Project Documentation - GenAI Career Intelligence Platform

Track - Education & Learning **Team -** 403 Forbidden

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1. Introduction

In the rapidly evolving landscape of higher education, the bridge between academic learning and industry employability is often fragile. While universities excel at delivering theoretical knowledge, students frequently struggle to translate that knowledge into the practical, high-pressure environment of technical interviews.

Our solution, the **GenAI Career Intelligence Platform**, is designed to democratize access to high-quality career coaching. By leveraging the power of Generative AI, we provide an "always-on" personal mentor that simulates realistic interview scenarios, analyses resumes against industry standards, and offers granular, actionable feedback. Our mission is to transform how students prepare for their careers—moving from static, generic advice to dynamic, personalized intelligence that adapts to their unique strengths and weaknesses.

2. Problem Statement

The "Feedback Gap" in Career Preparation

Despite the abundance of online learning resources, a critical gap remains in the recruitment lifecycle for students:

- **Lack of Personalized Feedback:** University career centres are often understaffed, unable to provide the one-on-one coaching required for thousands of students.
- **Static Preparation Tools:** Traditional methods—flashcards, static question lists, or peer mock interviews—fail to simulate the unpredictability and pressure of a real technical interview.
- **Generic Assessments:** Existing automated tools often provide binary "pass/fail" results without explaining *why* a candidate failed or how they can improve their communication style and technical depth.

The Consequence: Talented students often fail to showcase their true potential due to anxiety and lack of preparation, leading to a disconnect between graduate skills and employer expectations.

3. Technical Architecture Overview

To guarantee **100% service uptime** and seamless scalability, we have engineered a cloud-native architecture defined by a robust **Three-Level Intelligence System**. This hierarchical approach ensures that the interview experience never breaks, regardless of network conditions or latency.

3.1 Core Strategy: Three-Level Intelligence System

Our platform moves beyond simple redundancy by utilizing a tiered fallback mechanism:

- **Level 3 (Cloud AI - High Performance):** This is our apex intelligence layer, hosted on **AWS EC2**. It handles complex reasoning and deep analysis tasks. Simultaneously, **Amazon S3** is integrated for secure, scalable data persistence, managing candidate resumes and session recordings with enterprise-grade reliability.
- **Level 2 (Local AI - Privacy & Speed):** For rapid, cost-effective processing, we utilize **Ollama** running locally. This layer handles immediate tasks like initial parsing and real-time interaction, reducing latency and keeping sensitive data private.
- **Level 1 (Deterministic Fallback - Reliability):** As a final safety net, a rule-based deterministic layer ensures continuity. If both AI layers encounter issues, this system takes over to maintain the interview flow, ensuring the user journey is never disrupted.

3.2 Agile Development & Deployment

To accelerate our time-to-market, we leveraged **Kiro.dev** for rapid prototyping. This allowed our team to iterate quickly on the architecture, testing the interaction between Local and Cloud layers, and deploying a production-ready cloud-native solution with speed and precision.

3.3 Infrastructure Stack

Our infrastructure is streamlined to support this multi-engine approach efficiently:

- **Frontend Interface:** Built with **React and Vite**, offering a responsive, real-time experience where students can interact seamlessly with the AI.
- **Backend Orchestrator:** A high-performance **FastAPI (Python)** server acts as the central bridge, executing the logic for the Hybrid Mode and routing requests between Ollama and Gemini.
- **Data Persistence:**
    - **MongoDB Atlas:** Selected for its flexibility with unstructured data, storing user profiles, transcripts, and scoring metrics.
    - **AWS S3:** Acts as our secure object store for heavy artifacts, hosting PDF resumes and generated performance reports.

3.3 Feature-Specific Data Workflows

Our architecture supports three distinct data flows corresponding to our core features:

A. Job Fit Analysis (Resume Intelligence)

1. **Ingestion:** The student uploads a resume. The file is securely streamed to **AWS S3**, while the text is extracted.
2. **Mapping:** The **Local AI Engine** parses the skills and experience against a target Job Description.
3. **Gap Analysis:** The system identifies missing critical skills (e.g., "Missing: Docker") and generates a compatibility score.
4. **Output:** A detailed "Fit Report" is stored in **MongoDB** with actionable upskilling recommendations.

B. Aptitude Testing & Training

1. **Generation:** The **Hybrid Engine** generates logical reasoning and quantitative aptitude questions tailored to the student's branch of study.
2. **Interaction:** The student answers time-bound questions.
3. **Evaluation:** The system evaluates accuracy and speed instantly.
4. **Tracking:** Performance metrics are logged in **MongoDB**, allowing the system to recommend specific focus areas (e.g., "Focus more on Data Interpretation").

C. Adaptive AI Mock Interview (The Core Loop)

1. **Context Loading:** The system loads the candidate's resume and target role from **MongoDB**.
2. **Adaptive Simulation:**
    - *Step 1:* The AI generates an initial question.
    - *Step 2:* **Real-Time Difficulty Adjustment:** As the student answers, the AI analyses the depth of the response. If the answer is strong, the next question becomes **harder/more complex**. If weak, it adjusts to fundamental concepts to rebuild confidence.
3. **Scoring:** The input is routed through the **Cloud AI Engine** for deep analysis of Technical Accuracy, Communication Clarity, and Role Fit.
4. **Final Report:** A comprehensive performance report is generated and persisted for longitudinal tracking.

4. Conclusion

The GenAI Career Intelligence Platform represents a shift from "generic advice" to "personalized intelligence." By architecting a solution that integrates **Job Fit Analysis, Aptitude Training, and Adaptive Interviews**, we offer a complete placement ecosystem.

Our unique Hybrid Architecture ensures this solution is not only powerful but also private and economically viable for educational institutions. We are empowering students to fail safely in practice so they can succeed confidently in reality.