ensured security policies and least privilege principle were followed across services.
- Managed cross-service permissions and deployment setup.

Member 4 (MURAMALLA AMBICA SAIRAM)– AI Scoring Strategy & NLP Logic Designer

- Designed the logic and algorithm to calculate scores from AI service outputs (skills, expressions, transcription).
- Fine-tuned emotion-based grading rules (e.g., Happy = +10, Low confidence = –5).
- Configured AWS Comprehend usage for entity extraction (e.g., skills, sentiments).
- Provided mappings for sentiment/emotion weights and contributed to the business logic behind candidate evaluation.

Member 5 (GODE SIVA RAMA KRISHNA DURGA PRASAD)– Testing & Debugging Lead

- Validated Lambda outputs using CloudWatch logs and manual test uploads.
- Monitored system behavior under different input scenarios (PDFs with no text, silent videos, etc.).
- Reported and documented system bugs, bottlenecks, and recommended improvements.
- Verified successful data storage in DynamoDB and correct API responses.

Member 6 (BIKKAVOLU S SAI VEERA BHADRA AYYAN) – Documentation & Presentation Manager

- Wrote project documentation, including architecture diagrams, flowcharts, AWS usage tables, and setup instructions.
- Prepared the final presentation (PPT), README files, and user guide.
- Organized screenshots, test outputs, and GitHub folder structure.
- Led coordination for final project submission and demonstration.

Learnings and Challenges

Key Learnings:

- **Serverless Architecture**: Gained hands-on experience with AWS Lambda and other serverless services like S3, API Gateway, and DynamoDB. I learned how to create efficient, cost-effective applications with minimal infrastructure management.
- **AI Services**: I learned how to integrate AWS AI services like **Textract**, **Comprehend**, and **Rekognition** for real-world applications like document processing and video analysis.
- **Event-Driven Design**: I understood the importance of event-driven architecture in cloud applications, especially for triggering actions based on file uploads in S3 using event notifications.
- **Monitoring and Debugging**: I learned how to leverage **CloudWatch Logs** to monitor Lambda executions, track errors, and optimize the performance of AWS Lambda functions.

Challenges:

- **Complexity of AI Integration**: Integrating multiple AI services like **Rekognition** and **Comprehend** for analyzing videos and resumes posed challenges, such as handling various data formats and optimizing performance.
- **Error Handling**: Ensuring that all Lambda functions handled errors gracefully, especially in complex scenarios where the processing could fail at any step (e.g., file format issues, API rate limits).

Advantages of the System

- **Automation**: The system automates resume analysis and interview grading, making the hiring process faster and more efficient.
- **Scalability**: The serverless architecture ensures that the system can scale with the increasing number of resumes and videos uploaded.
- **AI-Driven**: By leveraging AWS AI services, the system performs complex tasks like skill extraction and emotion detection without human intervention.
- **Cost Efficiency**: Using AWS Lambda and other serverless services ensures minimal operational costs, as resources are only consumed when required.

Limitations:

- Basic scoring system – does not fully consider experience or context.
- Video analysis may miss subtle emotions or poor audio quality affects Transcribe.
- Currently supports English only.
- No feedback loop from users to improve accuracy.

Future Enhancements

- **Improved Scoring Mechanisms**: Currently, scoring is based on skills or facial expressions. A more complex scoring system could be developed that incorporates various factors such as experience, language proficiency, and sentiment.
- **User Feedback**: Implement a feedback mechanism where users can validate the results of the analysis (resume or interview) to continuously improve the accuracy of the system.
- **Expanded Support for Video Formats**: The system currently supports common video formats. Adding support for more formats and integrating multi-language transcription for international users would enhance the system.
- Multi-language transcription.
- More advanced scoring models using ML.
- Real-time interviewer feedback system.

Summary

The HireFusion-AI project was developed with the aim of revolutionizing the recruitment process by leveraging cloud computing and artificial intelligence. The system focuses on two primary modules:

1. Resume Analyzer – Automates the process of extracting information from resumes using Amazon Textract and Amazon Comprehend. It detects candidate skills, generates scores, and stores results in DynamoDB for future reference.
2. Interview Grader – Evaluates interview videos using Amazon Rekognition (for facial expressions and gestures), Amazon Transcribe (for speech-to-text conversion), and Comprehend (for sentiment and keyword analysis).

The entire project is built on AWS serverless architecture for scalability and cost-efficiency. S3 Event Notifications trigger Lambda functions, which process the uploaded files and store results in DynamoDB. The processed data is then displayed to users through APIs exposed via API Gateway, and user authentication is securely managed using AWS Cognito.

To ensure smooth operations, CloudWatch was integrated for detailed monitoring, logging, and setting alarms in case of system failures. The project's modular design allows future integrations with external HR tools and AI models.

The system significantly reduces manual effort in candidate evaluation, eliminates recruiter bias, and delivers consistent, data-driven results. This project demonstrates how modern recruitment processes can be automated using AI + Cloud technologies to streamline hiring.

Conclusion

In conclusion, HireFusion-AI is a robust and scalable platform designed to transform traditional recruitment practices. By utilizing AWS serverless services, the system ensures minimal infrastructure management while providing high availability and reliability. The integration of AI services like Textract, Rekognition, Comprehend, and Transcribe enables automated, intelligent analysis of resumes and interviews, reducing hiring time and improving accuracy.

Key takeaways of the system include:

- Efficiency: Automates resume screening and interview evaluation, reducing recruiter workload.
- Accuracy: Data-driven scoring reduces bias and human error.
- Scalability: Serverless architecture allows the system to handle an increasing number of users without performance issues.
- Extensibility: Future enhancements, such as ML-based scoring models and real-time feedback, can be easily integrated.

This project successfully showcases the potential of cloud-based AI solutions for HR automation. Our team learned hands-on how to integrate multiple AWS services into a unified system, implement event-driven architecture, and monitor applications using CloudWatch. With further enhancements, HireFusion-AI can evolve into a full-fledged recruitment platform capable of supporting organizations worldwide.