Project Documentation

Project Name: ***HalaTuju***

Team Name: ***Bubble Berry***

SDG: ***4 – Quality Education***

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1. Technical Implementation Overview

1.1 Core Mission

HalaTuju is an intelligent decision-support platform designed to resolve the stream selection crisis in Malaysian secondary education. It bridges the gap between traditional counseling and the digital economy by providing an AI-driven "*Oracle*" that analyzes student psychometrics.

1.2 Technologies Used

- **Google AI Studio (Gemini 1.5):** Acts as the core reasoning engine. It processes raw psychometric scores (RIASEC model) to generate future-proof career roadmaps and "Career Personas" such as *"The Makers"* or *"The Storytellers".*
- **Firebase Studio:** Utilized as a unified agentic workspace to architect both the user interface and backend infrastructure.
- **Firebase Realtime Database:** Provides a low-latency NoSQL database to store the 90-question diagnostic bank, student responses, and generated career reports.
- **Firebase Authentication:** Used to provide secure Google Login for each student.
- **Next.js 14:** The primary frontend framework using the App Router and Server Actions for secure AI logic handling.

2. Implementation, Innovation, and Challenges

2.1 Implementation Details

The system follows a strategic steps flow:

Multi-Dimensional Input: The student provides two critical datasets:

- ***Psychometric Assessment:*** A 90-question diagnostic mapping Interests (Heart), Competency (Hands), and Personality (Head).
- ***Academic Profile:*** Users key in their most recent grades for core subjects (Mathematics, Science, English, etc.).

Hybrid Scoring Engine: The system calculates a "Preference Score" based on the RIASEC model.

- ***Academic Validation:*** This is the "Reality Check" layer. The engine compares the student's preferred career path against their academic strengths. For example, if a student expresses interest in "STEM/Engineering" but their keyed-in Mathematics grade is a "D," the AI is instructed to suggest a bridge program or emphasize the specific subjects they need to improve to reach that goal.

AI Reasoning (Gemini 1.5): The backend triggers a request to Gemini 1.5, passing the combined data *(Psychometric Scores + Academic Grades)*. Through strict system instructions, the AI acts as a counselor, reconciling the student's passion with their actual academic performance.

Reporting: A personalized "Future Roadmap" is generated, recommending specific Form 4 streams (Sains Tulen, Aliran Teknikal, or Kemanusiaan) that are both aspirational and academically realistic.

2.2 Innovation

- **Static to Dynamic:** Unlike traditional paper-based tests (PPsi) that give generic categories, HalaTuju provides a qualitative explanation of why a student fits a specific path.
- **Predictive Market Alignment:** The AI's knowledge base is integrated with the current Critical Occupations List, steering students toward high-growth fields like AI and Cybersecurity rather than just traditional roles.
- **Career Personas:** Instead of abstract academic choices, it defines tangible professional identities to help students visualize their future selves.

2.3 Challenges Faced & Solutions

- **Challenge 1:** *Steep Learning Curve with Firebase Studio*

  As first-time users of Firebase Studio, we faced a significant challenge in managing a unified agentic workspace. Navigating the integration between the AI-driven code generation and our manual backend configurations was difficult for a "newbie" team.

  - **Solution:** We adopted an iterative learning approach, spending extra hours in the documentation and utilizing Firebase's real-time debugging tools to ensure our database rules and authentication flows were synchronized correctly. This forced us to master full-stack concepts in a very short timeframe.
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- **Challenge 2:** *Google Cloud Billing & Resource Constraints*

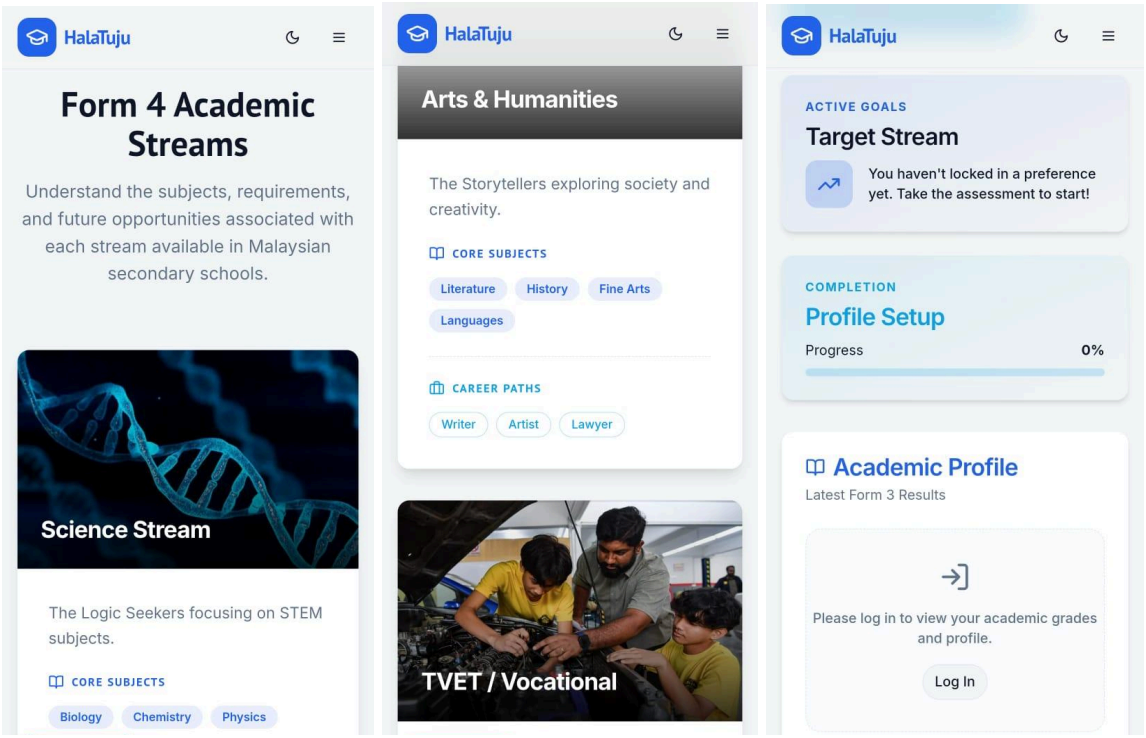
  A major hurdle was the requirement for paid Google Cloud Service tiers for certain advanced features (like automated deployment or specific cloud functions). As a student team with zero budget, we could not access the paid features necessary for a "one-click" live deployment.

  - **Solution:** We pivoted our strategy to focus on a Local-First Technical Review. By optimizing our code to run perfectly in a local development environment and providing clear GitHub documentation, we ensured the judges could still evaluate our 100% functional prototype without needing a hosted URL.

- **Challenge 3:** *Reconciling Passion with Academic Reality*

  Integrating user grades introduced a logic conflict: what happens when a student's dream doesn't match their current results?

  - **Solution:** We engineered the Gemini 1.5 prompt to act as a "Growth Mindset" counselor. Instead of telling a student "No," the AI suggests the necessary academic improvements and specific KSSM subjects needed to bridge the gap between their current grades and their desired career.



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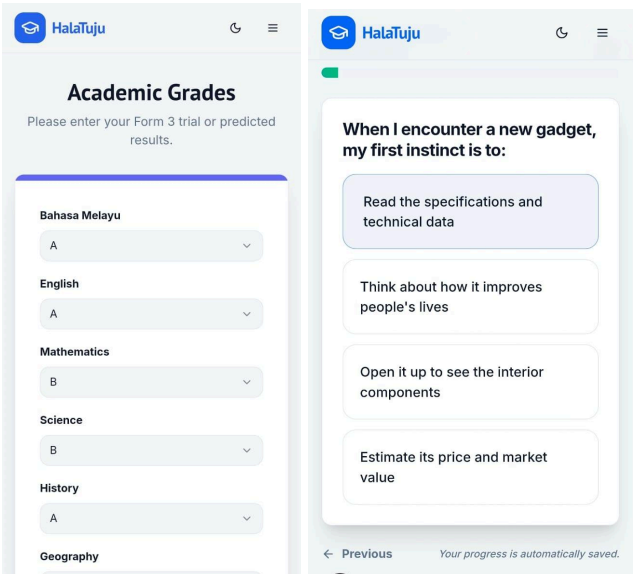

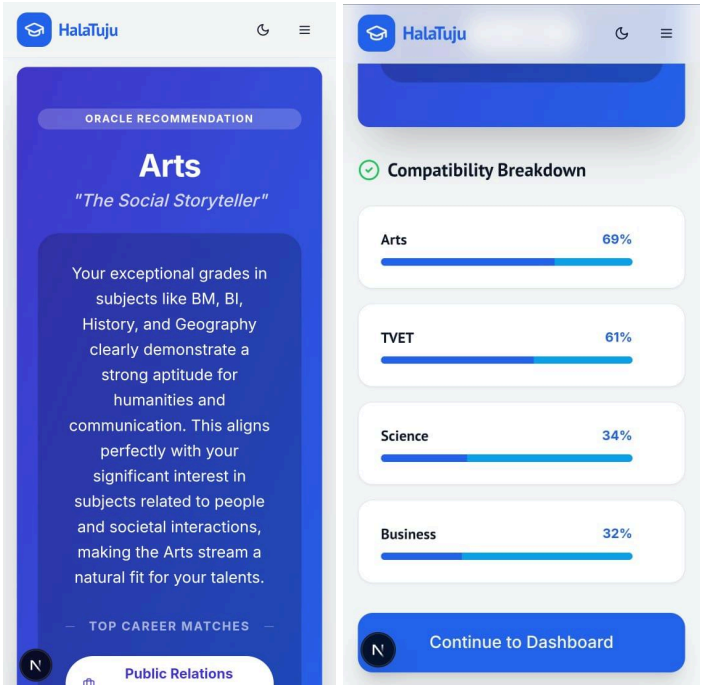

Disclaimer: This app is on testing phase and not all streams in Malaysia has been fully integrated into the system.