**Edututor ai-Technology stack**

**Date: 30 AUG 2025  
Team ID:** **NM2025TMID08930**

**Project Name: Edututor ai**

**Technical Architecture Components**

| **S.No** | **Component** | **Description** | **Technology** |
| --- | --- | --- | --- |
| 1 | User Interface | Web dashboard and student portal | React.js, Gradio (optional prototyping) |
| 2 | LMS Integration | Sync with Google Classroom | Google Classroom API |
| 3 | AI Models | Quiz generation, adaptation, evaluation | IBM Watsonx, IBM Granite LLM |
| 4 | Diagnostic Engine | Entry-level test generation for learner baseline | IBM Watsonx |
| 5 | Vector Search Engine | Embedding-based topic insights | Pinecone DB |
| 6 | Backend Logic | Quiz delivery, scoring, analytics | Python (Flask/FastAPI) |
| 7 | Database | Store quizzes, student scores, content metadata | PostgreSQL or MongoDB |
| 8 | Real-Time Feedback | Immediate scoring and suggestions | Flask + Socket.IO or Firebase RTDB |
| 9 | Authentication | User access and roles | OAuth 2.0 (Google), Firebase Auth (alt) |
| 10 | Analytics Dashboard | Performance tracking for teachers | Chart.js/D3.js + React.js |
| 11 | Infrastructure | Modular, scalable deployment | Docker, Kubernetes on IBM Cloud or GCP |

**⚙️ Application Characteristics**

| **S.No** | **Characteristic** | **Description** | **Technology** |
| --- | --- | --- | --- |
| 1 | Modular Architecture | Independent modules for AI, LMS, dashboard | Microservices, REST APIs |
| 2 | Scalability | Handles high traffic during peak student logins | Kubernetes + Load Balancer |
| 3 | Real-Time Capabilities | Push feedback and updates instantly | WebSockets / Firebase RTDB |
| 4 | Personalization Engine | Adaptive learning based on quiz history | AI-driven logic from IBM Watsonx |
| 5 | Performance Monitoring | Uptime and usage analytics | Prometheus + Grafana (opt) |
| 6 | Security & Privacy | Role-based access, encrypted data | JWT, TLS, AES-256 |