

Introduction

- **Title:** Public Transport Fare Collection and Management System
Subtitle:
- **Presented by:** JoyAnn Wairimu Mwangi
- **Reg. No:** 23/05024
- **Supervisor:** Charles Malungu
- **Metro Trans Investments Ltd**

Project Overview

- The Public Transport Fare Collection and Management System aims to:
- Enhance revenue security and reduce fraud.
- Improve operational efficiency through digital fare collection.
- Replace manual cash handling with a secure, real-time system.

Objectives

- To automate fare collection and eliminate revenue leakages.
- Provide secure transactions via MPesa, QR codes, and NFC.
- Improve financial transparency and customer trust.

Scope

- **In-Scope Features:**

- Cashless payments via MPesa, QR codes, NFC.
- Real-time transaction monitoring for fraud detection.
- Secure user authentication for passengers, touts, and administrators.
- Transaction logging & financial reporting for management.

- **Out-of-Scope:**

- Physical infrastructure modifications in buses.
- AI-driven predictive analytics (future enhancement).

Functional Requirements

- User Authentication: Secure login for different roles.
- Fare Payment System: Supports MPesa, QR codes, and NFC payments.
- Transaction Monitoring: Real-time tracking & reporting.
- Fraud Prevention: Alerts & anomaly detection for suspicious transactions.
- User Management: Admin controls for system access & roles.

Non-Functional Requirements

- Security: AES encryption and multi-factor authentication.
- Performance: Transactions processed in under 2 seconds.
- Scalability: System must support 10,000+ concurrent users.
- Reliability: 99.9% uptime with failover mechanisms.
- Usability: Responsive mobile & web interfaces.

External Interfaces

- Payment API Integration: MPesa API for digital transactions.
- Database: MySQL for secure storage of fare transactions.
- Web & Mobile Interaction: RESTful APIs for system communication.
- Hardware Integration: QR/NFC scanners for fare validation.

Validation and Verification

- Unit Testing: Ensure individual components work correctly.
- User Acceptance Testing (UAT): Trial run with Metro Trans staff.
- Security Testing: Penetration tests to prevent fraud.
- Performance Testing: Ensure real-time fare processing without delays

Acceptance Criteria

- For the system to be considered complete, it must:
Process 100% accurate fare transactions.
- Prevent unauthorized fare reversals and fraudulent payment
- Provide a real-time monitoring dashboard for management.
- Ensure secure user authentication & access control.
- Be fully compliant with local financial transaction laws.