AI Study Buddy – Technical Documentation

1. Overview

AI Study Buddy is a web-based application that assists students in organizing and studying educational content using AI-enhanced features. The system includes a frontend interface, backend processing logic, and a secure data persistence layer.

2. Technical Architecture

Includes frontend interface, backend processing, and data persistence layer with security measures.

2.1 Frontend Interface

Built using modern frameworks (e.g., React). Includes authentication, content upload, AI-based processing, and results review. Mobile-responsive and uses HTTPS for security.

2.2 Backend Processing Logic

Handles RESTful API endpoints, manages AI service coordination, session handling, rate limiting, and job queueing. Includes authentication via JWT/OAuth.

2.3 Data Persistence Layer

Stores user profiles, study content, and processed results securely in a relational or NoSQL database. Ensures encryption, backups, and compliance with data privacy laws.

3. API Authentication & Rate Limiting

Uses JWT tokens for authentication and Redis-based rate limiting. Limits users per hour or per endpoint to prevent abuse.

4. Error Handling & User Feedback

Structured JSON errors with codes (400, 401, 403, 429, etc.). Frontend shows clear feedback with retry options and job status tracking.

5. Testing Strategy

Comprehensive testing includes unit, integration, and E2E tests. Uses CI/CD pipelines for deployment with test automation and monitoring.

6. Additional Considerations

Covers scalability, compliance (POPIA, GDPR), versioning, logging, analytics, and cost management.

7. Summary

Documentation covers full technical scope — frontend, backend, security, APIs, testing, and future scalability plans.