Project Design Phase – II

Project Name: Real-Time Payment Fraud Detection System

Team ID: __ LTVIP2026TMIDS89328_____

1. Technical Architecture Overview

Architecture Type: 3-Tier Architecture

Presentation Layer → Application Layer → Data Layer

Architecture Flow:

User (Browser)

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Web Interface (HTML/CSS – Flask Templates)

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Flask Backend Server

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Data Preprocessing Module (Scaler + Encoder)

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Machine Learning Model (SVM / Logistic Regression)

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Prediction Output

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JSON Log Storage

2. Components & Technologies (Table-1)

S.No	Component	Description	Technology
1	User Interface	Web interface for transaction input & result display	HTML, CSS, Bootstrap
2	Application Logic-1	Backend processing	Python, Flask

		& routing	
3	Application Logic-2	Data preprocessing (encoding, scaling)	Scikit-learn, Pandas
4	Application Logic-3	Fraud prediction logic	SVM / Logistic Regression
5	Database	Prediction logs storage	JSON / Local Storage
6	Cloud Database	Future cloud storage	MongoDB Atlas (Future Scope)
7	File Storage	Model & scaler files	.pkl Files
8	External API-1	SMS Alert (Future)	Twilio API
9	External API-2	Payment Gateway (Future)	Razorpay / Stripe
10	Machine Learning Model	Fraud detection model	Scikit-learn
11	Infrastructure	Deployment Environment	Localhost / AWS EC2

3. Application Characteristics (Table-2)

S.No	Characteristic	Description	Technology
1	Open-Source Frameworks	Frameworks used in development	Flask, Scikit-learn
2	Security Implementations	Input validation & secure data handling	OWASP principles
3	Scalable Architecture	3-tier scalable design	Modular Flask Architecture
4	Availability	Accessible via web deployment	Localhost / Cloud
5	Performance	Fast prediction (<2 sec)	Pre-trained ML Model

4. UML Diagrams (Description)

Use Case Diagram: User inputs transaction details and receives fraud prediction.

Sequence Diagram: User → Flask → Preprocessing → ML Model → Result → User.

Class Diagram: Classes include UserInput, Preprocessor, MLModel, PredictionLogger.

5. C4 Model Description

Level 1 (Context): User interacts with Fraud Detection Web Application.

Level 2 (Container): Web UI, Flask Backend, ML Model, Data Storage.

Level 3 (Component): Preprocessing Component, Prediction Component, Logging Component.