Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	27 June 2025
Team ID	LTVIP2025TMID29535
Project Name	EduTutor-AI_personalized-learning-with-generative-ai-and-lms-integration
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

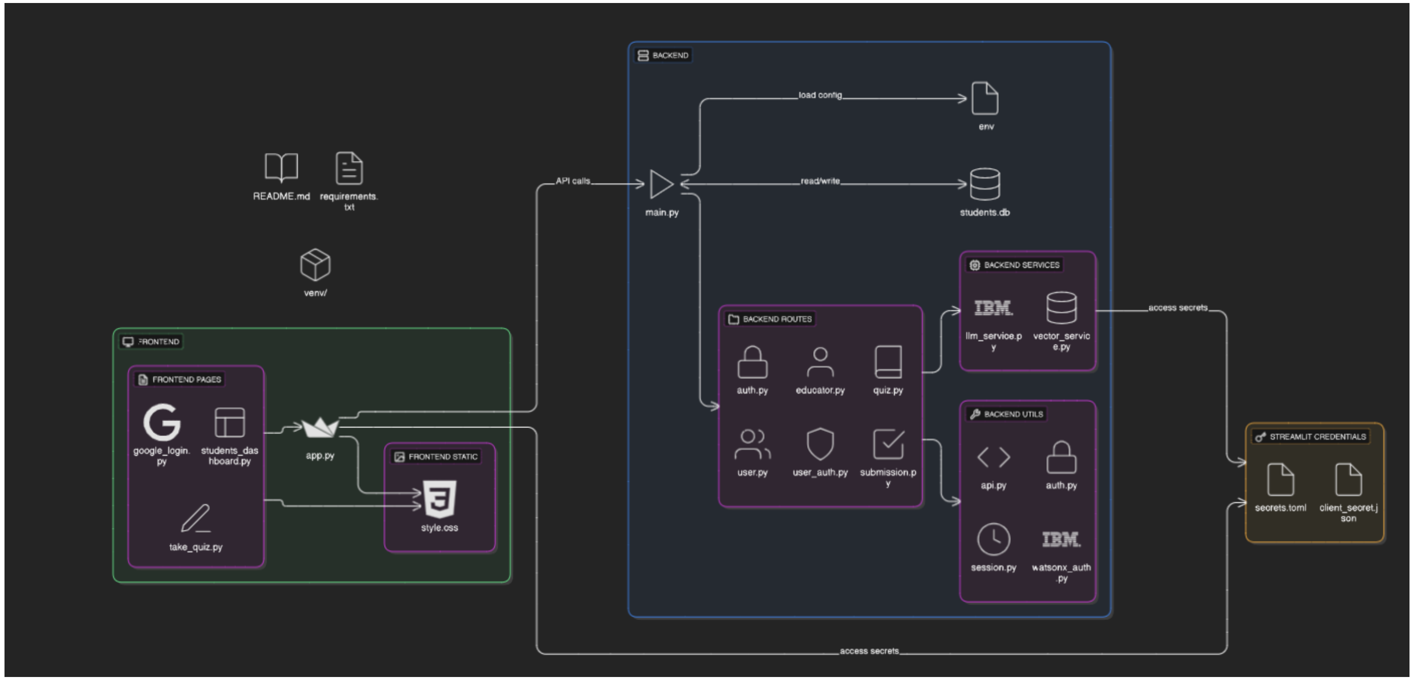

Table-1 : Components & Technologies:

S.No	Component	Description	Technology/Tools Used
1.	**User Interface**	How users interact with the application — for quiz access and results view	**Streamlit** (Student/Admin UI), **React JS**
2.	**Application Logic-1**	Backend logic for quiz generation, student evaluation	**Python** (Flask/FastAPI)
3.	**Application Logic-2**	Voice-to-text conversion for quiz questions (if used)	**IBM Watson Speech to Text (STT)**
4.	**Application Logic-3**	Chatbot for user support or quiz guidance	**IBM Watson Assistant**
5.	**Database**	Stores student records, quiz questions, scores	**MySQL**, **Firebase Realtime DB**, **NoSQL**
6.	**Cloud Database**	Cloud-hosted database for scalability	**IBM Cloudant**, **IBM DB2 on Cloud**
7.	**File Storage**	Stores result exports, user-uploaded files, etc.	**IBM Cloud Object Storage**, **Local Filesystem**
8.	**External API-1**	For quiz content enrichment (e.g., weather quiz, if applicable)	**IBM Weather API**, **Open Trivia DB**
9.	**External API-2**	For secure user verification or personalization	**Aadhar API**, **Google OAuth API**
10.	**Machine Learning Model**	AI-based model for adaptive quiz difficulty or score prediction	**Scikit-learn**, **Custom ML Model**
11.	**Infrastructure**	Where the app is hosted and deployed	**IBM Cloud Foundry**, **Kubernetes**, **Localhost**

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology Used
1.	**Open-Source Frameworks**	Frameworks used for frontend, backend, and ML	**Streamlit**, **React JS**, **Flask**, **Scikit-learn**, **Pandas**, **NumPy**
2.	**Security Implementations**	User data protection, secure login, and API access	**SHA-256 password hashing**, **OAuth2.0**, **JWT**, **IAM Controls**, **HTTPS**, **OWASP Guidelines**

S.No	**Characteristics**	**Description**	**Technology Used**
3.	**Scalable Architecture**	Designed using a 3-tier structure with potential for microservices (modularized quiz engine, auth)	**3-Tier Architecture**, **Docker**, **IBM Cloud Kubernetes**, **FastAPI/Flask APIs**
4.	**Availability**	Deployed with high availability through cloud services, backups, and horizontal scaling	**IBM Cloud Load Balancer**, **Redundancy on Kubernetes**, **Auto-Scaling**, **Cloud Foundry**
5.	**Performance**	Designed for fast quiz access and high concurrency; uses caching and stateless APIs	**Redis Cache**, **CDNs**, **Optimized DB Queries**, **Async APIs**, **Uvicorn (FastAPI)**