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International Journal of Engineering Technology Research & Management (IJETRM)
Journal Article
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REAL TIME PAYMENT THREATS ANALYZER

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ABSTRACT
In today's fast-growing digital era, online payment systems such as **UPI, debit cards, credit cards, net banking, and digital wallets** have become an unavoidable part of everyday life. People depend on digital payment methods for shopping, bill payments, ticket booking, fund transfers, online subscriptions, and business transactions. Digital payment platforms provide fast and cashless transactions, which increases convenience for users and reduces dependency on physical cash. Due to the rapid increase in digital transactions, financial institutions and payment gateways must maintain high performance, quick response time, strong security, and reliable transaction confirmation. Millions of transactions are processed every second through different banking and financial platforms, and even a small issue in processing may lead to customer dissatisfaction, financial disputes, and revenue loss. Therefore, maintaining a stable, scalable, and secure real-time payment environment has become a major responsibility for banks, fintech companies, and payment gateway providers.

Keywords
Credit card fraud, Fraud detection, Imbalanced learning, Feature engineering

INTRODUCTION

In the modern digital era, financial technology has transformed the way people perform transactions. Traditional cash-based transactions are slowly being replaced by online and digital payment methods due to their speed, convenience, and accessibility. Payment systems such as UPI, credit cards, debit cards, mobile wallets, and internet banking have become essential in both personal and business environments. Today, customers expect instant money transfers, quick payment confirmation, and secure transaction processing without delays. As the number of online transactions increases rapidly, financial institutions and payment gateways face high pressure to provide stable and uninterrupted services.

Real-time payment systems are designed to process transactions immediately once the user initiates a payment request. These systems are expected to handle massive traffic during peak hours such as festival seasons, salary days, flash sales, and online shopping campaigns. During such times, payment servers receive millions of transaction requests within seconds. To manage this huge volume, payment platforms use distributed computing and multi-threading techniques. Multi-threading is a process where multiple transactions are handled simultaneously by dividing them across different threads. Each thread works independently and processes a group of transactions to ensure faster execution. This approach improves system speed and increases the transaction throughput.

However, real-time payment processing is not always smooth and error-free. Many real-world issues occur such as transaction delay, transaction timeout, server congestion, payment pending, network interruptions, and payment failures. Sometimes the money is deducted from the sender's account but not credited to the receiver instantly, which creates trust issues among users. These issues occur mainly due to overloaded threads, improper resource allocation, poor load balancing, and network instability. When one thread becomes slower than others, it causes a bottleneck situation that affects the overall payment processing speed. Hence, thread-level monitoring is extremely important in payment gateway systems.

Another serious problem in digital payment platforms is the increase in fraudulent activities. Fraudsters attempt to exploit payment systems by using illegal techniques such as phishing, identity theft, unauthorized access, account hacking, and fake transactions. Suspicious patterns such as repeated payment attempts, sudden high-value transactions, multiple failures, unusual login behavior, and rapid transactions from different locations may indicate fraudulent activity. If such fraud is not detected early, it can lead to financial loss and damage the

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reputation of payment service providers. Therefore, modern payment platforms require advanced fraud detection systems that can identify abnormal transaction behavior in real time.

OBJECTIVE

The main objective of the Real-Time Payment Thread Analyzer project is to design and develop an advanced and intelligent monitoring system that can continuously analyze digital payment transactions in real time and improve the overall performance, reliability, and security of online payment platforms. In today's banking and financial environment, payment systems such as UPI, debit cards, credit cards, net banking, and digital wallets are widely used by millions of users for fast money transfers, bill payments, online purchases, and business transactions. Due to this high usage, payment gateways and financial servers must process a huge volume of transactions within a short time. Therefore, the primary objective of this project is to ensure smooth transaction processing by continuously monitoring each transaction from the beginning stage until it reaches final completion. The system aims to track every transaction and classify it into different statuses such as successful, failed, pending, or timeout, so that the overall payment flow can be clearly understood.

Another major objective of this project is to collect and store all important payment transaction details such as transaction ID, user ID, payment amount, payment method, timestamp, processing time, thread ID, location, device type, IP address, and transaction status. These details are very useful for monitoring system performance, detecting errors, and generating transaction analytics reports. The system aims to process these details instantly and store them in a structured database such as MySQL, MongoDB, or SQLite, so that transaction history can be maintained for future analysis, auditing, and security verification. By storing transaction logs, the system supports transparency and helps administrators identify the causes of transaction failure or delay.

SCOPE OF THE PROJECT

The scope of the Real-Time Payment Thread Analyzer project is focused on the design, development, and implementation of an advanced monitoring and analytical system that enhances the performance, reliability, and security of modern digital payment platforms. In today's fast-growing digital economy, online transactions have become an integral part of daily life, and payment systems such as UPI, online banking, debit and credit card processing, mobile wallets, and e-commerce payment gateways handle millions of transactions every second. This project aims to provide a comprehensive solution that can operate alongside such systems to monitor transaction activities in real time, analyze thread-level processing performance, detect system inefficiencies, and identify potential fraud patterns. The system is intended to act as a support tool for payment service providers, banks, and financial institutions by offering real-time insights into transaction processing and system behavior.

One of the primary areas covered under the scope of this project is real-time transaction monitoring, where the system continuously captures transaction-related data such as transaction ID, user information, payment method, transaction amount, timestamp, geographical location, IP address, device details, and transaction status. By processing this data instantly, the system can track the entire lifecycle of each transaction, including initiation, validation, authentication, authorization, processing, and completion. This enables administrators to observe the flow of transactions in real time and quickly identify issues such as delays, failures, or abnormal patterns. The system also maintains a structured database using technologies such as MySQL, MongoDB, or SQLite to store transaction logs, which can be used for historical analysis, auditing, and report generation.

PROPOSED SYSTEM

The proposed system titled "Real-Time Payment Thread Analyzer" is designed to provide a complete real-time monitoring, analysis, and fraud detection solution for modern digital payment platforms. The system is mainly developed to overcome the drawbacks of existing payment systems, which often fail to provide detailed performance monitoring and early fraud detection. With the rapid increase in online transactions, payment platforms require a high-speed, secure, and reliable system that can handle large transaction volumes without delay or failure. Therefore, the proposed system focuses on analyzing payment transaction flow at both transaction level and thread level.

In this proposed system, every payment transaction is continuously monitored from the initial request stage to the final confirmation stage. The system collects important transaction details such as transaction ID, user ID, payment amount, payment method, transaction status, timestamp, processing time, thread ID, device type, IP address, and location. These transaction details are processed instantly and stored in a structured database such as MySQL, MongoDB, or SQLite. This database storage helps in maintaining transaction history, generating

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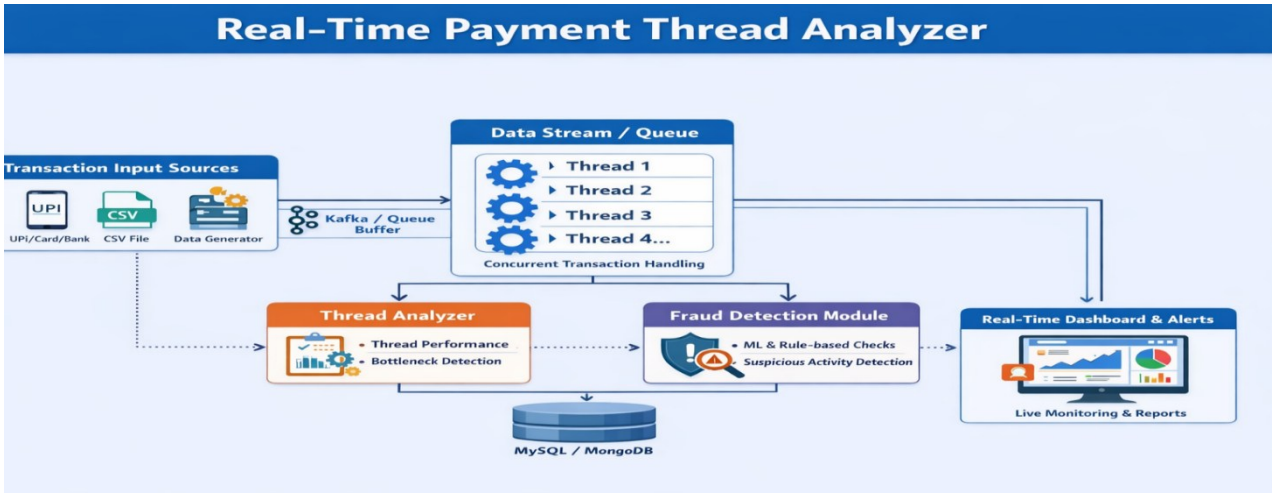
reports, and supporting auditing processes. Unlike existing systems, which only provide transaction status updates, the proposed system provides a complete analytical view of the internal processing of each transaction.

SYSTEM ARCHITECTURE

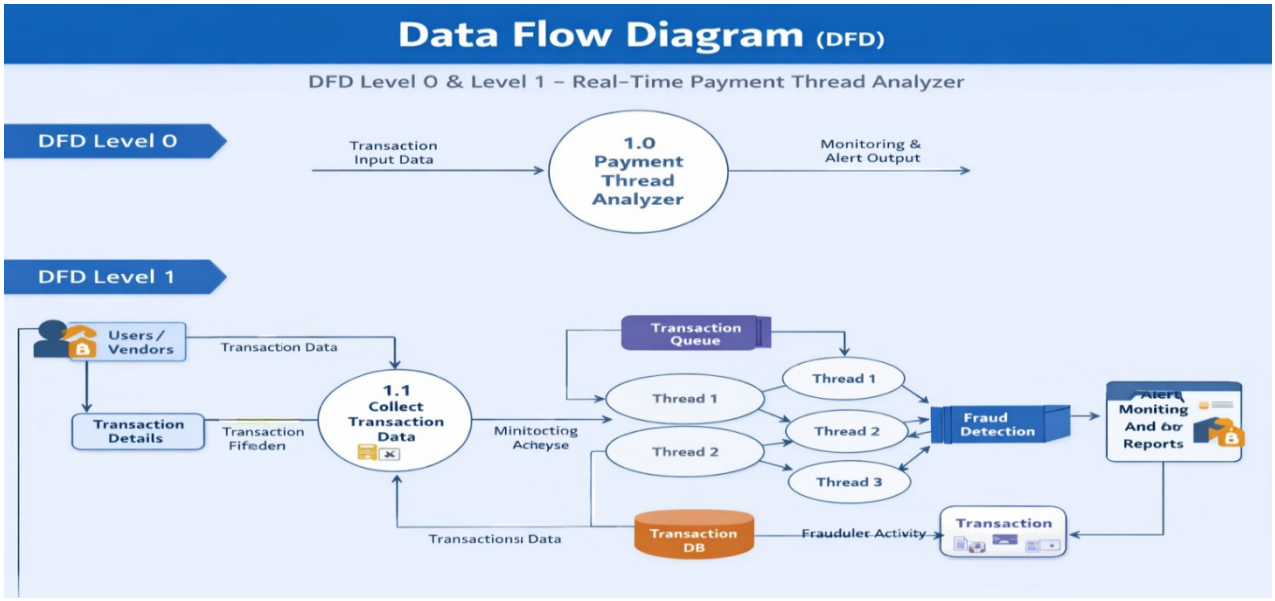
The System Architecture of the Real-Time Payment Thread Analyzer describes how the entire system is structured to efficiently monitor digital payment transactions, analyze processing threads, detect fraudulent activities, and present insights through dashboards and alerts. The architecture is designed using a layered approach to ensure modularity, scalability, and high performance. It is divided into multiple layers such as the data generation layer, data ingestion layer, processing layer, thread analysis layer, fraud detection layer, storage layer, and visualization layer, where each layer performs a specific function in the overall workflow.

The first layer is the data generation layer, which is responsible for generating or collecting transaction data. This data may come from real-time payment systems such as UPI platforms, banking systems, or simulated transaction generators. Each transaction contains detailed attributes such as transaction ID, user ID, transaction amount, payment method, timestamp, device type, IP address, geographic location, and transaction status. This layer ensures continuous data flow into the system, mimicking real-world payment environments where thousands of transactions occur every second.

SYSTEM ARCHITECTURE DIAGRAM



DATA FLOW DIAGRAM



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CONCLUSION

The Real-Time Payment Thread Analyzer project is developed to provide an advanced and reliable solution for monitoring, analyzing, and improving the overall performance of modern digital payment systems. In today's world, online payment methods such as UPI, debit card, credit card, net banking, and mobile wallets have become an essential part of daily transactions for both personal and business needs. Due to the rapid growth of digital payments, financial institutions and payment gateways are required to process millions of transactions every day with high speed, high accuracy, and maximum security. Users expect instant confirmation, error-free processing, and smooth transaction flow without delays. However, real-time payment systems often face major challenges such as transaction delay, payment pending issues, server overload, network interruptions, thread congestion, duplicate transactions, and frequent transaction failures. These problems create a negative experience for customers and reduce trust in digital payment platforms. Therefore, the proposed system plays a significant role in improving transaction reliability, customer satisfaction, and operational efficiency.

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