**Bus management**

**User cases**

1. Passenger (View Bus Schedule; Receive Notifications)

a. Primary Actor: Passenger

Goal: To view the schedule of buses.

Preconditions: The passenger is logged into the system.

Main Success Scenario:

- The passenger selects the “View Schedule” option.

- The system prompts the passenger to enter the desired route or bus number.

- The passenger enters the route or bus number.

- The system displays the schedule for the selected route or bus.

- The passenger reviews the schedule and plans their travel accordingly.

b. Primary Actor: Passenger

Goal: To receive notifications about bus status.

Preconditions: The passenger has an active booking and is logged into the system.

Main Success Scenario:

- The system monitors the status of the booked bus.

- The system detects any changes or delays in the bus schedule.

- The system sends notifications to the passenger about the status changes.

- The passenger receives the notifications and adjusts their plans accordingly.

c. Primary Actor: Passenger

Goal: To receive notifications about remaining amount in account.

Preconditions: The passenger has an active booking and is logged into the system.

Main Success Scenario:

- The system monitors the status of the remaining amount in account.

- The system detects any changes in the bus account.

- The system sends notifications to the passenger about the status changes.

- The passenger receives the notifications and adjusts their account accordingly.

**1. Book Ticket**

* **Description**: The passenger selects a route and books a ticket for their trip.
* **Actors**: Passenger
* **Preconditions**: Passenger has selected a route and there are available seats.
* **Main Flow**:
  1. Passenger selects the desired route and date.
  2. System checks for seat availability.
  3. Passenger confirms booking details and makes payment.
  4. System generates a ticket and confirms the booking.
* **Postconditions**: Passenger receives a ticket confirmation, and the booking is recorded.

**2. View History**

* **Description**: The passenger views a list of their past bookings and trips.
* **Actors**: Passenger
* **Preconditions**: Passenger is logged into the system.
* **Main Flow**:
  1. Passenger selects the “View Booking History” option.
  2. System displays past bookings and trip details.
* **Postconditions**: Passenger reviews their previous trips and bookings.

**3. Provide Feedback**

* **Description**: The passenger submits feedback or a rating for a completed trip.
* **Actors**: Passenger
* **Preconditions**: Passenger has completed a trip.
* **Main Flow**:
  1. Passenger selects the “Provide Feedback” option.
  2. System prompts for feedback or a rating.
  3. Passenger submits their comments or rating.
* **Postconditions**: Feedback is recorded and sent to administration for review.

2. Driver (View Assigned Routes; Report Maintenance Issues; Receive Real-Time Traffic Updates)

a. Primary Actor: Bus Driver

Goal: To view assigned routes and schedules.

Preconditions: The driver is logged into the system.

Main Success Scenario:

- The driver selects the “View Routes” option.

- The system displays the driver’s assigned routes and schedules.

- The driver reviews the routes and plans their day accordingly.

- The system confirms the routes and schedules to the driver.

b. Primary Actor: Bus Driver

Goal: To report maintenance issues with the bus.

Preconditions: The driver is logged into the system.

Main Success Scenario:

- The driver selects the “Report Issue” option.

- The system prompts the driver to enter details about the maintenance issue.

- The driver enters the issue details and submits the report.

- The system logs the issue and notifies the maintenance team.

- The system confirms the report submission to the driver.

c. Primary Actor: Bus Driver

Goal: To receive real-time traffic updates.

Preconditions: The driver is logged into the system and the bus is equipped with GPS.

Main Success Scenario:

- The driver starts their route and the system activates real-time traffic monitoring.

- The system detects traffic conditions and provides updates to the driver.

- The driver receives notifications about traffic delays or alternative routes.

- The driver adjusts their route based on the updates to ensure timely arrival.

- The system logs the traffic updates and route adjustments.

**1.Check In**

* **Description**: The driver marks the start of their shift to indicate they are ready to begin their assigned route.
* **Actors**: Driver
* **Preconditions**: Driver is logged into the system and assigned to a route.
* **Main Flow**:
  1. Driver selects the “Check In” option.
  2. System records the driver’s check-in time.
* **Postconditions**: Driver is marked as available for their shift.

**2. Report Issues**

* **Description**: The driver reports any mechanical or operational issues with the bus that may affect its performance or safety.
* **Actors**: Driver
* **Preconditions**: Driver is logged into the system and is in possession of a bus.
* **Main Flow**:
  1. Driver selects the “Report Issue” option.
  2. System prompts the driver to describe the issue.
  3. Driver submits the issue details.
  4. System logs the issue and notifies administration.
* **Postconditions**: The issue is reported, and administration is alerted.

**3. Complete Trip**

* **Description**: The driver marks the trip as completed once they reach the final destination, updating the system with the trip status.
* **Actors**: Driver
* **Preconditions**: Driver has completed their route.
* **Main Flow**:
  1. Driver selects the “Complete Trip” option.
  2. System updates the status of the trip to completed.
* **Postconditions**: Trip status is updated, and the system reflects that the route has been finished.

3. Administrator (Manage Bus Schedules; Monitor System Performance; Manage User Accounts)

a. Primary Actor: Administrator

Goal: To create and update bus schedules.

Preconditions: The administrator is logged into the system.

Main Success Scenario:

- The administrator selects the “Manage Schedules” option.

- The system displays the current bus schedules.

- The administrator adds, updates, or deletes schedules as needed.

- The system saves the changes and updates the schedule database.

- The system confirms the changes to the administrator.

b. Primary Actor: Administrator

Goal: To monitor the performance of the bus management system.

Preconditions: The administrator is logged into the system.

Main Success Scenario:

- The administrator selects the “System Performance” option.

- The system displays performance metrics such as bus punctuality, driver performance, and passenger feedback.

- The administrator reviews the metrics and identifies any issues.

- The administrator takes necessary actions to resolve identified issues.

- The system logs the actions taken by the administrator.

c. Primary Actor: Administrator

Goal: To manage user accounts for passengers and drivers.

Preconditions: The administrator is logged into the system.

Main Success Scenario:

- The administrator selects the “Manage User Accounts” option.

- The system displays a list of current user accounts.

- The administrator adds, updates, or deletes user accounts as needed.

- The system saves the changes and updates the user database.

-The system confirms the changes to the administrator.

**1. Assign Drivers**

* **Description**: The administrator assigns drivers to specific routes and shifts.
* **Actors**: Administrator
* **Preconditions**: Administrator is logged into the system and drivers/routes are available.
* **Main Flow**:
  1. Administrator selects the “Assign Drivers” option.
  2. System displays available drivers and routes.
  3. Administrator assigns drivers to specific routes and shifts.
  4. Administrator saves the assignments.
* **Postconditions**: Drivers are assigned to their respective routes and schedules.

**2. View Reports**

* **Description**: The administrator generates and views reports on bus operations, such as route performance, driver performance, and ticket sales.
* **Actors**: Administrator
* **Preconditions**: Administrator is logged into the system.
* **Main Flow**:
  1. Administrator selects the “View Reports” option.
  2. System displays various report categories (e.g., route performance, ticket sales).
  3. Administrator selects the desired report type and generates the report.
  4. Administrator reviews the report data.
* **Postconditions**: Administrator views and analyses operational reports.

**User stories**

1. Passenger (Viewing Bus Schedule; Receiving Notifications)

a. As a passenger, I want to view the bus schedule so that I can plan my travel according to the available bus timings.

b. As a passenger, I want to receive notifications about my bus’s arrival and departure times so that I can be informed of any delays or changes in schedule.

c. As a passenger, I want to view and remaining amount in account so that I can can top-up my account when it is empty.

d. **As a passenger, I want to view my booking history,** so that I can track my past trips and manage future plans.

e. **As a passenger, I want to provide feedback on my trip,** so that I can share my experience and help improve the service.

2. Driver (Viewing Assigned Routes; Reporting Maintenance Issues; Receiving Real-Time Traffic Updates)

a. As a bus driver, I want to view my assigned routes and schedules so that I can plan my day and ensure I am on time for each trip.

b. As a bus driver, I want to report any maintenance issues with the bus so that the maintenance team can address them promptly and ensure the bus is safe to operate.

c. As a bus driver, I want to receive real-time traffic updates so that I can avoid delays and choose the most efficient routes to reach my destinations on time.

d. **As a driver, I want to check in at the start of my shift,** so that the system knows I’m available to drive.

e. **As a driver, I want to mark my trip as completed,** so that the system knows I’ve successfully finished my route.

3. Administrator (Managing Bus Schedules; Monitoring System Performance; Managing User Accounts)

a. As an administrator, I want to create and update bus schedules so that I can ensure all routes are covered and buses run on time.

b. As an administrator, I want to monitor the performance of the bus management system so that I can identify and resolve any issues promptly to maintain smooth operations.

c. As an administrator, I want to manage user accounts for passengers and drivers so that I can ensure only authorized users have access to the system and maintain data security.

D. **As an administrator, I want to generate and view reports,** so that I can monitor bus operations, track performance, and make informed decisions.

e. **As an administrator, I want to manage system alerts and notifications,** so that I can address issues like driver absences or bus breakdowns promptly.

**Functional and Non-functional requirements**

1. Functional Requirements:

These specify what the system must do in terms of features, functionalities, and behaviors. They focus on the system’s behavior and how it responds to user actions.

Examples of functional requirements for a bus management system might include:

- Route Planning: The system should allow users to plan bus routes, including stops, schedules, and connections.

- Ticket Booking: Users should be able to book tickets online or through mobile apps.

- Real-Time Tracking: The system must provide real-time bus tracking for passengers.

- Fare Calculation: Calculate fares based on distance, time, and passenger type.

1. Non-functional requirements (NFRs):

NFRs define the system’s quality attributes, performance standards, and operational constraints. They describe how the system should behave rather than what it should do.

Examples of non-functional requirements for a bus management system include:

- Performance: The system must process transactions within a specified time (e.g., two seconds).

- Security: All sensitive data (e.g., passenger information) should be encrypted.

- Usability: The system should have a user-friendly interface adhering to accessibility standards.

- Reliability: The system must function correctly over time, ensuring availability and fault tolerance.

- Scalability: It should handle increased loads and be expandable for future growth.

- Compliance: Adherence to regulatory, legal, and industry standards.