
Informatics

Semester 4

# Distributed Systems Architecture Assignment I

**TEAM:**
Jaime Gracia Gil
Samir Ibrahimov

Teacher :

Rubén Ruiz Torrubiano

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# 1 Introduction

This project presents a fraud detection system architecture for banking applications, designed to ensure secure authentication, real-time fraud detection, and efficient notifications. Built on a microservices approach, our system processes transactions asynchronously, detects suspicious activities, and alerts bank personnel instantly.

# 2 Architecture Explanation

## 2.1 Principle actors

Bank Employees: Agents in charge of credit card fraud detection.

System Administrators: They manage and supervise the system.

## 2.2 Components

Web User Interface: This is the front-end where bank employees and system administrators interact with the system. They can access transaction data, review fraud alerts, and manage security settings

API Gateway: It acts as the main entry point for all requests. It ensures that incoming data is properly routed to the correct services while adding an extra layer of security.

Orchestrator Service: This is the brain of our system, managing the flow of information between different services. It helps coordinate authentication, fraud detection, and notifications efficiently.

User Authentication Service: Before accessing the system, users must authenticate through this service. It verifies credentials by checking the Customer Database, ensuring only authorized personnel can log in

Customer Database: This stores user information, it’s essential for authentication and user management.

Event Queue: Every transaction or suspicious activity generates an event, which is sent to the Event Queue. This helps process data asynchronously and ensures our system remains responsive even under heavy loads. E.g. Kafka

Fraud Detection Service: It analyzes transaction data using advanced algorithms stored in the Model Database to detect fraudulent patterns in real time.

Model Database: – This contains the fraud detection models, continuously updated with new data to improve accuracy.

Notification service: If fraudulent activity is detected, this service immediately notifies the bank employees and system administrators, allowing them to take quick action to prevent financial losses.

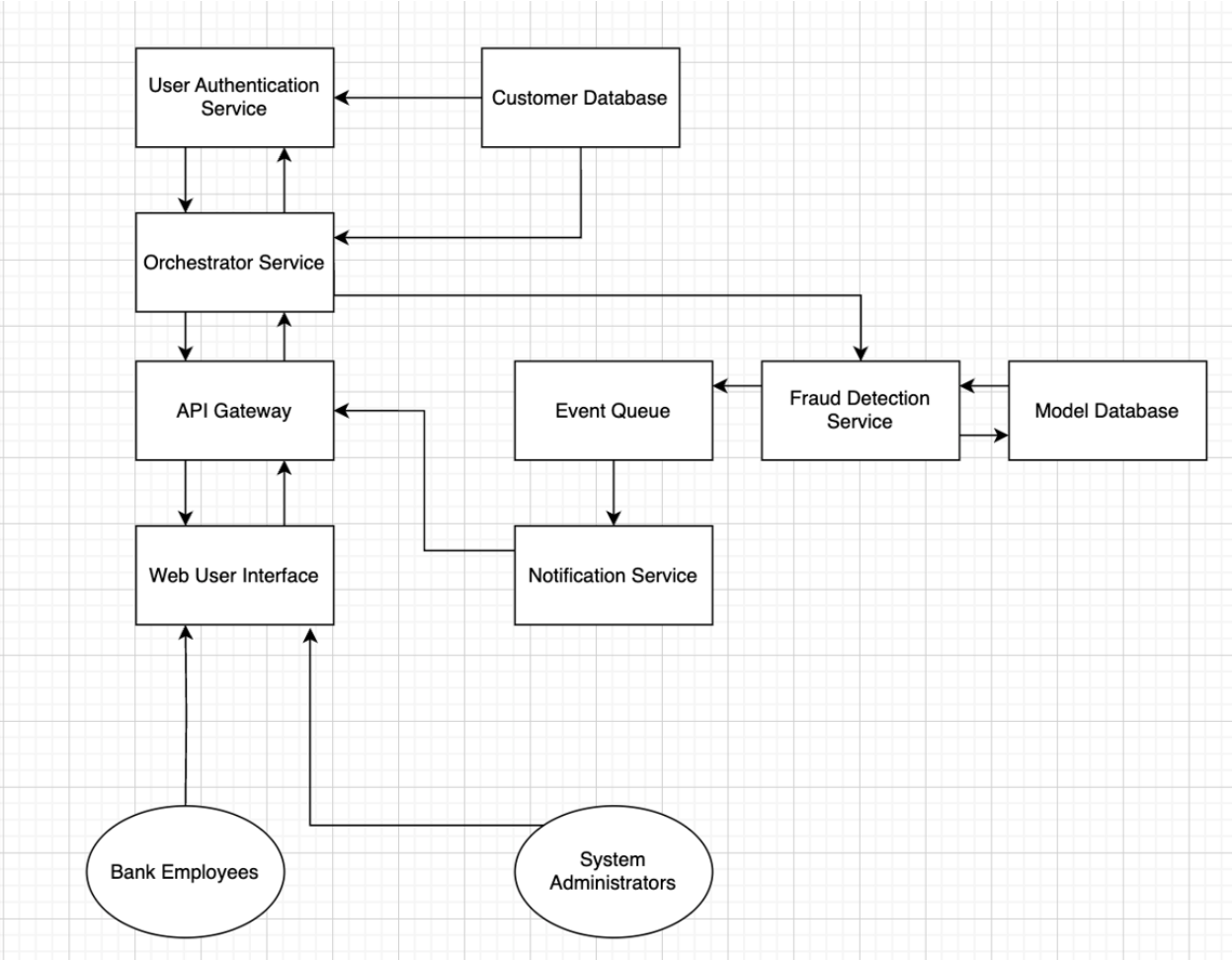


*Figure 1 – Architecture*