Project Design Phase: Solution Architecture

Date: 05 February 2026

Team ID: LTVIP2026TMIDS51094

Project Name: Flavour Fusion: AI-Driven Recipe Blogging

Maximum Marks: 4 Marks

1. Architectural Strategy

The architecture for **Flavour Fusion** is designed to handle high-latency AI processes without degrading the user experience. By utilizing an asynchronous communication pattern between the React frontend and the Node.js backend, we ensure the UI remains responsive.

> **Scalability:** The use of MongoDB Atlas allows the database to scale as the user's recipe library grows.
>
> **Security:** A Middleware layer handles **JWT Authentication** and ensures the **Gemini API Key** is never exposed to the client-side browser.
>
> **Efficiency: Gemini 2.5 Flash** was chosen for the inference engine to provide a balance between deep culinary knowledge and rapid response times.
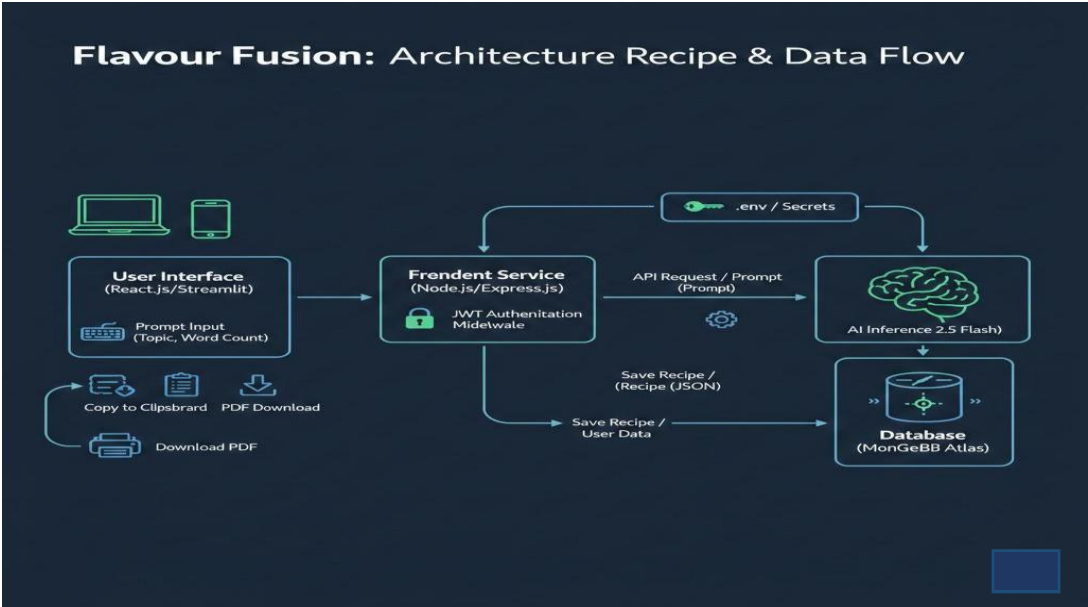
2. Solution Architecture Diagram

Figure 1: Architecture and Data Flow of the Flavour Fusion Application

Data Flow Description:

User Input: The user enters a recipe topic and word count via the **React.js** interface.

Request Handling: The frontend sends a POST request with a **JWT token** to the **Express.js** backend.

Security & Env: The backend retrieves the **Google API Key** from the .env file (protected environment).

AI Inference: The server communicates with the **Gemini 2.5 Flash** model, sending a structured prompt.

Data Processing: The AI returns raw text; the Node.js server formats this and sends it back to the client.

Persistence: Optionally, the generated recipe and metadata are stored in **MongoDB** for the user's dashboard.

Export: The user can trigger a client-side function to convert the JSON response into a **PDF** using the FPDF/jspdf library.

3. Solution Specifications

Component	Technology	Role
Frontend	React.js / Streamlit	Manages the UI, user input, and PDF export rendering.
Backend	Node.js & Express	Handles routing, authentication, and AI API orchestration.
Database	MongoDB	Stores user profiles, saved recipes, and session data.
AI Model	Gemini 2.5 Flash	Acts as the "Brain" for creative recipe writing and formatting.
Security	.env / JWT	Ensures credential safety and authorized access to the AI engine.

4. Stakeholder Value

For Users: Provides a fast, reliable, and secure way to generate content.

For Developers: Follows a modular MERN structure, making it easy to add future features like "Image Generation" or "Social Media Auto-posting."