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

Date	18th Febraury 2026
Team ID	LTVIP2026TMIDS57900
Project Name	Online Payments Fraud Detection using Machine Learning
Maximum Marks	4 Marks

Technical Architecture:

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

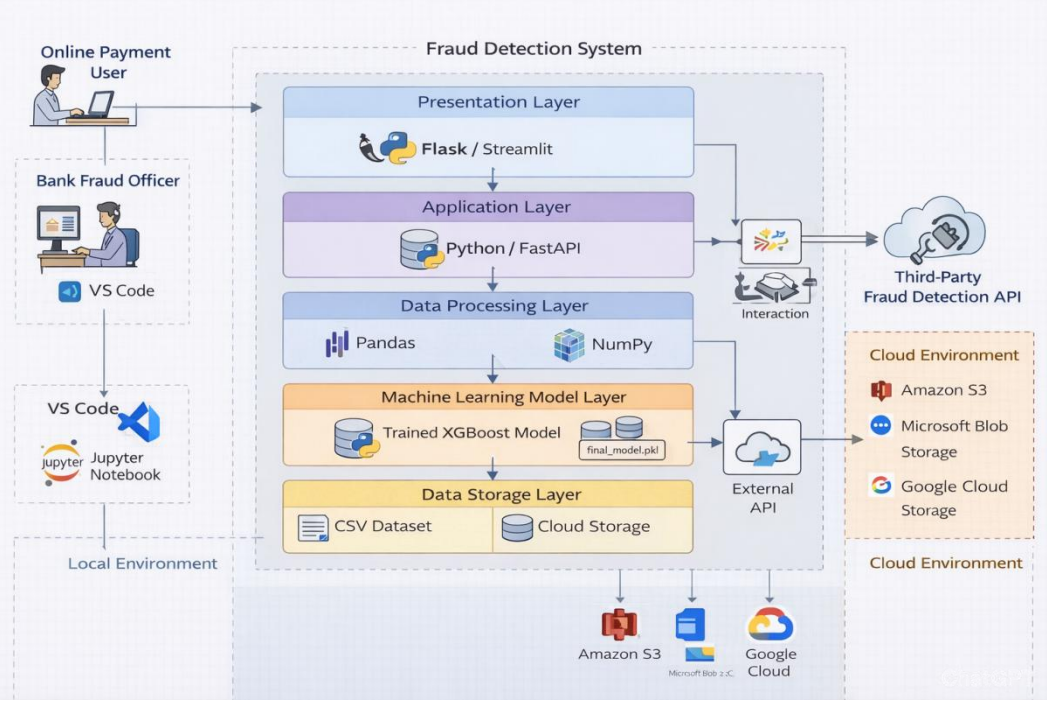

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Data Source	Provides raw financial transaction dataset for training and testing.	Kaggle Dataset (PS_20174392719_1491204439457_log.csv)
2.	Data Exploration & Analysis	Performs initial data understanding, visualization, and fraud pattern identification.	Python, Pandas, Matplotlib, Seaborn
3.	Data Preprocessing Module	Cleans dataset, removes irrelevant columns, encodes categorical data, balances classes, and prepares features for modeling.	Pandas, Label Encoding (Scikit-learn)
4.	Feature Engineering & Dataset Split	Splits dataset into input features (X) and target variable (y), and performs train–test split (80–20).	Scikit-learn
5.	Machine Learning Model Training	Trains multiple classification algorithms and evaluates performance.	Decision Tree, Random Forest, Extra Trees, SVM, XGBoost (Scikit-learn & XGBoost Library)
6.	Model Evaluation Module	Evaluates models using confusion matrix, precision, recall, F1-score, and accuracy.	Scikit-learn Metrics
7.	Final Model (Fraud Prediction Engine)	Uses selected XGBoost model to classify transactions as Fraud or Legitimate.	XGBoost Classifier
8.	Model Storage	Stores trained model for deployment and real-time prediction.	Pickle (final_model.pkl)
9.	Web Application Interface	Allows users to input transaction details and view prediction results.	Flask / Streamlit
10.	Application Logic Layer	Handles request processing and connects web interface with ML model.	Python
11.	Data Storage (Local)	Stores dataset and trained model locally.	CSV File, Local File System
12.	Deployment Environment	Runs the application for real-time fraud detection.	Local Server / Cloud Deployment (Future Scope)

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Performance	System provides fraud prediction results in real time after transaction submission.	XGBoost Optimized Model
2.	Accuracy	Achieves very high fraud detection accuracy (~100%) with minimal missed fraud cases.	XGBoost Classifier
3.	Security	Ensures transaction data is securely processed and protected from unauthorized access.	Secure Python Backend
4.	Scalability	Can be deployed on cloud infrastructure to handle large transaction volumes.	Cloud Deployment (Future Scope)
5.	Usability	Provides a simple and user-friendly web interface for transaction input and result display.	Flask / Streamlit
6.	Maintainability	Allows easy retraining or replacement of the fraud detection model.	Modular Python Architecture