

Project Design Phase-II

Technology Stack (Architecture & Stack)

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| Date | 12 February 2026 |
| Team ID | LTVIP2026TMIDS83641 |
| Project Name | Online Payments Fraud Detection using Machine Learning |
| Maximum Marks | 4 Marks |

Technical Architecture

Architecture includes Web UI / Payment Interface, Backend API layer, preprocessing pipeline, Machine Learning fraud detection model, transaction database, and optional integration with payment gateway APIs. Initial deployment can be Local with a cloud-ready scalable design.

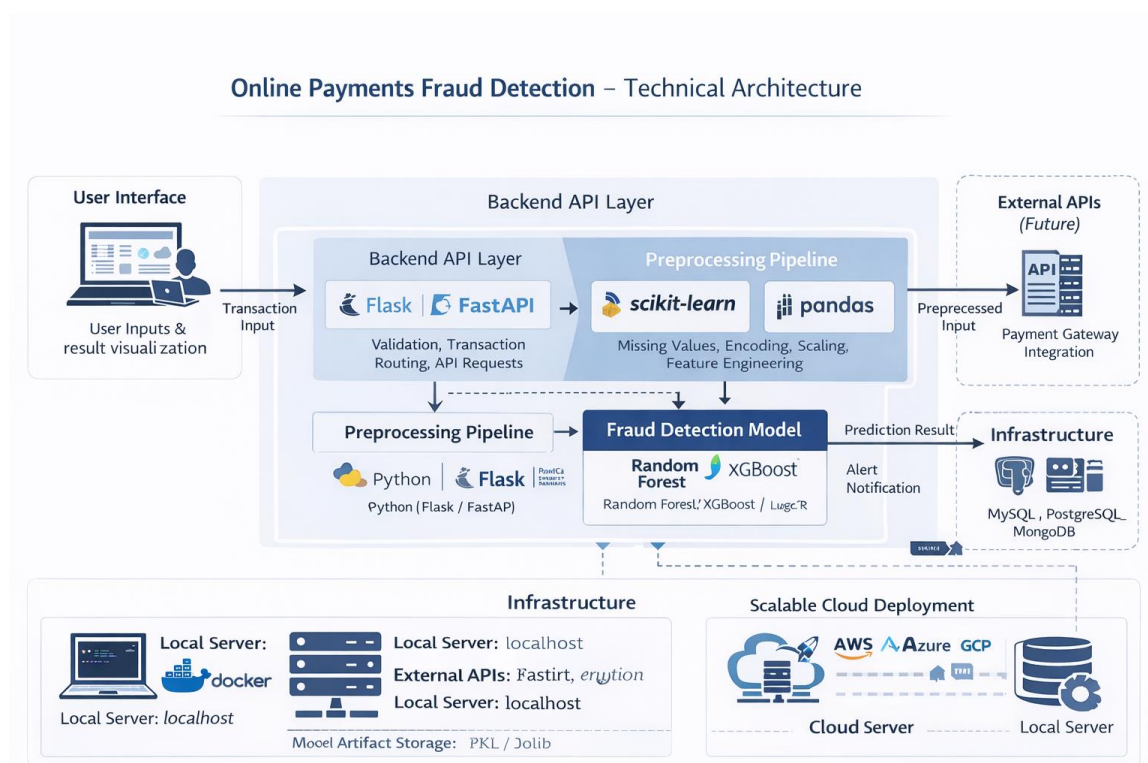


Table-1: Components & Technologies

| S.No | Component | Description | Technology |
|------|-------------------|---------------------------------------------------------------|------------------------------------------|
| 1 | User Interface | Transaction input, monitoring dashboard, fraud result display | HTML, CSS, JavaScript / React (Optional) |
| 2 | Application Logic | API endpoints, transaction routing, | Python (Flask / FastAPI) |

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|---|------------------------|----------------------------------------------------------------|-----------------------------------------------|
| | | validation | |
| 3 | Preprocessing Pipeline | Missing value handling, encoding, scaling, feature engineering | scikit-learn, pandas, NumPy |
| 4 | Machine Learning Model | Fraud detection & probability scoring | Random Forest / XGBoost / Logistic Regression |
| 5 | Database / Storage | Transaction records, logs, model artifacts | MySQL / PostgreSQL / MongoDB |
| 6 | Model Artifact Storage | Store trained model files (PKL/Joblib) | Local File System |
| 7 | External API (Future) | Payment gateway integration | Stripe API / Razorpay API (Optional) |
| 8 | Infrastructure | Local deployment; scalable cloud deployment | Localhost, Docker (Future), AWS / Azure / GCP |

Table-2: Application Characteristics

| S.No | Characteristics | Description | Technology |
|------|--------------------------|-----------------------------------------------------------|-------------------------------------------------|
| 1 | Open-Source Frameworks | ML and backend built using open-source stack | Flask/FastAPI, scikit-learn, pandas |
| 2 | Security Implementations | Secure transaction handling, encryption, input validation | HTTPS, JWT/Auth, Data Encryption |
| 3 | Scalable Architecture | Modular layered design; cloud-ready | 3-tier architecture, Docker/Kubernetes (Future) |
| 4 | Availability | Continuous fraud monitoring support | Cloud VM, Load Balancer (Future) |
| 5 | Performance | Real-time low-latency fraud detection | Optimized inference pipeline, caching (Future) |