Project Design Phase-II
TechnologyStack(Architecture&Stack)

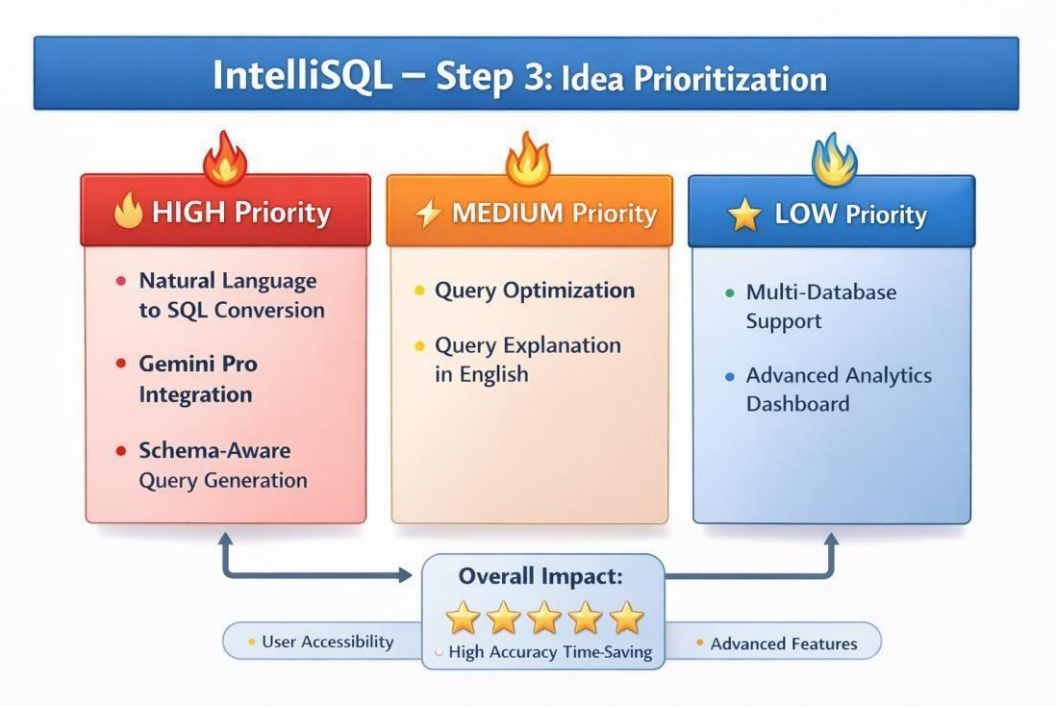
Date	08February2026
TeamID	LTVIP2026TMIDS66060
ProjectName	IntelligentSQLQueryingwithLLMsUsing GeminiPro
MaximumMarks	4 Marks

TechnicalArchitecture:

TheIntelliSQLsystemfollowsamodularAI-poweredarchitecturewhereusersprovidenaturallanguageinputthroughawebinterface.Theinputis processed by the application logic layer and forwarded to Gemini Pro (LLM) for SQLquery generation.

Thegeneratedqueryisvalidated,executedonthedatabase,andresultsaredisplayedbacktotheuser.

ThearchitectureclearlyseparatesUserInterface,ApplicationLogic,MachineLearningLayer,DatabaseLayer,andCloudInfrastructurecomponents.


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

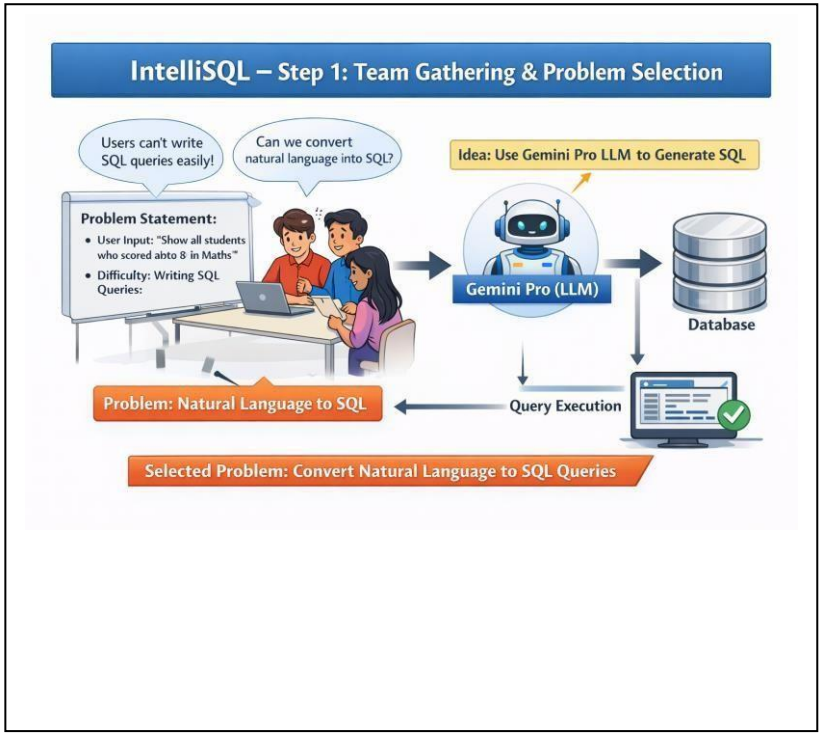

IntelliSQL – Step 1: Team Gathering & Problem Selection
Users can't write SQL queries easily!
Can we convert natural language into SQL?
Idea: Use Gemini Pro LLM to Generate SQL
Problem Statement:
User Input: "Show all students who scored abto 8 in Maths"
Difficulty: Writing SQL Queries:
Gemini Pro (LLM)
Database
Problem: Natural Language to SQL
Query Execution
Selected Problem: Convert Natural Language to SQL Queries

Table-1:Components&Technologies:

S.No	Component	Description	Technology
1.	UserInterface	Web-basedinterfaceforenteringnaturallanguage queriesandviewingresults.	HTML,CSS,JavaScript,Streamlit/ React
2.	ApplicationLogic-1	Handlesrequestprocessing,schemaretrieval, promptengineering,andAPIcommunication.	Python(Flask/FastAPI)
3.	LLM Integration	ConvertsnaturallanguageintoschemaSQL queries.	GeminiProAPI
4.	QueryValidationModule	ValidatesgeneratedSQLandpreventsSQL injection.	CustomPythonvalidationscripts
5.	Database	StoresstructureddataandexecutesSQLqueries.	MySQL/ PostgreSQL
6.	CloudInfrastructure	Deploymentandhostingofapplication.	AWS/GCP/Azure
7.	ExternalAPI	GeminiProAPIintegrationforLLMprocessing.	GoogleAIAPI

Table-2:ApplicationCharacteristics:

S.No	Characteristics	Description	Technology
1.	Open-SourceFrameworks	Usesopen-sourcelibrariesforbackend and frontenddevelopment.	Python,Flask, React
2.	SecurityImplementations	Implementsauthentication,encryption,andSQL injectionprevention.	JWT,HTTPS,SHA-256
3.	ScalableArchitecture	Supportshorizontalscalingandmicroservicesbased deployment.	Docker,Kubernetes
4.	Availability	Ensureshighavailabilitythroughcloudhostingand redundancy.	CloudLoadBalancer

5.	Performance	Optimized prompt engineering and caching mechanismsforfasterresponse.	RedisCache