A diagram of a software process

AI-generated content may be incorrect.

Image 1. Use Case Diagram – Public Transit Fleet Management System

Use case Diagram Description

**User Registration**

Actor(s): Operator, Transit Manager

Pre-condition: The user is not yet registered in the system.

Main Flow:

* 1. The user provides name, email, password, and role.
  2. The system validates and registers the user.

Alternative Flow:

* 1. If the email is already used or input is invalid, an error is shown.

Post-condition: The user is registered and ready for authentication.

**Authentication**

Actor(s): Operator, Transit Manager

Pre-condition: User account exists.

Main Flow:

* 1. The user enters credentials.
  2. System verifies the credentials.
  3. User gains access to system functionalities based on role.

Alternative Flow:

* 1. Wrong credentials result in access denial.

Post-condition: The user is logged in.

**GPS Tracking**

Actor(s): Transit Manager

Pre-condition: Vehicles must be registered in the system.

Main Flow:

* 1. GPS location is updated in real time.
  2. Transit Manager views vehicle movements.

Post-condition: Vehicle positions are stored and shown in the dashboard.

**Fuel/Energy Monitoring**

Actor(s): Operator

Pre-condition: GPS and fuel sensor data are available.

Main Flow:

* 1. Fuel/energy usage is recorded.
  2. Efficiency data is logged and displayed.

Alternative Flow:

* 1. Missing or corrupted fuel data prompts estimated values.

Post-condition: Updated monitoring data available for reporting and alerts.

**Fuel/Energy Alerts**

Actor(s): Operator

Pre-condition: Fuel/Energy consumption exceeds threshold.

Main Flow:

* 1. The system detects abnormal usage.
  2. An alert is triggered for the Operator.

Alternative Flow:

* 1. False positives can be dismissed by Operator.

Post-condition: Alerts are logged and acted upon.

**Operator Bus Stop Logging**

Actor(s): Operator

Pre-condition: The vehicle is on an active route.

Main Flow:

* 1. Operator logs arrival/departure at stops.
  2. Data is stored for analytics and performance tracking.

Alternative Flow:

* 1. System estimates timing using GPS if Operator forgets to log.

Post-condition: Accurate timing data is recorded.

**Route Management**

Actor(s): Transit Manager

Pre-condition: Routes must be defined in the database.

Main Flow:

* 1. Transit Manager assigns vehicles to routes.
  2. Changes are saved and propagated to Operators.

Alternative Flow:

* 1. Invalid route data leads to error messages.

Post-condition: Updated route assignments.

**Timestamp Tracking**

Actor(s): Operator

Pre-condition: Operator is authenticated.

Main Flow:

* 1. Operator logs in/out or punches in/out.
  2. Timestamps are saved.

Alternative Flow:

* 1. Missed timestamps can be manually corrected by an admin.

Post-condition: Attendance and time data is available.

**Timestamp Alert**

Actor(s): System (initiated internally)

Pre-condition: Timestamp data is abnormal (e.g., missed punch or late).

Main Flow:

* 1. System detects irregular timestamp pattern.
  2. Alert is generated to notify Operator or Admin.

Alternative Flow:

* 1. Alerts may be ignored by configuration.

Post-condition: Alert is acknowledged or resolved.

**Maintenance Request**

Actor(s): Transit Manager

Pre-condition: A vehicle requires servicing.

Main Flow:

* 1. Request is forwarded to Transit Manager for approval and scheduling.

Alternative Flow:

* 1. Request is rejected or delayed due to availability.

Post-condition: Maintenance task is queued or scheduled.

**Predictive Maintenance**

Actor(s): Transit Manager

Pre-condition: System has wear/use data.

Main Flow:

* 1. System evaluates wear and diagnostics.
  2. Upcoming maintenance is forecasted.

Alternative Flow:

* 1. Unexpected failures still require manual handling.

Post-condition: Maintenance tasks are triggered in advance.

**Reporting & Analytics**

Actor(s): Transit Manager

Pre-condition: System contains collected operational data.

Main Flow:

* 1. Transit Manager chooses report type (fuel, performance, costs).
  2. System generates and displays/export the report.

Alternative Flow:

* 1. No data = empty or error message.

Post-condition: Report is saved, exported, or reviewed.