Technology Stack Report

Date	14 February 2026
Team ID	LTVIP2026TMIDS54062
Project Name	Online Payments Fraud Detection using Machine Learning

Data Layer

Component	Description
Dataset	transactions_data.csv – structured dataset capturing transaction amount, timestamp, device ID, location, merchant category, IP address, and fraud label
Dataset	historical_fraud_data.csv – contains previous fraud records and chargeback history
Storage Format	Relational Database (MySQL / PostgreSQL) and CSV for model training
Tools Used	Python, SQL, Excel (for preprocessing and validation)

Data Processing Layer

Tool/Technology	Purpose
Python (Pandas, NumPy)	Data cleaning, feature engineering, handling missing values
Scikit-learn / XGBoost	Machine Learning model for fraud detection
SQL	Querying transaction records
Jupyter Notebook	Model training and experimentation

Model & Analytics Layer

Tool/Technology	Purpose
Machine Learning Model	Risk scoring and fraud prediction
Random Forest / XGBoost	Classification of transactions (Fraud / Legitimate)
Feature Engineering	Behavioral pattern analysis
Evaluation Metrics	Accuracy, Precision, Recall, F1-Score, ROC-AUC

Application &User Interaction Layer

Feature	Role
Real-Time Transaction Monitoring Dashboard	Displays suspicious activities and risk scores
Fraud Alerts (SMS/Email/Push Notification)	Notifies users instantly
Risk Segmentation Dashboard	Categorizes transactions into Low, Medium, High risk
Admin Panel	Allows fraud analysts to review flagged transactions
Customer Interface	Allows user to verify or block transaction

Security & Sharing

Feature	Notes
Data Encryption	SSL/TLS encryption for secure transactions
Multi-Factor Authentication	OTP / Biometric verification
Role-Based Access Control	Separate access for Admin, Analyst, and Customer
Compliance	PCI-DSS compliance for payment security

Deployment Layer

Tool/Technology	Purpose
Flask / FastAPI	Backend API for fraud detection
React / Web Application	Frontend user interface
Cloud Hosting (AWS / Azure / GCP)	Scalable deployment
Docker (Optional)	Containerized deployment

Justification for Technology Choices

- Machine Learning models provide accurate fraud detection compared to rule-based systems.
- Python ecosystem offers strong support for data processing and ML implementation.
- Real-time dashboards improve fraud monitoring efficiency.
- Cloud deployment ensures scalability and 24/7 availability.

- Encryption and compliance standards ensure secure financial transactions.