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

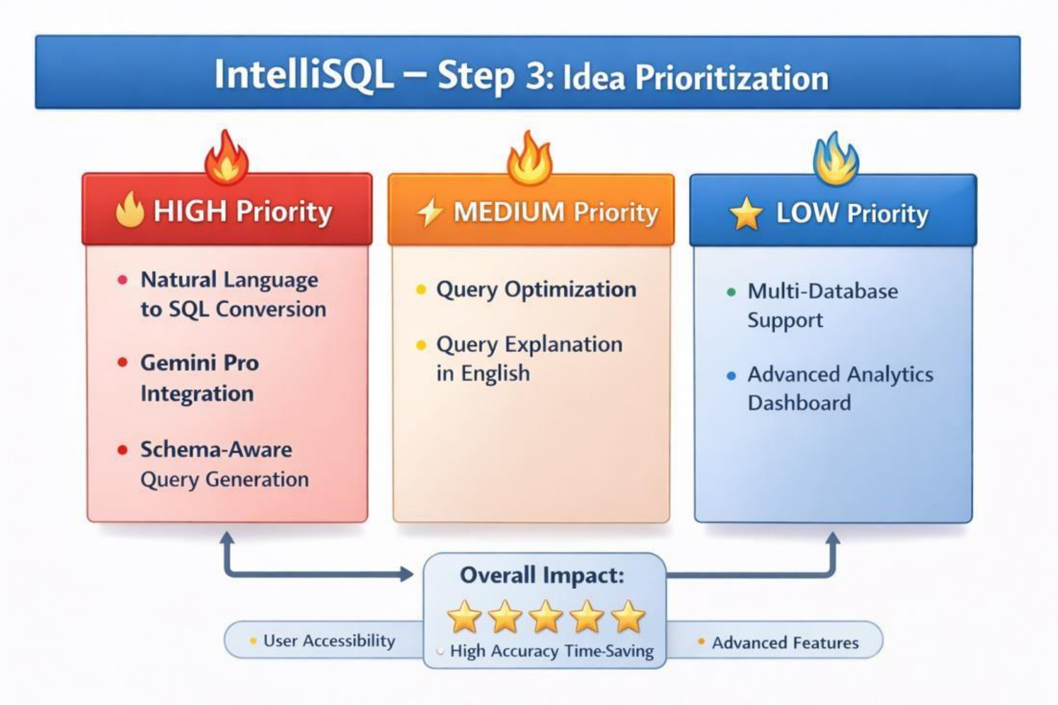
Date	20 February 2026
Team ID	LTVIP2026TMIDS52185
Project Name	Intelligent SQL Querying with LLMs Using Gemini Pro
Maximum Marks	4 Marks

Technical Architecture:

The Intelli SQL system follows a modular AI-powered architecture where users provide natural language input through a web interface. The input is processed by the application logic layer and forwarded to Gemini Pro (LLM) for SQL query generation.

The generated query is validated, executed on the database, and results are displayed back to the user.

The architecture clearly separates User Interface, Application Logic, Machine Learning Layer, Database Layer, and Cloud Infrastructure components.



IntelliSQL – Step 3: Idea Prioritization

HIGH Priority

- Natural Language to SQL Conversion
- Gemini Pro Integration
- Schema-Aware Query Generation

MEDIUM Priority

- Query Optimization
- Query Explanation in English

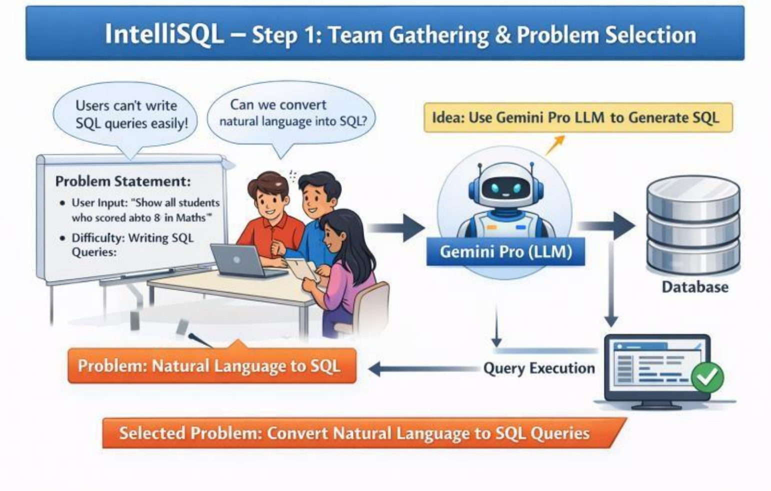
LOW Priority

- Multi-Database Support
- Advanced Analytics Dashboard

Overall Impact:

★★★★★

- User Accessibility
- High Accuracy Time-Saving
- Advanced Features



IntelliSQL – Step 1: Team Gathering & Problem Selection

Users can't write SQL queries easily!
Can we convert natural language into SQL?
Idea: Use Gemini Pro LLM to Generate SQL
Gemini Pro (LLM)
Database
Query Execution

Problem Statement:

- User Input: "Show all students who scored abto 8 in Maths"
- Difficulty: Writing SQL Queries:

Problem: Natural Language to SQL

Selected Problem: Convert Natural Language to SQL Queries

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	Web-based interface for entering natural language queries and viewing results.	HTML, CSS, JavaScript, Stream lit / React
2.	Application Logic-1	Handles request processing, schema retrieval, prompt engineering, and API communication.	Python (Flask / Fast API)
3.	LLM Integration	Converts natural language into schema-aware SQL queries.	Gemini Pro API
4.	Query Validation Module	Validates generated SQL and prevents SQL injection.	Custom Python validation scripts
5.	Database	Stores structured data and executes SQL queries.	MySQL / PostgreSQL
6.	Cloud Infrastructure	Deployment and hosting of application.	AWS / GCP / Azure
7.	External API	Gemini Pro API integration for LLM processing.	Google AI API

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Uses open-source libraries for backend and frontend development.	Python, Flask, React
2.	Security Implementations	Implements authentication, encryption, and SQL injection prevention.	JWT, HTTPS, SHA-256
3.	Scalable Architecture	Supports horizontal scaling and microservicesbased deployment.	Docker, Kubernetes
4.	Availability	Ensures high availability through cloud hosting and redundancy.	Cloud Load Balancer

5.	Performance	Optimized prompt engineering and caching mechanisms for faster response.	Redis Cache